PROJECT MANUAL

PROJECT/CONTRACT NUMBER: 01-18

Parkway Heights Middle School Modernization, Phase II

SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT

February 16, 2018

QUATTROCCHI KWOK
ARCHITECTS

Project Manual

for the

PARKWAY HEIGHTS MIDDLE SCHOOL MODERNIZATION - PHASE 2

January 25, 2015

DSA File Number: 41-28
DSA Application Number: 01-116522
PTN Number: 69070-97

Owner:
South San Francisco Unified School District
398 B Street
South San Francisco, California 94080

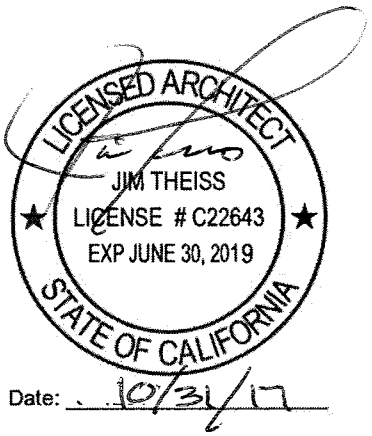
Architect:
Quattrocchi Kwok Architects
636 Fifth Street
Santa Rosa, CA 95404
P: 707.576.0829
F: 707.576.0295

Architect's Project No.: 1277.04

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PROFESSIONAL SEALS AND DSA IDENTIFICATION STAMP

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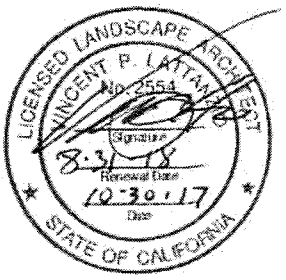


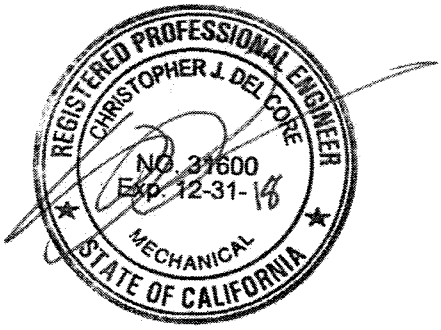
Date: 10/31/17



IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT

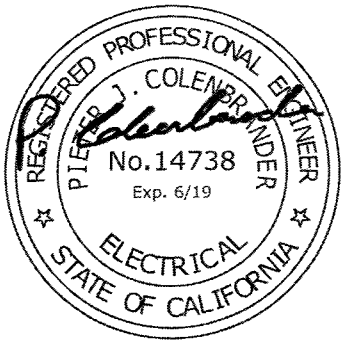
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10-30-2017



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NOTICE TO BIDDERS

1. Notice is hereby given that the governing board ("Board") of the South San Francisco Unified School District ("District") will receive sealed bids for the following project, Bid No. 01-18, ("Project" or "Contract"):

Parkway Heights Middle School Modernization Phase II

2. The Project consists of:

Modernization of a classroom building and sitework.

3. To bid on this Project, the Bidder is required to possess one or more of the following State of California contractors' license(s)**: B**

The Bidder's license(s) must remain active and in good standing throughout the term of the Contract.

4. To bid on this Project, the Bidder is required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code. The Bidder's registration must remain active throughout the term of the Contract.

5. Contract Documents will be available on or after **February 16, 2018**. Contract Documents are available for bidders' review at the Peninsula Builder's Exchange, (650) 591–4486. Plans and specifications can be viewed and downloaded on the District's website at: www.ssfusd.org/mjb Plans and specifications can be purchased directly from ARC, 945 Bryant St. San Francisco, CA 94103 and electronically on Planwell from ARC. Phone (415)-537-2200. www.e-arc.com Reference SSFUSD Project No. 01-18, Parkway Heights Middle School Modernization Phase II.

6. Sealed bids will be received until **2:00 p.m., March 27, 2018,** at the District Facilities Office, 634 El Camino, South San Francisco, California 94080, at or after which time the bids will be opened and publicly read aloud. Any bid that is submitted after this time shall be nonresponsive and returned to the bidder. Any claim by a bidder of error in its bid must be made in compliance with section 5100 et seq. of the Public Contract Code.

7. Pursuant to Public Contract Code section 20111.6, only prequalified bidders will be eligible to submit a bid for contracts $1 million or more using or planning to use state bond funds. Any bid submitted by a bidder who is not prequalified shall be non-responsive and returned unopened to the bidder. Moreover, any bid listing subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 or C-46 licenses, if used, who have not been prequalified, shall be deemed nonresponsive and will not be considered.

8. All bids shall be on the form provided by the District. Each bid must conform and be responsive to all pertinent Contract Documents, including, but not limited to, the Instructions to Bidders.

9. A bid bond by an admitted surety insurer on the form provided by the District, cash, or a cashier's check or a certified check, drawn to the order of the South San Francisco Unified School District, in the amount of ten percent (10%) of the total bid price, shall accompany the Bid Form and Proposal, as a guarantee that the Bidder will, within seven (7) calendar days after the date of the Notice of Award, enter into a contract with the District for the performance of the services as stipulated in the bid.

10. A mandatory pre-bid conference and site visit will be held on February 22, 2018 and March 1, 2018, at 10:00 a.m., at Parkway Heights Middle School, 650 Sunset Avenue, South San Francisco, California. All participants are required to sign in front of the project classroom building. The site visit is expected to take approximately 1 (one) hour. Failure to attend or tardiness to one of the site visits will render bid ineligible.

11. The successful Bidder shall be required to furnish a 100% Performance Bond and a 100% Payment Bond if it is awarded the Contract for the Work.

12. The successful Bidder may substitute securities for any monies withheld by the District to ensure performance under the Contract, in accordance with the provisions of section 22300 of the Public Contract Code.

13. The successful bidder will be required to certify that it either meets the Disabled Veteran Business Enterprise ("DVBE") goal of three percent (3%) participation or made a good faith effort to solicit DVBE participation in this Contract if it is awarded the Contract for the Work.

14. The Contractor and all Subcontractors under the Contractor shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to section 1770 et seq. of the California Labor Code. Prevailing wage rates are also available from the District or on the Internet at: <http://www.dir.ca.gov>.

15. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and subject to the requirements of Title 8 of the California Code of Regulations. The Contractor and all Subcontractors under the Contractor shall furnish electronic certified payroll records directly to the Labor Commissioner weekly and within ten (10) days of any request by the District or the Labor Commissioner. The successful Bidder shall comply with all requirements of Division 2, Part 7, Chapter 1, Articles 1-5 of the Labor Code.

16. The District has entered into a Project Labor Agreement that is applicable to this Project. For questions or assistance concerning the Project Labor Agreement, contact Bill Savidge, bsavidge@ssfusd.org and/or Victoria Vargas at vmvargas@ssfusd.org.

17. The District's Board has found and determined that the following item(s) shall be used on this Project based on the purpose(s) indicated. (Public Contract Code

section 3400(c).) A particular material, product, thing, or service is designated by specific brand or trade name for the following purpose(s):

(1) In order to match other products in use on a particular public improvement either completed or in the course of completion:

a. Door Hardware: Schlage/ Ingersoll Rand product
b. EMS systems: Alerton/Honeywell Industries
c. Telephone system: CiscoCallManager
d. Security Control Pads and Equipment: Sonitrol
e. Security Door Contacts:Sonitrol
f. Security Card Readers: HID Global
g. Fire Detection and Alarm: Siemens, AG

18. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on:

A. The base bid amount plus the following alternates:

1. Additive alternate: Site work at quad as delineated in the drawings.

19. The Board reserves the right to reject any and all bids and/or waive any irregularity in any bid received. If the District awards the Contract, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

END OF DOCUMENT

DOCUMENT 00 21 13

INSTRUCTIONS TO BIDDERS

Bidders shall follow the instructions in this document, and shall submit all documents, forms, and information required for consideration of a bid.

South San Francisco Unified School District ("District") will evaluate information submitted by the apparent low Bidder and, if incomplete or unsatisfactory to District, Bidder's bid may be rejected at the sole discretion of District.

1. Bids are requested for a general construction contract, or work described in general, for the following project ("Project" or "Contract"):

   Parkway Heights Middle School Modernization Phase II, Project No. 01-18

2. A Bidder and its subcontractors must possess the appropriate State of California contractors' license and must maintain the license throughout the duration of the project. Bidders must also be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code. Bids submitted by a contractor who is not properly licensed or registered shall be deemed nonresponsive and will not be considered.

3. The District has prequalified bidders pursuant to Public Contract Code section 20111.6 for contracts $1 million or more using or planning to use state bond funds. Only prequalified bidders will be eligible to submit a bid for this Project. Any bid submitted by a bidder who is not prequalified shall be deemed nonresponsive and will not be considered. Moreover, any bid listing subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 or C-46 licenses, if used, who have not been prequalified, shall be deemed nonresponsive and will not be considered.

4. District will receive sealed bids from bidders as stipulated in the Notice to Bidders.

   a. All bids must be sealed in an envelope, marked with the name and address of the Bidder, name of the Project, the Project Number and/or bid number, and time of bid opening.

   b. Bids must be submitted to the Facilities Office, 634 El Camino Real, South San Francisco, CA 94080, by date and time shown in the Notice to Bidders.

   c. Bids must contain all documents as required herein.

5. Bidders are advised that on the date that bids are opened, telephones will not be available at the District Offices for use by bidders or their representatives.

6. Bids will be opened at or after the time indicated for receipt of bids.

7. Bidders must submit bids on the documents titled Bid Form and Proposal, and must submit all other required District forms. Bids not submitted on the District's required forms shall be deemed nonresponsive and shall not be considered. Additional sheets required to fully respond to requested information are permissible.

8. Bidders shall not modify the Bid Form and Proposal or qualify their bids. Bidders shall not submit to the District a re-formatted, re-typed, altered, modified, or otherwise recreated version of the Bid Form and Proposal or other District-provided document.

9. Bids shall be clearly written and without erasure or deletions. District reserves the right to reject any bid containing erasures, deletions, or illegible contents.

10. Bidders must supply all information required by each Bid Document. Bids must be full and complete. District reserves the right in its sole discretion to reject any bid as nonresponsive as a result of any error or omission in the bid. Bidders must complete and submit all of the following documents with the Bid Form and Proposal:

    a. Bid Bond on the District's form, or other security.

    b. Designated Subcontractors List.

    c. Site Visit Certification, if a site visit was required.

    d. Non-Collusion Declaration.

    e. Iran Contracting Act Certification, if contract value is $1,000,000 or more.

    f. OCIP Insurance forms

11. Bidders must submit with their bids cash, a cashier's check or a certified check payable to District, or a bid bond by an admitted surety insurer of not less than ten percent (10%) of amount of Base Bid, plus all additive alternates ("Bid Bond"). If Bidder chooses to provide a Bid Bond as security, Bidder must use the required form of corporate surety provided by District. The Surety on Bidder's Bid Bond must be an insurer admitted in the State of California and authorized to issue surety bonds in the State of California. Bids submitted without necessary bid security will be deemed nonresponsive and will not be considered.

12. If Bidder to whom the Contract is awarded fails or neglects to enter into the Contract and submit required bonds, insurance certificates, and all other required documents, within **SEVEN (7)** calendar days after the date of the Notice of Award, District may deposit Bid Bond, cash, cashier's check, or certified check for collection, and proceeds thereof may be retained by District as liquidated damages for failure of Bidder to enter into Contract, in the sole discretion of District. It is agreed that calculation of damages District may suffer as a result of Bidder's failure to enter into the Contract would be extremely difficult and impractical to determine and that the amount of the Bidder's required bid security shall be the agreed and conclusively presumed amount of damages.

13. Bidders must submit with the bid the Designated Subcontractors List for those subcontractors who will perform any portion of Work, including labor, rendering of service, or specially fabricating and installing a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of total bid. Failure to submit this list when required by law shall result in bid being deemed nonresponsive and the bid will not be considered.

14. All of the listed subcontractors are required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code.

    a. An inadvertent error in listing the California contractor license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.

    b. An inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:

        (1) The subcontractor is registered prior to the bid opening.

        (2) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.

        (3) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.

15. If a mandatory pre-bid conference and site visit ("Site Visit") is required as referenced in the Notice to Bidders, then Bidders must submit the Site Visit Certification with their Bid. District will transmit to all prospective Bidders of record such Addenda as District in its discretion considers necessary in response to questions arising at the Site Visit. Oral statements shall not be relied upon and will not be binding or legally effective. Addenda issued by the District as a result of the Site Visit, if any, shall constitute the sole and exclusive record and statement of the results of the Site Visit.

16. Bidders shall submit the Non-Collusion Declaration with their bids. Bids submitted without the Non-Collusion Declaration shall be deemed nonresponsive and will not be considered.

17. The Contractor and all Subcontractors under the Contractor shall pay all workers on all work performed pursuant to the Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the Department of Industrial Relations, are available upon request at the District's principal office. Prevailing wage rates are also available on the internet at http://www.dir.ca.gov.

18. The District has entered into a Project Labor Agreement that is applicable to this Project. Project Stabilization Agreement for the South San Francisco School District for the Measure J Bond Improvement Program is attached.

19. Section 17076.11 of the Education Code requires school districts using funds allocated pursuant to the State of California School Facility Program for the construction and/or modernization of school building(s) to have a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended on projects that receive state funding or demonstrate its good faith effort to solicit DVBE participation in this Contract. In order to meet this requirement by demonstrating a good faith effort, Bidder must advertise for DVBE-certified subcontractors and suppliers before submitting its Bid. For any project that is at least partially state-funded, the lowest responsive responsible Bidder awarded the Contract must submit certification of compliance with the procedures for implementation of DVBE contracting goals with its signed Agreement. DVBE Certification form is attached. Do not submit this form with your Bid. Submit forms within four (4) days after Notice of Award

20. Submission of bid signifies careful examination of Contract Documents and complete understanding of the nature, extent, and location of Work to be performed. Bidders must complete the tasks listed below as a condition to bidding, and submission of a bid shall constitute the Bidder's express representation to District that Bidder has fully completed the following:

    a. Bidder has visited the Site, if required, and has examined thoroughly and understood the nature and extent of the Contract Documents, Work, Site, locality, actual conditions, as-built conditions, and all local conditions and federal, state and local laws, and regulations that in any manner may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto;

    b. Bidder has conducted or obtained and has understood all examinations, investigations, explorations, tests, reports, and studies that pertain to the subsurface conditions, as-built conditions, underground facilities, and all other physical conditions at or contiguous to the Site or otherwise that may affect the cost, progress, performance, or furnishing of Work, as Bidder considers necessary for the performance or furnishing of Work at the Contract Sum, within the Contract Time, and in accordance with the other terms and conditions of Contract Documents, including specifically the provisions of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies, or similar information or data are or will be required by Bidder for such purposes;

    c. Bidder has correlated its knowledge and the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents;

    d. Bidder has given the District prompt written notice of all conflicts, errors, ambiguities, or discrepancies that it has discovered in or among the Contract Documents and the actual conditions, and the written resolution(s) thereof by the District is/are acceptable to Bidder;

    e. Bidder has made a complete disclosure in writing to the District of all facts bearing upon any possible interest, direct or indirect, that Bidder believes any

representative of the District or other officer or employee of the District presently has or will have in this Contract or in the performance thereof or in any portion of the profits thereof;

f. Bidder must, prior to bidding, perform the work, investigations, research, and analysis required by this document and that Bidder represented in its Bid Form and Proposal and the Agreement that it performed prior to bidding. Contractor under this Contract is charged with all information and knowledge that a reasonable bidder would ascertain from having performed this required work, investigation, research, and analysis. Bid prices must include entire cost of all work "incidental" to completion of the Work.

g. Conditions Shown on the Contract Documents: Information as to underground conditions, as-built conditions, or other conditions or obstructions, indicated in the Contract Documents, e.g., on Drawings or in Specifications, has been obtained with reasonable care, and has been recorded in good faith. However, District only warrants, and Bidder may only rely, on the accuracy of limited types of information.

(1) As to above-ground conditions or as-built conditions shown or indicated in the Contract Documents, there is no warranty, express or implied, or any representation express or implied, that such information is correctly shown or indicated. This information is verifiable by independent investigation and Bidder is required to make such verification as a condition to bidding. In submitting its Bid, Bidder shall rely on the results of its own independent investigation. In submitting its Bid, Bidder shall not rely on District-supplied information regarding above-ground conditions or as-built conditions.

(2) As to any subsurface condition shown or indicated in the Contract Documents, Bidder may rely only upon the general accuracy of actual reported depths, actual reported character of materials, actual reported soil types, actual reported water conditions, or actual obstructions shown or indicated. District is not responsible for the completeness of such information for bidding or construction; nor is District responsible in any way for any conclusions or opinions that the Bidder has drawn from such information; nor is the District responsible for subsurface conditions that are not specifically shown (for example, District is not responsible for soil conditions in areas contiguous to areas where a subsurface condition is shown).

h. Conditions Shown in Reports and Drawings Supplied for Informational Purposes: Reference is made to the document entitled Geotechnical Data, and the document entitled Existing Conditions, for identification of:

(1) Subsurface Conditions: Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by Architect in preparing the Contract Documents; and

(2) Physical Conditions: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to

the Site that has been utilized by Architect in preparing the Contract Documents.

(3) These reports and drawings are **not** Contract Documents and, except for any "technical" data regarding subsurface conditions specifically identified in Geotechnical Data and Existing Conditions, and underground facilities data, Bidder may not in any manner rely on the information in these reports and drawings. Subject to the foregoing, Bidder must make its own independent investigation of all conditions affecting the Work and must not rely on information provided by District.

21. Bids shall be based on products and systems specified in Contract Documents or listed by name in Addenda. Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Bidder may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified. The District is not responsible and/or liable in any way for a Contractor's damages and/or claims related, in any way, to that Contractor's basing its bid on any requested substitution that the District has not approved in advance and in writing. Contractors and materials suppliers who submit requests for substitutions prior to the award of the Contract must do so in writing and in compliance with Public Contract Code section 3400. All requests must comply with the following:

a. District must receive any notice of request for substitution of a specified item a minimum of **TEN (10)** calendar days prior to bid opening. The Successful Bidder will not be allowed to substitute specified items unless properly noticed.

b. Within 35 days after the date of the Notice of Award, the Successful Bidder shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the Specifications. Insufficient information shall be grounds for rejection of substitution.

c. Approved substitutions, if any, shall be listed in Addenda. District reserves the right not to act upon submittals of substitutions until after bid opening.

d. Substitutions may be requested after Contract has been awarded only if indicated in and in accordance with requirements specified in the Special Conditions and the Specifications.

22. Bidders may examine any available "as-built" drawings of previous work by giving District reasonable advance notice. District will not be responsible for accuracy of "as-built" drawings. The document entitled Existing Conditions applies to all supplied "as-built" drawings.

23. All questions about the meaning or intent of the Contract Documents are to be directed via email to the District to Victoria Vargas. Interpretations or clarifications considered necessary by the District in response to such questions will be issued in

writing by Addenda and emailed, faxed, mailed, or delivered to all parties recorded by the District as having received the Contract Documents or posted on the District's website at http://www.ssfusd.org/mjb. Questions received less than **SEVEN (7)** calendar days prior to the date for opening bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

24. Addenda may also be issued to modify other parts of the Contract Documents as deemed advisable by the District.

25. Each Bidder must acknowledge each Addendum in its Bid Form and Proposal by number or its Bid shall be considered non-responsive. Each Addendum shall be part of the Contract Documents. A complete listing of Addenda may be secured from the District.

26. This Contract may include alternates. Alternates are defined as alternate products, materials, equipment, systems, methods, or major elements of the construction that may, at the District's option and under terms established in the Contract and pursuant to section 20103.8 of the Public Contract Code, be selected for the Work.

27. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on the criteria as indicated in the Notice to Bidders. In the event two or more responsible bidders submit identical bids, the District shall select the Bidder to whom to award the Contract by lot.

28. Time for Completion: District may issue a Notice to Proceed within **NINETY (90)** days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.

    a. In the event that the District desires to postpone issuing the Notice to Proceed beyond this 90-day period, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed.

    b. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed beyond a 90-day period. If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to the Contractor, the Contractor may terminate the Contract. Contractor's termination due to a postponement beyond this 90-day period shall be by written notice to District within **TEN (10)** calendar days after receipt by Contractor of District's notice of postponement.

    c. It is further understood by the Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement and which the District had in writing authorized Contractor to perform prior to issuing a Notice to Proceed.

d. Should the Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.

29. The Bidder to whom Contract is awarded shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7th)** calendar day following the date of the Notice of Award. Failure to properly and timely submit these documents entitles District to reject the bid as nonresponsive.

a. Agreement: To be executed by successful Bidder. Submit four (4) copies, each bearing an original signature.

b. Escrow of Bid Documentation: This must include all required documentation. See the document titled Escrow Bid Documentation for more information.

c. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

d. Payment Bond (Contractor's Labor and Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

e. Insurance Certificates and Endorsements as required.

f. Workers' Compensation Certification.

g. Prevailing Wage and Related Labor Requirements Certification.

h. Disabled Veteran Business Enterprise Participation Certification.

i. Drug-Free Workplace Certification.

j. Tobacco-Free Environment Certification.

k. Hazardous Materials Certification.

l. Lead-Based Materials Certification.

m. Imported Materials Certification.

n. Criminal Background Investigation/Fingerprinting Certification.

o. Buy American Certification.

p. Registered Subcontractors List: Must include Department of Industrial Relations (DIR) registration number of each subcontractor for all tiers.

30. Any bid protest by any Bidder regarding any other bid must be submitted in writing to the District, before 5:00 p.m. of the **THIRD (3rd)** business day following bid opening.

a. Only a Bidder who has actually submitted a bid, and who could be awarded the Contract if the bid protest is upheld, is eligible to submit a bid protest. Subcontractors are not eligible to submit bid protests. A Bidder may not rely on the bid protest submitted by another Bidder.

b. A bid protest must contain a complete statement of any and all bases for the protest and all supporting documentation. Materials submitted after the bid protest deadline will not be considered.

c. The protest must refer to the specific portions of all documents that form the basis for the protest.

(1) Without limitation to any other basis for protest, an inadvertent error in listing the California contractor's license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.

(2) Without limitation to any other basis for protest, an inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:

(i) The subcontractor is registered prior to the bid opening.

(ii) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.

(iii) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.

d. The protest must include the name, address and telephone number of the person representing the protesting party.

e. The party filing the protest must concurrently transmit a copy of the protest and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

f. The procedure and time limits set forth in this paragraph are mandatory and are each bidder's sole and exclusive remedy in the event of bid protest. Failure to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including filing a Government Code Claim or legal proceedings.

31. District reserves the right to reject any or all bids, including without limitation the right to reject any or all nonconforming, nonresponsive, unbalanced, or conditional bids, to re-bid, and to reject the bid of any bidder if District believes that it would not

be in the best interest of the District to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by District. District also reserves the right to waive any inconsequential deviations or irregularities in any bid. For purposes of this paragraph, an "unbalanced bid" is one having nominal prices for some work items and/or enhanced prices for other work items.

32. Discrepancies between written words and figures, or words and numerals, will be resolved in favor of figures or numerals.

33. It is the policy of the District that no qualified person shall be excluded from participating in, be denied the benefits of, or otherwise be subjected to discrimination in any consideration leading to the award of contract, based on race, color, gender, sexual orientation, political affiliation, age, ancestry, religion, marital status, national origin, medical condition or disability. The Successful Bidder and its subcontractors shall comply with applicable federal and state laws, including, but not limited to the California Fair Employment and Housing Act, beginning with Government Code section 12900, and Labor Code section 1735.

34. Prior to the award of Contract, District reserves the right to consider the responsibility of the Bidder. District may conduct investigations as District deems necessary to assist in the evaluation of any bid and to establish the responsibility, including, without limitation, qualifications and financial ability of Bidders, proposed subcontractors, suppliers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to District's satisfaction within the prescribed time.

END OF DOCUMENT

PROGRAM STABILIZATION AGREEMENT FOR THE SOUTH SAN FRANCISCO UNIFIED SCHOOL MEASURE J BOND IMPROVEMENT PROGRAM

INTRODUCTION/FINDINGS

The purpose of this Agreement is to promote efficiency of construction operations during the South San Francisco Unified School District's Measure J Bond Improvement Program ("the Program") and provide for peaceful settlement of labor disputes and grievances without strikes or lockouts, thereby promoting the public interest in assuring the timely and economical completion of the Program.

WHEREAS, the successful completion of the Program is of the utmost importance to the South San Francisco School District; and

WHEREAS, large numbers of workers of various skills will be required in the performance of the construction work, including those to be represented by the unions affiliated with the San Mateo County Building and Construction Trades Council and any other labor organization which is signatory to this Agreement employed by contractors and subcontractors who are signatory to agreements with said labor organizations; and

WHEREAS, it is recognized that on a Program of this magnitude with multiple contractors and bargaining units on the job site at the same time over an extended period of time, the potential for work disruption is substantial without an overriding commitment to maintain continuity of work; and

WHEREAS, the interests of the general public, the District, the Unions and Contractor/Employers would be best served if the construction work proceeded in an orderly manner without disruption because of strikes, sympathy strikes, work stoppages, picketing, lockouts, slowdowns or other interferences with work; and

WHEREAS, the Contractor/Employers and the Unions desire to mutually establish and stabilize wages, hours and working conditions for the workers employed on the Program by the Contractor/Employer(s) and the Union(s) to the end that a satisfactory, continuous and harmonious relationship will exist among the parties to this Agreement; and

WHEREAS, this Agreement is not intended to replace, interfere, abrogate, diminish or modify existing local or national collective bargaining agreements in effect during the duration of the Program, insofar as a legally binding agreement exists between the Contractor/Employer(s) and the affected Union(s) except to the extent that the provisions of this Agreement are inconsistent with said collective bargaining agreements, in which event, the provisions of this Agreement shall prevail; and

WHEREAS, the parties agree that one of the primary purposes of this Agreement is to avoid the tensions that might arise on the Project if union and nonunion workers of different employers were to work side by side on the Project thereby leading to labor disputes that could delay completion of the Project; and

WHEREAS, the contracts for the construction of the Program will be awarded in accordance with the applicable provisions of the California State Public Contract Code; and

WHEREAS, the District has the absolute right to select the lowest reliable and responsible bidder for the award of construction contracts or the "Best Value" submission for Design-Build contracts on the Program; and

WHEREAS, the parties signatory to this Agreement pledge their full good faith and trust to work towards mutually satisfactory completion of the Program;

NOW, THEREFORE, IT IS AGREED BETWEEN AND AMONG THE PARTIES HERETO, AS FOLLOWS:

ARTICLE I
DEFINITIONS

1.1 "Agreement" means this Program Stabilization Agreement

1.2 "District" means the South San Francisco Unified School District.

1.3 "Contractor/Employer(s)" means any individual, firm, partnership or corporation, or combination thereof, including joint ventures, which is an independent business enterprise and has entered into a contract with the District or any of its contractors or subcontractors of any tier, with respect to the construction of any part of the Program under contract terms and conditions approved by the District and which incorporate the Agreement.

1.4 "Construction Contract" means the public works or improvement contracts which have been signed by the District and which are necessary to complete the Program.

1.5 "Program" means the Improvement Program as funded by the South San Francisco Unified School District Measure J Bond Program, and any future projects that the parties may mutually agree to add to this Agreement.

1.6 "Project" is the individual construction Project that is a part of the Program and designated to be covered by this Agreement in Exhibit A and any future addenda to Exhibit A.

1.7 "Union" or "Unions" means the San Mateo County Building and Construction Trades Council, AFL-CIO ("Council") and any other labor organization signatory to this Agreement, acting in their own behalf and on behalf of their respective affiliates and member organization whose names are subscribed hereto and who have through their officers executed this Agreement ("Signatory Unions")

1.8 "Program Manager" means the business entity designated by the District to oversee all phases of construction on the Program and is [NAME OF PROGRAM MANAGER].

1.9 "Master Agreement" means the Master Collective Bargaining Agreement of each craft union signatory hereto.

ARTICLE II
SCOPE OF AGREEMENT

2.1 Parties: The Agreement shall apply and is limited to all Contractors/Employers performing construction contracts on the Project including on-site testing and inspection where such work is traditionally covered by a collective bargaining agreement with a Union, the District and the San Mateo County Building and Construction Trades Council, AFL-CIO ("Council") and any other labor organization signatory to this Agreement, acting in their own behalf and on behalf of their respective affiliates and member organizations whose names are subscribed hereto and who have through their officers executed this Agreement ("Signatory Unions").

2.2 Project Description: Exhibit A, and any future Addenda thereto, attached to this Agreement and incorporated herein by reference, is a list of construction contracts to be covered by this Agreement. The District has the absolute right to combine, consolidate, add, or cancel Project(s) or portion of Project(s) identified as part of the Program. Should the District remove any Project listed in Exhibit A from the Program and thereafter authorize that construction work be commenced on the Project, the Project shall be performed under the terms of the Agreement. Once a

construction Project is completed, it is no longer covered by this Agreement. For the purposes of this Agreement, a construction Project shall be considered completed upon filing of a Notice of Completion.

2.3 Program Labor Disputes: All Program labor disputes involving the application or interpretation of the collective bargaining agreement to which a signatory Contractor/Employer and a Signatory Union are parties shall be resolved pursuant to the resolution procedures of the collective bargaining agreement. All disputes relating to the interpretation or application of the Program Stabilization Agreement shall be subject to resolution by the Grievance Committee and the grievance arbitration procedure set forth herein.

2.4 Covered Work:

2.4.1 This Agreement covers, without limitation, all on-site construction, demolition, alteration, painting or repair of buildings, structures, landscaping, temporary fencing and other works and related activities for a Project that is within the craft jurisdiction of one of the Unions and that is part of the Project, including, without limitation, site preparation, survey work, demolition of existing structures. This scope of work includes all soils and materials testing and inspection where such testing and inspection is a classification as to which a prevailing wage determination has been published.

2.4.2 This Agreement covers all on-site fabrication work over which the District, Contractor(s) or subcontractor(s) possess the right of control (including work done for the Project in any temporary yard or area established for a Project.) This Agreement also covers all off-site fabrication work traditionally performed by the Unions that is part of the Project, provided such off-site fabrication work is covered by a provision of a current Schedule A Agreement or local addenda to a National Agreement of the applicable Union(s).

2.4.3 The furnishing of supplies, equipment or materials which are stockpiled for later use shall in no case be considered subcontracting. Construction trucking work, such as the delivery of ready-mix, asphalt, aggregate, sand or other fill material which are directly incorporated into the construction process as well as the off-hauling of debris and excess fill material and/or mud, shall be covered by the terms and conditions of this Agreement, to the fullest extent provided by law and by prevailing wage determinations of the California Department of Industrial Relations.

2.4.4 Work covered by the Project Stabilization Agreement within the craft jurisdiction of the Elevator Constructors will be performed under the terms of the National Agreement of the International Union of Elevator Constructors except that Articles IV, XII, and XIII of the Program Stabilization Agreement shall prevail and be applied to such work.

2.5 Exclusions:

(1) The Agreement shall be limited to construction work on the Program with Projects listed in Exhibit A and any Addenda thereto and is not intended to, and shall not govern any construction work performed at the District at anytime prior to the effective date, or after the expiration or termination of the Agreement.

(2) The Agreement is not intended to, and shall not affect or govern the award of public works contracts by the District which are outside the approved scope of the Program.

(3) The Agreement is not intended to, and shall not affect the operation or maintenance of the District.

(4) The Agreement shall not apply to a Contractor/Employer's executives, managerial employees, engineering employees, supervisors (except those covered by existing building and construction trades collective bargaining agreements), office and clerical employees.

ARTICLE III
EFFECT OF AGREEMENT

3.1 By executing the Agreement, the Unions and the District agree to be bound by each and all of the provisions of the Agreement.

3.2 By accepting the award of a construction contract for a Project, whether as contractor or subcontractor, the Contractor/Employer agrees to be bound by each and every provision of the Agreement and agrees that it will evidence its acceptance prior to the commencement of work by executing the Letter of Assent in the form attached hereto as Addendum A.

3.3 At the time that any Contractor/Employer enters into a subcontract with any subcontractor providing for the performance of a construction contract, the Contractor/Employer shall provide a copy of this Agreement to said subcontractor and shall require the subcontractor as a part of accepting an award of a construction subcontract to agree in writing to be bound by each and every provision of this

Agreement prior to the commencement of work. If a Contractor/Employer requires a subcontractor to agree in writing to comply with the terms of this Agreement as a condition of awarding work to the subcontractor, the Contractor/Employer shall not be liable in any way for the subcontractor's failure to pay the wages and benefits required by this Agreement except as required by the provisions of the California Labor Code.

3.4 This Agreement shall only be binding on the signatory parties hereto and shall not apply to the parents, affiliates, subsidiaries, or other ventures of any such party.

ARTICLE IV
WORK STOPPAGES, STRIKES, SYMPATHY STRIKES AND LOCKOUTS

4.1 The Unions, District and Contractor/Employers agree that for the duration of the Program:

(1) There shall be no strikes, sympathy strikes, work stoppages, picketing, handbilling or otherwise advising the public that a labor dispute exists, or slowdowns of any kind, for any reason, by the Unions or employees employed on a Project, at the job site of the Program or at any other facility of the District because of a dispute on a Project. If labor is withheld by a Union due to lack of payment to a Trust Fund or failure to meet its payroll on this project, it is not considered a violation of this Article. Disputes arising between the Unions and Contractor/Employers on other District projects are not governed by the terms of the Agreement.

(2) As to employees employed on a Project, there shall be no lockout of any kind by a Contactor/Employer covered by the Agreement.

(3) If a Master Agreement between a Contractor/Employer and the Union expires before the Contractor/Employer completes the performance of a construction contract and the Union or Contractor/Employer gives notice of demands for a new or modified Master Agreement, the Union agrees that it will not strike the Contractor/Employer on said contract for work covered under this Agreement and the Union and the Contractor/Employer agree that the expired collective bargaining agreement shall continue in full force and effect for work covered under this Agreement until a new or modified Master Agreement is reached between the Union and Contract Employer. If the new or modified Master Agreement reached between the Union and Contractor/Employer provides that any terms of compensation of the Master Agreement shall be retroactive, the Contractor/Employer agrees to comply with any retroactive

terms of the new or modified Master Agreement which is applicable to employees employed on a project during the retroactive time period within seven (7) days.

4.2 Any party to this Agreement may institute the following procedure, prior to any other action at law or equity, when a breach of this Article is alleged to have occurred:

(1) A party invoking this procedure shall notify John Kagel, as the permanent arbitrator, or, Tom Angelo, as the alternate under this procedure. In the event that the permanent arbitrator is unavailable to hear the matter at any time within 24 hours, the alternate will be contacted. If neither is available, then a selection shall be made from the list of arbitrators in Article 12.2. Notice to the arbitrator shall be by the most expeditious means available, with notices by facsimile or telephone to the party alleged to be in violation and to the San Mateo Building and Construction Trades Council and involved local Union if a Union is alleged to be in violation.

(2) Upon receipt of said notice, the District will contact the designated arbitrator named above or his alternate who will attempt to convene a hearing within twenty-four (24) hours if it is contended that the violation still exists.

(3) The arbitrator shall notify the parties by facsimile or telephone of the place and time for the hearing. Said hearing shall be completed in one session, which, with appropriate recesses at the arbitrator's discretion, shall not exceed twenty-four (24) hours unless otherwise agreed upon by all parties. A failure of any party to attend said hearings shall not delay the hearing of evidence or the issuance of any award by the arbitrator.

(4) The sole issue at the hearing shall be whether or not a violation of Article IV, Section 4.1 of the Agreement has occurred. The arbitrator shall have no authority to consider any matter of justification, explanation or mitigation of such violation or to award damages, which issue is reserved for court proceedings, if any. The arbitrator's decision as to whether or not a violation has occurred shall be issued in writing within three (3) hours after the close of the hearing, and may be issued without a written opinion. If any party desires a written opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with or enforcement of the award. The arbitrator may order cessation of the violation of this Article and other appropriate relief and such award shall be served on all parties by hand or registered mail upon issuance.

(5) Such award may be enforced by any Court of competent jurisdiction upon the filing of this Agreement and all other relevant documents referred to above in the following manner. Written notice of the filing of such enforcement proceedings shall be given to the other party. In the proceeding to obtain a temporary order enforcing the arbitrator's award as issued under Section 4.2(4) of this Article, all parties waive the right to a hearing and agree that such proceedings may be ex parte (subject to the notice requirements of the selected Court). Such agreement does not waive any party's right to participate in a hearing for a final order or enforcement. The Court's order or orders enforcing the arbitrator's award shall be served on all parties by hand or delivered by certified mail.

(6) Any rights created by statute or law governing arbitration proceedings inconsistent with the above procedure or which interfere with compliance are waived by the parties.

(7) The fees and expenses of the arbitrator shall be divided equally between the parties.

(8) The parties to this Agreement agree that the Signatory Unions have not waived their legal rights to undertake otherwise lawful activity with regard to any dispute or disputes which they may have regarding non-Program construction work and operations; provided, however, that any such activities by the Signatory Unions shall not disrupt or interfere in any way with the ongoing Program work covered by this Agreement.

Recognizing the above and, in order to carry out the principles of this Agreement, the parties agree:

A. Should a Signatory Union have a dispute with regard to non-Program work on or adjacent to District property, the Signatory Union will notify the San Mateo Building and Construction Trades Council prior to undertaking, on or adjacent to District property, any public activity regarding the dispute, and representatives of the Signatory Union and the Council shall meet with the representatives of the District (and its Program Manager) prior to undertaking any such activity to discuss and review the appropriate, valid, legal manner and means by which the Signatory Union may undertake its activities with regard to this dispute (giving due consideration in such discussions and review to the traditional concerns for the ongoing operations of the Project) and to the importance of the continuity of the work covered by the Master Agreement, and develop a program which allows the Signatory Union to exercise its

legal rights, but at the same time eliminates any possible disruptive effect on the ongoing Program construction work; and

(9) Should any Signatory Union or the District (or its Program Manager/Project Contractors) become aware of a possible or actual labor dispute involving non-Program construction work or operations and involving non-signatory unions which may result in public activity on or about the District property by such non-signatory unions, the representative of each will jointly meet to discuss such activity and to work together, using their best efforts, to avoid having such activity adversely impact or otherwise delay or interfere with ongoing Program construction contracts.

ARTICLE V
PRECONSTRUCTION CONFERENCE

5.1 A preconstruction conference shall be held prior to the commencement of each construction Project. Such conference shall be attended by a representative from each participating Contractor/Employers and Union(s) and the Program Manager.

ARTICLE VI
NO DISCRIMINATION

6.1 The Contractor/Employers and Unions agree not to engage in any form of discrimination on the ground or because of race, color, creed, national origin, ancestry, age, sex, sexual orientation, disability or Acquired Immune Deficiency Syndrome or AIDS Related Condition (AIDS/ARC), against any employee, or applicant for employment, on the Program.

ARTICLE VII
UNION SECURITY

7.1 The Contractor/Employers recognize the Union(s) as the sole bargaining representative of all craft employees working within the scope of this agreement.

7.2 All employees who are employed by Contractor/Employers to work on a Project will be required to become members and maintain membership in the appropriate Union on or before the 8th day of consecutive or cumulative employment on

a construction contract subject to this Agreement. Membership under this section shall be satisfied by the tendering of periodic dues and fees uniformly required to the extent allowed by the law.

7.3 Authorized representatives of the Unions shall have access to the Projects whenever work covered by this Agreement is being, has been, or will be preformed on the Projects, provided it is not disruptive to the work of the Projects or the operation of the District.

ARTICLE VIII
REFERRAL

8.1 Contractor/Employers performing construction work on the Project described in the Agreement shall in filling craft job requirements be bound by and utilize the registration facilities and referral systems established or authorized by the Signatory Unions when such procedures are not in violation of Federal law. The Contractor/Employer(s) shall have the right to reject any applicant referred by the Union(s), in accordance with the applicable Master Agreement.

8.2 The Contractor(s) shall have the unqualified right to select and hire directly all supervisors above General Foreman it considers necessary and desirable, without such persons being referred by the Union(s).

8.3 In the event that referral facilities maintained by the Unions are unable to fill the requisition of a Contractor/Employer for employees within a forty-eight (48) hour period (Saturday, Sundays and Holidays excluded) after such requisition is made by the Contractor/Employer, the Contractor/Employer shall be free to obtain work persons from any source.

8.4 Unions will exert their utmost efforts to recruit sufficient numbers of skilled craft persons to fulfill the requirements of the Contractor/Employers. The parties to this Agreement support the development of increased numbers of skilled construction workers from the residents of the San Francisco Bay Area to meet the needs of the Program and the requirements of the industry generally. Toward that end, the Unions agree to encourage the referral and utilization, to the extent permitted by law and the hiring hall procedures, of qualified Bay Area residents as journeymen and apprentices on this Program and entrance into such apprenticeship and training programs as may be operated by the Signatory Unions.

ARTICLE IX
BENEFITS

9.1 All Contractor/Employers agree to pay contributions to the established vacation, pension and other form of deferred compensation plan, apprenticeship, and health benefit funds for each hour worked on the project in the amounts designated in the Master Agreements of the appropriate Unions. The Contractor/Employers shall not be required to pay contributions to any other trust funds that are not contained in the published prevailing wage determination to satisfy their obligation under this Article except those Contractor/Employers who are signatory to the Master Agreements with the respective trades shall continue to pay all trust fund contributions as outlined in such Master Agreements.

9.2 By signing this Agreement, the Contractor/Employers adopt and agree to be bound by the written terms of the legally established Trust Agreements, as described in 9.1, specifying the detailed basis on which payments are to be made into, and benefits paid out of, such Trust Funds.

9.3 Wages, Hours, Terms and Conditions of Employment: The wages, hours and other terms and conditions of employment on a Project shall be governed by the Master Agreement of the respective crafts, copies of which shall be on file with the District, to the extent such Master Agreement is not inconsistent with this Agreement. Where a subject is covered by the Master Agreement and not covered by this Agreement, the Master Agreement will prevail. When a subject is covered by both the Master Agreement and this Agreement, to the extent there is any inconsistency, this Agreement will prevail.

ARTICLE X
EMPLOYEE GRIEVANCE PROCEDURE

10.1 All Contractor/Employer(s) including any Contractor/Employer which is not otherwise bound through an agreement with a labor organization to a grievance procedure which has jurisdiction to consider and resolve disputes over the imposition of discipline or dismissal of its employees working on this Program shall be bound to the grievance procedure contained in the Master Agreement of the craft

representing the employee(s) involved in the dispute. Such Contractor/Employer shall not impose discipline or dismissal on its employees covered by this Agreement without just cause.

ARTICLE XI
COMPLIANCE

11 .1 It shall be the responsibility of the Contractor/Employers and Unions to investigate and monitor compliance with the provisions of the Agreement contained in Article IX. Nothing in this agreement shall be construed to interfere with or supersede the usual and customary legal remedies available to the Unions and/or employee benefit Trust Funds to collect delinquent Trust Fund contributions from Employers on the Project. The District shall monitor and enforce compliance with the prevailing wage requirements of the State and Contractor/Employers' compliance with this Project Stabilization Agreement.

ARTICLE XII
GRIEVANCE ARBITRATION PROCEDURE

12.1 The parties understand and agree that in the event any dispute arises out of the meaning, interpretation or application of the provisions of this Agreement, the same shall be settled by means of the procedures set out herein. No grievance shall be recognized unless the grieving party (Union or District Council on its own behalf, or on behalf of an employee whom it represents, or a contractor on its own behalf) provides notice in writing to the signatory party with whom it has a dispute within five (5) days after becoming aware of the dispute but in no event more than thirty (30) days after it reasonably should have become aware of the event giving rise to the dispute. The time limits in Section 12.1 may be extended by mutual written agreement of the parties.

12.2 Grievances shall be settled according to the following procedures:

Step 1: Within five (5) business days after the receipt of the written notice of the grievance, the Business Representative of the involved Union or District Council, or his/her designee, or the representative of the employee, and the representative of the involved Contractor/Employer shall confer in person and attempt to resolve the grievance.

Step 2: In the event that the representatives are unable to resolve the dispute within the five (5) business days after its referral to Step 1, either involved party may submit it within three (3) business days to the Grievance Committee, which shall meet within five (5) business days after such referral (or such longer time as is mutually agreed upon by all representatives on the Grievance Committee), to confer in an attempt to resolve the grievance. The Grievance Committee shall be comprised of one (1) representative of the District; one (1) representative of the Program Manager; and two (2) representatives of the San Mateo County Building & Construction Trades Council. If the dispute is not resolved within such time (five (5) business days after its referral or such longer time as mutually agreed upon) it may be referred within five (5) business days by either party to Step 3.

Step 3: Within five (5) business days after referral of a dispute to Step 3, the representatives shall choose a mutually agreed upon arbitrator for final and binding arbitration. The parties agree that if the permanent arbitrator or his alternate is not available, an arbitrator shall be selected by the alternate striking method from the list of five (5) below:

1. Barbara Chvany
2. Thomas Angelo
3. Robert Hirsch
4. Barry Winograd
5. Chuck Askin

The decision of the Arbitrator shall be binding on all parties. The Arbitrator shall have no authority to change, amend, add to or detract from any of the provisions of the Agreement. The expense of the Arbitrator shall be borne equally by both parties. The Arbitrator shall arrange for a hearing on the earliest available date from the date of his/her selection. A decision shall be given to the parties within five (5) calendar days after completion of the hearing unless such time is extended by mutual agreement.

A written opinion may be requested by a party from the presiding Arbitrator. The time limits specified in any step of the Grievance Procedure set forth in Section 12.2 may be extended by mutual agreement of the parties initiated by the written request of one party

to the other, at the appropriate step of the Grievance Procedure. However, failure to process a grievance, or failure to respond in writing within the time limits provided above, without an agreed upon extension of time, shall be deemed a waiver of such grievance without prejudice, or without precedent to the processing of and/or resolution of like or similar grievances or disputes.

In order to encourage the resolution of disputes and grievances at Steps 1 and 2 of this Grievance Procedure, the parties agree that such settlements shall not be precedent setting.

ARTICLE XIII
JURISDICTIONAL DISPUTES

13.1 There will be no strikes, no work stoppages, no picketing, sympathy strikes, slow downs or other interferences with the work because of jurisdictional disputes between Signatory Unions. The Assignment of work will be solely the responsibility of the Contractor/Employer performing the work involved; and such work assignments will be in accordance with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (the "Plan") or any successor Plan.

13.2 All Jurisdictional disputes on a Project, between or among any Signatory Unions and Contractors/Employers, parties to this Agreement, shall be settled and adjusted according to the present Plan established by the Building and Construction Trades Department or any other plan or method of procedure that may be adopted in the future by the Building and Construction Trades Department. Decisions rendered shall be final, binding and conclusive on the Contractors/Employers and Unions parties to this Agreement.

13.3 If any Union or Contractor/Employer fails to immediately and fully comply with a final decision rendered in any jurisdictional dispute, the District, the Contractor/Employer or the Union shall have the immediate right to seek full legal redress for such conduct including, but not limited to, injunctive relief and/or damages.

13.4 If there is a strike, sympathy strike, work stoppage, slowdown, picketing or otherwise advising the public that a labor dispute exists or interference with the progress of the Program by reason of a jurisdictional dispute, the District and/or the Contractor/Employer affected by said Union conduct, shall have the right to seek full

legal redress in the Courts of California, including injunctive relief and damages, after complying with the emergency arbitration provisions of Article IV.

ARTICLE XIV
APPRENTICES

14.1 Recognizing the need to maintain continuing support of programs designed to develop adequate numbers of competent workers in the construction industry, the Contractor/Employer(s) shall employ apprentices of a State approved Apprenticeship Program in the respective crafts to perform such work as is within their capabilities and which is customarily performed by the craft in which they are indentured.

14.2 The apprentice ratios will be in compliance with the applicable provisions of the California Labor Code and Prevailing Wage Rate Determination.

14.3 There shall be no restrictions on the utilization of apprentices in performing the work of their craft provided they are properly supervised.

ARTICLE XV
MANAGEMENT RIGHTS

15.1 The Contractor/Employer(s) shall retain full and exclusive authority for the management of their operations, including the right to direct their work force in their sole discretion. No rules, customs or practices shall be permitted or observed which limit or restrict production, or limit or restrict the working efforts of employees except that lawful manning provisions in the Master Agreement shall be recognized.

ARTICLE XVI
HELMETS TO HARDHATS

16.1 The Employers and the Unions recognize a desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Employers and Unions agree to utilize the services of the Center For Military Recruitment, Assessment and Veterans Employment (hereinafter "Center") and the Center's "Helmets to Hardhats" Program to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network,

employment opportunities and other needs as identified by the parties.

16.2 The Unions and Employers agree to coordinate with the Center to create and maintain an integrated database of veterans interested in working on the Project and of apprenticeship and employment opportunities for this Project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

ARTICLE XVII
SAVINGS CLAUSE

17.1 The parties agree that in the event any article, provision, clause, sentence or word of the Agreement is determined to be illegal or void as being in contravention of any applicable law, by a court of competent jurisdiction, the remainder of the Agreement shall remain in full force and effect. The parties further agree that if any article, provision, clause, sentence or word of the Agreement is determined to be illegal or void, by a court of competent jurisdiction, the parties shall substitute, by mutual agreement, in its place and stead, an article, provision, clause, sentence or work which will meet the objections to its validity and which will be in accordance with the intent and purpose of the article, provision, clause, sentence or work in question.

17.2 The parties also agree that in the event that a decision of a court of competent jurisdiction materially alters the terms of the Agreement such that the intent of the parties is defeated, then the entire Agreement shall be null and void.

17.3 If a court of competent jurisdiction determines that all or part of the Agreement is invalid and/or enjoins the District from complying with all or part of its provisions and the District accordingly determines that the Agreement will not be required as part of an award to a Contractor/Employer, the unions will no longer be bound by the provisions of Article IV.

ARTICLE XVIII
TERM

18.1 The Agreement shall be included as a condition of the award of construction contracts identified by the District as part of the Program in Exhibit A and any Addenda thereto.

18.2 The Agreement shall continue in full force and effect until the completion of the Program.

SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT

BY: Maurice D. Goodman Date: 3/10/11
Maurice D. Goodman
Board President

San Mateo Building & Construction
Trades Council AFL-CIO (Council)

By: Date: 3/10/11
William A. Nack
Business Manager

127053/607015

SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT
CONSTRUCTION STABILIZATION PROGRAM
EXHIBIT A

Project Description

ORIGINAL

The District is hereby authorized to use bond proceeds to acquire any of the projects on the Bond Project List through temporary leases, lease-purchase arrangements, or other appropriate financial arrangements, and to execute the purchase option under any lease or otherwise pay off outstanding lease obligations, for any of these authorized facilities.

BOND PROJECT LIST

Unless otherwise noted, the projects in the Bond Project List are authorized to be completed at each or any of the District's sites. District schools and locations are:

Elementary Schools

Buri Buri Elementary School	120 El Campo Drive, South San Francisco
Junipero Serra Elementary School	151 Victoria Street, Daly City
Los Cerritos Elementary School	210 West Orange Avenue, South San Francisco
Martin Elementary School	35 School Street, South San Francisco
Monte Verde Elementary School	2551 St. Cloud Drive, San Bruno
Ponderosa Elementary School	295 Ponderosa Road, South San Francisco
Skyline Elementary School	55 Christen Avenue, Daly City
Spruce Elementary School	501 Spruce Avenue, South San Francisco
Sunshine Gardens Elementary School	1200 Miller Avenue, South San Francisco

Middle Schools

Alta Loma Middle School	116 Romney Avenue, South San Francisco
Parkway Heights Middle School	825 Parkway Avenue, South San Francisco
Westborough Middle School	2570 Westborough Boulevard, South San Francisco

High Schools

El Camino High School	1320 Mission Road, South San Francisco
South San Francisco High School	400 B Street, South San Francisco
Baden High School	825 Southwood Drive, South San Francisco

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ORIGINAL

Other Facilities

South San Francisco Adult Education	825 Southwood Drive, South San Francisco
Children's Center	530 Tamarack Lane, South San Francisco
District Offices	398 B Street, South San Francisco
Foxridge (Community Day School)	2525 Wexford Avenue, South San Francisco
Sierra Vista (Training Center)	257 Longford Drive, South San Francisco
Hillside (pre-K)	1400 Hillside Boulevard, South San Francisco

Renovation, Repair and Construction

- ✓ Major renovation, repair and construction at the following school sites: Buri Buri Elementary School, Martin Elementary School, Alta Loma Middle School, Parkway Heights Middle School, South San Francisco High School
- ✓ Replace deteriorating portable classrooms with new permanent classroom buildings and support facilities
- ✓ Construct additional classrooms, classroom buildings and school support service space at sites where needed
- ✓ Upgrade and/or renovate science classrooms and labs to provide facilities equipped to meet all curriculum and safety requirements
- ✓ Repair/replace deteriorated roofs or portions of roofs to extend the useful life of school facilities
- ✓ Repair/rehabilitate classroom buildings and other structures in need of strengthening for earthquake safety
- ✓ Improve student safety by replacing, upgrading and / or installing fire- and life-safety systems, emergency communications systems, and security systems including alarms, smoke- and fire-detection systems and sprinklers, and building and campus security improvements including fencing, locks, exterior lighting, etc.
- ✓ Upgrade outdated electrical, heating and ventilation, and power generation and distribution systems, to provide for basic facilities operating needs, meet the requirements of technology upgrades, etc.
- ✓ Replace, repair or upgrade aging and /or inadequate gas lines, and plumbing & drainage systems, including water supply, water heating, wastewater systems, and plumbing fixtures; within buildings and sites and to connect with city supply and drainage systems
- ✓ Renovate and/or construct restrooms to replace deteriorating facilities with upgraded toilet facilities
- ✓ Provide improvements to comply with the requirements of the Americans with Disabilities Act ("ADA") and state building codes. These improvements may include upgrades,

SIGNED: _____

SIGNED: _____

ORIGINAL

modifications, and construction of restrooms, classrooms and other school facilities such as ramps, paths, doors, and parking

- ✓ Upgrade and/or renovate school libraries and theaters, and construct new libraries, gymnasiums and/or multipurpose rooms for instructional, athletic and physical education, and performing arts uses, as well as community uses

- ✓ Renovate, improve, construct and/or repair athletic fields, tracks and turf, swimming pool, bleachers, lighting, fencing, etc., including irrigation and drainage, to improve student safety and allow greater use of school facilities including community use

- ✓ Improvement of school grounds, including paths, ramps, school entry areas, outdoor student eating areas, student drop-off areas, and parking; construct new outdoor performance/instruction spaces for classes, school event, and community use

- ✓ Replace / upgrade / install new classroom teaching tools and educational equipment, including smartboards, computers, digital projectors, audio and video recording and editing equipment, etc.

- ✓ Furnish and equip classrooms, athletic facilities and other facilities, including replacement of equipment on an ongoing basis, as needed

- ✓ Upgrade voice and data communication systems, including wired and wireless network equipment

- ✓ Upgrade buildings with efficient technologies to conserve energy and reduce costs, such as energy-efficient windows, window coverings, improved insulation, and climate control systems

- ✓ Install solar panels and power-generating equipment, and other alternative/renewable energy systems

- ✓ Remove, dispose of, and otherwise remediate hazardous materials, including asbestos, lead, etc., where necessary

- ✓ Address unforeseen conditions revealed by renovation / construction (including plumbing breaks, dry rot, seismic, structural defects, etc.)

- ✓ Necessary site preparation and restoration in connection with new construction, renovation or remodeling, or installation or removal of portable classrooms, including demolition and replacement of existing structures; removing, replacing, or installing irrigation, drainage, utility lines (gas, water, sewer, electrical, data and voice, etc.), trees and landscaping; relocating fire access roads; and acquiring any necessary easements, licenses, or rights of way to the property

- ✓ Rental or construction of storage facilities and other space on an interim basis, as needed, to accommodate construction materials, equipment, personnel, and interim classrooms

EXHIBIT A

SIGNED: _____

SIGNED: _____

ORIGINAL

(including relocatables) for students and school functions or other storage for classroom materials displaced during construction

- ✓ All other work, furnishing and equipping, necessary and incidental to specific projects described above.

For any project involving renovation, rehabilitation or repair of a building or the major portion of a building, the District shall be authorized to proceed with new replacement construction instead (including any necessary demolition), if the Board of Trustees determines that replacement and new construction is more practical than renovation, rehabilitation and repair, considering the building's age, condition, expected remaining life, comparative cost, and other relevant factors.

<<<<<----------END OF FULL TEXT OF MEASURE.

SIGNED: _____

SIGNED: _____

Addendum A: Agreed To Letter of Assent

[Date]
[Addressee]
[Address]
[City and State]

Re: (NAME OF PROJECT),
Program Stabilization Agreement -- Letter of Assent

Dear Mr./Ms._____:

The undersigned party confirms that it agrees to be a party to and bound by the (NAME OF PROJECT), Program Stabilization Agreement as such Agreement may, from time to time, be amended by the parties or interpreted pursuant to its terms.

By executing this Letter of Assent, the undersigned party subscribes to, adopts and agrees to be bound by the written terms of the legally established trust agreements specifying the detailed basis upon which contributions are to be made into, and benefits made out of, such trust funds and ratifies and accepts the trustees appointed by the parties to such trust funds.

Such obligation to be a party to and bound by this Agreement shall extend to all work covered by said Agreement undertaken by the undersigned party on the (NAME OF PROJECT). The undersigned party shall require all of its subcontractors, of whatever tier, to become similarly bound for all their work within the scope of this Agreement by signing an identical Letter of Assent.

This letter shall constitute a subscription agreement, to the extent of the terms of the letter.

CONTRACTOR/SUBCONTRACTOR:_____

_____

California State License Number: _____

Name and Signature of Authorized Person: _____
(Print Name)

_____
(Title)

_____
(Signature)

_____
(Telephone Number)

_____
(Facsimile Number)

International Association of Heat and Frost Insulators & Asbestos Workers Local #16

Date: 3-2-11

Carpenters 46 Northern California Counties Conference Board

Date: 2-9-11

Brick Layers & Allied Crafts Local #3

Date: _____

Northern California Carpenters Regional Council

Date: 2-9-11

International Brotherhood of Electrical Workers Local Union #617

Date: _____

District Council of Plasterers & Cement Masons of No. California

Date: 3/2/11

International Association of Bridge Structural & Ornamental Iron Workers Local Union #377

Date: 2/28/11

Roofers & Waterproofers Local Union #40

Date: 3/7/2011

International Union of Operating Engineers Local Union #3

Date: 2-25-11

International Brotherhood of Teamsters Local Union #853

Date: 3/1/11

United Association of Plumbers & Steamfitters Local Union #467

Date: 2-17-11

Sheet Metal Workers Local Union #104

Date: _____

Sprinkler Fitters Local Union #483

Date: 2/16/11

Laborers Local Union #389

Date: 2/25/11

Plasterers Local Union #66

Date: 2-17-11

U.A. Local Union #355

Date: 03-02-2011

Elevator Constructors Local Union #3

Date: 3/2/11

Laborers Local Union #67

Date: 3-10-11

District Council #16 for Painters Local #913,
Glaziers Local #718 & Carpet Layers Local #12

Date: 3/2/11

DOCUMENT 00 31 19

EXISTING CONDITIONS

1. Summary

This document describes existing conditions at or near the Project, and use of information available regarding existing conditions. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. Reports and Information on Existing Conditions

a. Documents providing a general description of the Site and conditions of the Work may have been collected by the South San Francisco Unified School District ("District"), its consultants, contractors, and tenants. These documents may, but are not required to, include previous contracts, contract specifications, tenant improvement contracts, as-built drawings, utility drawings, and information regarding underground facilities.

b. Information regarding existing conditions may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports, documents, and other information are **not** part of the Contract Documents. These reports, documents, and other information do **not** excuse Contractor from fulfilling Contractor's obligation to independently investigate any or all existing conditions or from using reasonable prudent measures to avoid damaging existing improvements.

c. Information regarding existing conditions may also be included in the Project Manual, but shall **not** be considered part of the Contract Documents.

d. Prior to commencing this Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey.

e. Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.

f. The reports and other data or information regarding existing conditions and underground facilities at or contiguous to the Project are the following:

(1) **Hazardous Material Report(s). Asbestos and Lead Report by ProTech Consulting and Engineering dated March 30, 2016. Attached to this section.**
(2) **Analytical Sampling and Texting of Soil by Geosphere Consultants, Inc., dated January 23, 2013**
(3) **Engineering Geology and Seismology review by California Geological Survey dated June 6, 2013**

3. Use of Information

a. Information regarding existing conditions was obtained only for use of District and its consultants, contractors, and tenants for planning and design and is **not** part of the Contract Documents.

b. District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any information regarding existing conditions. Bidder represents and agrees that in submitting a bid it is not relying on any information regarding existing conditions supplied by District.

c. Under no circumstances shall District be deemed to warrant or represent existing above-ground conditions, as-built conditions, or other actual conditions, verifiable by independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder must perform as a condition to bidding and Bidder should not and shall not rely on this information or any other information supplied by District regarding existing conditions.

d. Any information shown or indicated in the reports and other data supplied herein with respect to existing underground facilities at or contiguous to the Project may be based upon information and data furnished to District by the District's employees and/or consultants or builders of such underground facilities or others. District does not assume responsibility for the completeness of this information, and Bidder is solely responsible for any interpretation or conclusion drawn from this information.

e. District shall be responsible only for the general accuracy of information regarding underground facilities, and only for those underground facilities that are owned by District, and only where Bidder has conducted the independent investigation required of it pursuant to the Instructions to Bidders, and discrepancies are not apparent.

4. Investigations/Site Examinations

a. Before submitting a bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.

b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in

the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

ProTech
Consulting & Engineering

1208 Main Street, Redwood City, CA 94063
P: (650) 569-4020 • F: (650) 569-4023 • E: info@protech-cal.com

Asbestos & Lead (Pb) Report

Limited Pre-Demolition/Renovation Survey & Evaluation

Date:	Revised March 30, 2016	Project No.:	064-MA16 R1
Requested By: (client)	South San Francisco Unified School District 398 B Street South San Francisco, California		
Project:	Parkway School Heights Middle School, 650 Sunset Avenue, S. San Fran California		
Project Description:	Demolition of: 8 Marked buildings on plans. No new construction or portables in the scope of work.		

February 2016, ***ProTech Consulting & Engineering, Inc.*** performed a building survey to identify asbestos-containing materials (ACM) and presence of Lead based paint (Pb) at the subject project. The survey was conducted in an effort to comply with pre-demolition/renovation regulatory requirements.

Environmental consulting services were conducted by ProTech's licensed and accredited staff as follows:

Consultant	Discipline	Issuing Agency	Certification No.
Glen Koutz	Asbestos Lead	Cal OSHA CDPH	11-4830 2204
Emanuel Dounias	Asbestos Lead	Cal OSHA CDPH	00-2766 13059
Bob Newman	Asbestos IAQ	Cal OSHA UC Berkley	00-2767 10-03

Services Requested by Client

Asbestos Survey

Consulting services were limited by the client to the following scope of services:

- Performed a visual survey of the project to identify, document, and assess suspect asbestos-containing materials (ACM).
- Collected representative samples to confirm or rebut the presence of ACM.
- Submitted necessary samples to a certified laboratory for analysis by standard polarized light microscopy (PLM) to determine asbestos content.
- Assess the friability and abatement classification of identified ACM;
- Prepared this written report presenting an evaluation and assessment of the data.

ProTech is only responsible for the specific scope of work as stated. No other services are intended or implied.

LBP Survey

- Performed a visual survey of the project to identify, document, and assess suspect lead-based paint (LBP).
- Tested painted/coated surfaces using a calibrated X-ray fluorescence analyzer (XRF).
- Prepared this written report presenting an evaluation and assessment of the data.

Results & Regulatory Assessment

Asbestos types are abbreviated as follows: Chr = Chrysotile; Amo = Amosite; Cro = Crocidolite; Tre = Tremolite; Act = Actinolite.

Asbestos-Containing Materials (ACM)

	Material Description	Material, System, Location	Smpl Nos.	Approx. Quant.	Lab Result	Regulatory Assessment	
						Cal OSHA	EPA/ AQMD
	Bldg.1-6						
1	Black sink undercoating	All sinks	**12**	**6 sinks**	**5% Chr**	Class II Abatement	Non-Friable
	Bldg. 17-21 & 29-33						
2	White TSI	Janitors closet	16	**10 ln ft**	**5% Chr**	Class I Abatement	Friable
3	White TSI elbows	Janitors closet	17	**4 visible**	**10% Chr 2% Amo 2% Croc**	Class I Abatement	Friable
4	Gray cement pipe	Penetrates floor in girls restroom plumbing chase	18	**4 ln ft.**	**15% Chr 2% Croc**	Class II Abatement	Non-Friable
	Admin Building						
5	Black wood wall panel mastic	All walls with wood paneling	08	**8500 sq ft.**	**Confirmed 1.27% by PLM Point count**	Class II Abatement	Non-Friable
	Mat room						
6	Transite window panels	Most windows	08	**400 sq ft.**	**10% Chr**	Class II Abatement	Non-Friable
7	Black residual flooring mastic	Below rubber mat in mat room	11, 12*	**1500 sq ft.**	**None detected to 5% Chr**	Class II Abatement	Non-Friable
	Roofs & Breezeways						
8	Gray/black roof mastic	On conduit	21	**150 ln ft.**	**10% Chr**	Class II Abatement	Non-Friable
9	White HVAC Duct mastic	Mechanical penthouse for library	23	**100 ln ft.**	**5% Chr**	Class II Abatement	Non-Friable

*** No asbestos detected in sample**

Confirmed Less Than 1% Asbestos Materials

	Material Description	Material, System, Location	Smpl Nos.	Approx. Quant.	Lab Result	Regulatory Assessment	
						Cal OSHA	EPA/ AQMD
	Bldg.1-6						
1.	Smooth drywall, joint tape and compound	Furnace closets, staff restrooms, security office. Storage closets	**01, 02, 03**	**12,000 sq ft.**	**<1% Chr**	Class II Abatement	Non-Friable
	Bldg. 9-13						
3	Gray exterior window glazing	Throughout	**17,18**	**2500 ln fit.**	**<1% Chr**	Class II Abatement	Non-Friable

Bldg. 14-16 & 26-28							
4	Smooth drywall, joint tape and compound	Furnace closets, mechanical attics and rear soffits	05, 06, 07	**8,000 sq ft.**	**<1% Chr**	Class II Abatement	Non-Friable
5	Gray exterior window glazing	Throughout	22, 23	**1,800 ln ft.**	**<1% Chr**	Class II Abatement	Non-Friable
Bldg. 17-21 & 29-33							
6	Smooth drywall, joint tape and compound	Soffits and upper walls for HVAC duct chases, walls and ceilings in janitors closet and furnace closets	01, 02, 03, 04, 05	**8000 sq ft.**	**<1% Chr**	Class II Abatement	Non-Friable
Admin Building							
10	Smooth drywall, joint tape and compound	Walls mixed with wood paneling throughout *May also exist behind some wood paneling	01*, 02, 03, 04, 05	**6500 sq ft.**	**None detected to <1% Chr**	Class II Abatement	Non-Friable
11	Drywall, joint tape and compound with texture	Wall dividing nurses office from hallway	06	**200 sq ft.**	**<1% Chr**	Class II Abatement	Non-Friable
13	Black mastic below NON ACM dark blue 12 x 12 vinyl floor tile and residual mastic	Mixed with carpet throughout office areas, and lounge	14*, 15	**3500 sq ft total for both**	**None detected to <1% Chr**	Class II Abatement	Non-Friable
14	Back mastic below NON ACM light blue 12 x 12 vinyl floor tile with residual mastic	Below all carpet	16, 17*		**None detected to <1% Chr**	Class II Abatement	Non-Friable
Library							
15	Drywall, joint tape and compound with texture	Walls and ceilings for build outs (offices, storage, hall and restroom) , main ceiling above ceiling tiles	01, 02, 03	**9600 sq ft,**	**<1% Chr**	Class II Abatement	Non-Friable
16	Topping texture	Walls and ceilings for build outs (offices, storage, hall and restroom)	04, 05, 06	**6000 sq ft.**	**2% Chr**	Class II Abatement	Friable
Mat Room							
17	Drywall, joint tape and compound	Partial walls in storage room, furnace closets, restrooms, janitors closet, old mechanical room	01, 02*, 03	**4000 sq ft.**	**None detected to <1% Chr**	Class II Abatement	Non-Friable
20	Gray exterior window gazing	Windows	13, 14*	**700 ln ft.**	**None detected to <1% Chr**	Class II Abatement	Non-Friable
MUR Room							
21	Smooth drywall, joint tape and compound	Walls and ceilings throughout including behind wood wall paneling and above 1 x 1 ceiling tiles	01, 02, 03, 04, 05*	**18,000 sq ft.**	**None detected to <1% Chr**	Class II Abatement	Non-Friable
Roofs & Breezeways							
23	Smooth drywall, joint tape and compound	Mechanical penthouse for library	22	**1000 sq ft**	**<1% Chr**	Class II Abatement	Non-Friable

*** No asbestos detected in sample**

Non-Asbestos Materials

No asbestos was detected in the following materials.

	Material Description	Material Location(s)	Sample Numbers
Bldg.1-6			
1.	White 1 x 1 nailed up ceiling tiles	Nearly throughout	04, 05, 05
2	Dark blue 12 x 12 vinyl floor tile with mastic and residual black mastic	Throughout mixed with light blue	07, 08
3	Light blue 12 x 12 vinyl floor tile with mastic and residual black mastic	Throughout mixed with dark blue	09, 10
4	White canvas HVAC seam tape	Some furnaces	11
5	Tan baseboard mastic	Room 5	13
6	Black residual roof curb	Interstitial space between classrooms	14
7	Gray exterior window glazing	Throughout	15, 16
Bldg. 9-13			
8	Smooth drywall, joint tape and compound	Furnace closets for all rooms, dividing walls In 11/12 science and science storage	01, 02, 03, 04, 05
9	White 1 x 1 nailed up ceiling tiles	Throughout	06, 07, 08
10	White/tan glued up 1 x 1 nailed up ceiling tiles	Room 13 only	09
11	Tan baseboard mastic	Throughout	10, 11
12	Black science counter tops	Rooms 11 & 12 only	12

13	Dark blue 12 x 12 vinyl floor tile with mastic and residual black mastic	Throughout mixed with light blue all room centers	13, 14
14	Light blue 12 x 12 vinyl floor tile with mastic and residual black mastic	Throughout mixed with dark blue all room centers	15, 16
Bldg 14-16 & 26-28			
15	Drywall, joint tape and compound with texture	Partial ceilings in al classrooms	01, 02
16	Topping texture	Partial ceilings in al classrooms	03, 04
17	Tan 1 x 1 nailed up ceiling tiles	Upper ceilings in all classrooms	08, 09, 10
18	Tan/brown glued up 1 x 1 nailed up ceiling tiles	Rear soffits in all classrooms	11
19	Black vapor barrier craft paper		12
20	White plaster	On structural steel columns between center divide walls	13
21	Black vapor barrier	Below plywood floor in duct	14
22	Tan fiberous wood wall panels	Behind all plywood panels	15
23	Tan /brown baseboard mastic	Throughout	16, 17
24	Light blue 12 x 12 vinyl floor tile with mastic and residual black mastic	Majority of all classroom flooring	18, 19
25	Dark blue 12 x 12 vinyl floor tile with mastic and residual black mastic	Partial floors in all classrooms	20, 21
Bldg. 17-21 & 29-33			
26	Drywall, joint tape and compound with texture	Walls and ceilings in janitors breakroom	06
27	Topping texture	Walls and ceilings in janitors breakroom	07
28	White glued up 1 x 1 ceiling tiles and mastic	Soffits for all classrooms, upper walls in 32	08, 09, 10
29	Black vapor barrier	Below plywood floor in duct chase/mechanical areas	11
30	White plaster	On structural steel columns between center divide	12, 13
31	Tan fibrous wood wall panels	Behind all plywood wall panels	14, 15
32	Black tar insulation on pipe	On pipe within the cement pipe in girls restroom plumbing chase	19
33	Light blue 12 x 12 vinyl floor tile with yellow/black mastic	Rooms 29, 30, 31, 32, 33	20, 21
34	Dark blue 12 x 12 vinyl floor tile with yellow/black mastic	Rooms 29, 30, 31, 32, 33	22, 23
35	Light blue 12 x 12 vinyl floor tile with yellow/black mastic	Rooms 17, 18, 19, 20, 21	24
36	Dark blue 12 x 12 vinyl floor tile with yellow/black mastic	Rooms 17, 18, 19, 20, 21	25
37	Tan baseboard mastic	Most walls	26, 27
38	White turazzo flooring	Girls room	28
39	Yellow turazzo flooring	Boys room	29
40	Gray ceramic tile mortar	Restrooms	30, 31
41	Window glazing	Most windows	32, 33
Library			
42	White glued up 1 x 1 ceiling tiles and mastic	Throughout excluding main library room, project grow room, hall adjacent restroom	07, 08, 09
43	Tan fibrous wood wall panels with mastic over drywall	Upper walls in main library	10, 11
44	Blue 12 x 12 vinyl floor tile with mastic	Throughout excluding main library room	12, 13
45	Yellow carpet mastic	main library room	14, 15
MAT Room			
46	White nailed up 1 x 1 ceiling tiles	Throughout	04, 05
47	Black vapor barrier craft paper	Above 1 x 1 ceiling tiles	06
48	Canvas seam tape	On plenums above furnaces	07
49	Interior stucco	Interior wall adjacent restrooms, left wall in old mechanical room	09
50	Blue 12 x 12 vinyl floor tile with black mastic	Store room	10
51	Exterior stucco	East and west perimeter walls	15
52	Brown terrazzo flooring	Restroom floor	16
53	Gray ceramic tile mortar	Restroom wall	17
MUR Room			
54	White with tan 1 x 1 ceiling tiles with mastic	Upper walls in multi purpose room glued to original 1 x 1 ceiling tiles	07
55	White with brown 1 x 1 ceiling tiles with mastic	Bottom layer of upper walls in MUR ceiling in mUR	08, 09
56	White 1 x 1 nailed up ceiling tiles	Kitchen and kitchen storage	10, 11
57	Tan baseboard mastic	Throughout	12, 13
58	Light blue 12 x 12 vinyl floor tile with mastic	Mixed throughout MUR and kitchen	14, 15
59	Dark blue 12 x 12 vinyl floor tile with mastic	Mixed throughout MUR and kitchen	16, 17
60	Brown terrazzo flooring	Staff restrooms	18
61	Gray ceramic wall tile mortar	Walls in staff restrooms	19
62	Gray exterior stucco	Front columns (facing parking lot)	20
63	Gray exterior window glazing	Most windows	21, 22

Roofs & Breezeways			
64	Black tar and gravel roof	Roofs	01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 12, 14, 15, 6, 17, 18
65	Gray /black roof curbs	Breezeway to building junctions	19, 20
66	Black roof curb	Library only	24
67	Yellow pipe jacket	Breezeway and 14-16/26-28	25
Exterior Locker Area			
68	Exterior stucco	Ceiling	01, 02

ACM Note: Topping Texture

The EPA and AQMD consider topping texture (skim coat) that is applied to drywall surfaces to be an "add-on" material. Add-on materials are not treated like joint compound. These materials (when present) require separate analysis independent of the substrate (eg: drywall). In other words, **add-on materials cannot be composited with** drywall during analysis and are classified as RACM if they contain greater than 1% asbestos.

ACM Note: Conflicting Laboratory Results

The EPA has a specific protocol for sampling suspect asbestos building materials. In general, it recommends collecting multiple samples (often a minimum of three) of each suspect asbestos material. Multiple samples are recommended by the EPA to increase the statistical reliability of the results and to minimize the potential for field or laboratory error.

Sometimes, multiple samples representing a particular material will yield both positive and negative results. When this happens, the negative sample result(s) are superseded by the positive results. **Once a single positive sample is identified, the material represented by the sampling is treated as an asbestos-containing material.**

However, if additional sampling data, as-built plans, or other reliable data can adequately explain or confirm that area(s) that tested positive are different (not homogeneous) from areas that tested negative, this information can be used to more accurately quantify ACM and define the scope of an asbestos abatement job.

<1% Asbestos Note: Drywall & Joint Compound

<1% drywall sample results are a composite value (drywall, joint compound and joint tape mixed together). EPA/AQMD allows compositing of these drywall **joint compound** systems **only**. Drywall system that yield a result of <1% asbestos by point count method are consider non-ACM my EPA/AQMD. However, Cal OSHA does not allow composite analysis. The percentage of asbestos in the specific asbestos bearing layer is the value used to make a Cal OSHA assessment. In other words, a drywall system that is less than 1% asbestos by composite but contains greater than 1% asbestos in the joint compound **layer** is an ACM from a Cal OSHA standpoint. In this case, the sheetrock removal would still be a Cal OSHA Class II abatement operation.

LEAD

Painted/coated surfaces were tested in the field using an X-Ray fluorescence (XRF) spectrum analyzer and/or sampled (paint chips) and submitted to a certified laboratory for analysis by atomic absorption spectroscopy (AAS). Lead paint samples fell in to 1 of 3 types - as follows:

Types of Lead Materials

LEAD TYPES	DEFINITION	LEAD CONTENT STANDARD
LBP	Lead-based paint (or material)	By XRF: 1 mg/cm^2 or greater By Paint Chip: 0.5 weight % or 5,000 mg/kg (at or above)
LCM	Lead containing material (or paint)	By XRF: <1 mg/cm^2 By Paint Chip: Below 0.5 wt % of 5,000 mg/kg
ND	No lead detected	By XRF: Requires paint chip confirmation By Paint Chip: No lead Detected or <0.006 wt %

Lead-Based Paint (LBP) – By XRF		
XRF Readings	• **20 (twenty)** XRF readings tested positive for lead-based paint/coating (see XRF report).	
Summary of LBP Components	Interior Components	•Ceramic wall tiles in restrooms, structural steel (beams, columns, etc.), Wood window components.
	Exterior Components	• Structural steel (beams , columns, etc., wood fascias, wood soffits, wood breezeways, metal down spouts, metal flagpole.

Lead-Containing Material (LCM) – By XRF		
XRF Readings	• **56 (fifty-six)** XRF readings tested positive for low levels of lead (see XRF) report.	
Summary of LCM Components	Interior Components	• See XRF results
	Exterior Components	• See XRF results

Non-Lead – By XRF	
XRF Readings	• **138 (One-Hundred and Thirty eight)** XRF readings tested negative (no lead detected) for the presence of lead (see XRF report). (Note: Cal OSAH does not accept XRF to prove "non-lead" – paint-chip lab analysis is required)

Asbestos Regulatory Notes

Cal OSHA (DOSH)

Asbestos-Containing Material (ACM): A material is an asbestos containing material (ACM) when the sample aggregate or any one of its layers (analyzed individually) contains greater than 1% asbestos. Cal OSHA does **not** allow composite analysis (mixing layers of materials together).

Less than 1% Asbestos: Materials containing less than 1% asbestos are not regulated by most governmental agencies. However, Cal OSHA is not one of those agencies. The Cal OSHA asbestos standard must be followed for work involving materials that contain a concentration of asbestos as low as **0.1%.**

If a material can be shown to contain less than 1% asbestos by PLM point count (or other approved method), it can be treated as an asbestos-containing construction material (ACCM). ACCM is a term Cal OSHA uses to describe materials containing **less than 1%** (but greater than 0.1%) asbestos. In certain situations, there may be some economic advantages to making this characterization. The decision to do so is evaluated on a case-by-case basis at the client's request.

Less than 0.1% Asbestos: If a material can be shown to contain less than **0.1%** asbestos by an approved method, it can be treated as a non-asbestos material. In certain situations, there may be

some economic advantages to making this characterization. The decision to do so is evaluated on a case-by-case basis at the client's request.

Class I Asbestos Work: Cal OSHA prescribes specific work practices involving the removal of asbestos-containing insulation and surfacing (i.e. sprayed-on) materials.

Class II Asbestos Work: Cal OSHA prescribes specific work practices involving the removal of ACM which is not insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing, cement products, and construction mastics.

EPA/AQMD

Asbestos-Containing Material (ACM): Any building material which contains commercial asbestos in an amount greater than 1%.

Less than 1% Asbestos: Materials that are found to contain less than 1% asbestos by standard polarized light microscopy (PLM) may be considered non-asbestos (by EPA/AQMD) if confirmation analysis is performed. To be treated as a non-asbestos material, the EPA and AQMD require analytical verification by PLM Point Count (or better). This verification is required because the standard PLM analysis is not sensitive enough to accurately determine asbestos content at or below 1%. In certain situations, there may be some cost advantages to making this characterization. The decision to do so is evaluated on a case-by-case basis at the client's request.

Regulated Asbestos-Containing Material (RACM): RACM includes friable (easily crumbled) ACM, or Category I nonfriable ACM that has or will become friable or that has been subjected to sanding, drilling, grinding, cutting, or abrading, or Category II nonfriable ACM that may become or has become crumbled, pulverized, or reduced to powder.

Friable: Materials that can be crumbled, pulverized, or reduced to powder, when dry, by hand pressure.

Non-Friable: Materials that **cannot** be easily crumbled, pulverized, or reduced to powder, when dry, by hand pressure. Non-friable materials are categorized by EPA/AQMD as follows:

- *Category I Nonfriable ACM:* Asbestos-containing packings, gaskets, resilient floor coverings, mastics and asphalt roofing products.

- *Category II Nonfriable ACM:* Asbestos-containing material, excluding Category I nonfriable asbestos-containing material, that, when dry, and in its present form, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

LEAD REGULATORY NOTES

Lead-Based Paint (LBP)

	MATERIAL DESCRIPTION	REGULATORY ASSESSMENT GOVERNING REGULATIONS
1.	Lead-based paint components (LBP)	• Cal OSHA standards apply if LBP will be disturbed by employees/workers • CDPH standards apply of lead "abatement" is performed • DTSC requires characterization of waste and proper disposal • US EPA standards apply if LBP is disturbed in a children occupied site
2.	Lead containing materials (LCM)	• Cal OSHA standards apply if LCM will be disturbed by employees • CDPH standards apply if worker exposure standards are exceeded • DTSC requires characterization of waste and proper disposal
3.	No Lead Detected by XRF	• Cal OSHA standards apply unless paint chip laboratory analysis confirms non-lead
4.	No Lead Detected by Paint-chip	• No regulations apply

Regulatory Assessment Notes

California Occupational Safety & Health Administration (Cal OSHA):
• Regulates any detectable amount of lead (does not have to be LBP) when trigger tasks are performed
• Requires worker training
• Regulates employee safety during lead-related work
• Enforces proper work practices
• Requires notification when 100 sq ft (or more) of LBP is disturbed.

California Department of Public Health (CDPH):
• Regulates "abatement" of Lead-based paint
• Requires *accredited* training for workers and supervisors
• Provides certification of workers and supervisors performing abatement
• Mandates lead abatement be performed in accordance with US HUD guidelines
• Defines "abatement" as an action performed for the purpose and intent of reducing or eliminating a lead "hazard"
• Requires notification when abatement is performed

California Department of Toxic Substance Control (DTSC):
• Regulates disposal of lead waste
• Requires testing of waste stream to characterize hazard level

US Environmental Protection Agency (US EPA):
• Regulates Lead-based paint in child occupied facilities
• Regulates work involving the disturbance of as little as 6 sq ft of interior & 20 sq ft exterior LBP
• Requires *accredited* training for workers and supervisors
• Requires certification of companies performing LBP work
• Mandates minimal work practices

Lead Discussion

Lead-Based Paint & Lead Containing Materials

Lead-based paint (LBP) is defined as a material/coating/paint which contains a lead content at or in excess of 5,000 parts per million (PPM), 0.5% by weight, or 1 mg/cm^2 (by XRF). Materials containing a lead content below these levels are not considered LBP and are not considered a hazard by most regulatory agencies. However, the dust from materials containing low levels of lead can produce a lead hazard if enough lead dust accumulates.

Cal OSHA Trigger Tasks

Cal OSHA defines lead paint at the Consumer Product Safety Commission's (CPAC) level of 600 ppm for non-trigger tasks. However, Cal OSHA regulates **any detectable amount of lead** when trigger tasks are conducted.

The following table lists the Cal OSHA trigger tasks, presumed exposure and the type of respiratory protection that is required while performing those tasks:

Cal OSHA Trigger Task	Presumed Exposure	Required Respiratory Protection
• Manual demolition • Manual scraping and sanding • Heat gun use • Use of power tools with dust collection systems • Spray painting with lead paint • Any other activity that the employer has any reason to believe that an employee may be exposed in excess of the PEL.	50-100 µm/m^3	Half-mask, air purifying
• Using lead containing mortar • Lead burning • Rivet busting • Power tool cleaning without dust collection system • Clean-up of dry abrasive blast residue.	500-2500 µm/m^3	Full-face, air purifying, or Tight fitting PAPR, or Supplied air, contiguous flow
• Abrasive blasting • Welding • Cutting • Torch burning.	>2500 µm/m^3	Supplied air, pressure demand

Survey & Report Limitations

- Scope of work limitations were established by the Client to include items of interest and concern to the Client. *ProTech* is only responsible for the specific scope of work performed. No other services are intended or implied.

- This report has been prepared for the exclusive use of ProTech's client and is not intended for use by any other party. The scope of work and results presented in this report may not be appropriate for uses by any other party. Any use by a third party of this report shall be at their own risk and shall constitute a release and an agreement to defend and indemnify ProTech from

any and all liability in connection therewith whether arising out of *ProTech's* negligence or otherwise.

- This project may contain undiscovered asbestos in areas that were not accessible or identified during ProTech's survey. Suspect asbestos may be discovered during demolition, renovation, or maintenance. If suspect asbestos is discovered, stop all work that could impact asbestos to allow properly trained personnel to perform sampling and or removal.

- This report and it's evaluations/conclusions are based on the current condition of the project. This report does not assess or anticipate future events that may impact or damage asbestos materials. Future changes in the condition of asbestos materials will require a new assessment by a certified asbestos consultant/technician.

- The quantities of asbestos stated in this report are approximations. This report is not a work plan or project specification. Contractors should not rely on this document for bidding purposes.

- Reasonable efforts were made to examine below **carpeted areas and resilient floor coverings** to determine and quantify the presence of suspect asbestos materials. ProTech accepts no liability for additional materials or under-reporting of asbestos materials which exist below other floor coverings.

- **Glass fiber insulated mechanical systems** were inspected as completely as possibly without destroying the integrity of the glass fiber insulation. The condition and presence or absence of asbestos associated with mechanical systems is assumed to be consistent with those areas exposed and examined during our inspection. However, ProTech does not guarantee that this is the case.

Survey Approach

Inspection & Sample Collection

ProTech performed a survey of the project to identify and document accessible suspect asbestos. Identified suspect asbestos materials categorized by homogenous area and sampled. Samples were collected by misting small areas with water, then cutting or scraping the sample from the substrate with an appropriate sampling tool. Whenever possible, samples were collected from areas previously damaged or deteriorating. No building systems, components, or structures were demolished to obtain samples of potentially hidden ACM.

Each suspect bulk sample was sealed in its own Zip-lock plastic container and labeled with a unique identification number. Sampling tools were individually cleaned before and after each sample was collected to avoid sample cross contamination. Decontamination was accomplished using single-use, pre-moistened cloths.

Sample information was recorded on ProTech's chain-of-custody form. This form accompanied the samples to a laboratory possessing accreditation from the National Voluntary Laboratory

Accreditation Program (NVLAP). Samples were submitted to Forensic Analytical Services, Inc. of Hayward, California.

Sample Analysis

Bulk sample analysis was conducted in accordance with the EPA interim method for determination of asbestos in bulk materials. Samples were first examined by a stereoscopic microscope for determination of homogeneity and preliminary evaluation of composition and presence of fibers. Fibers observed during this examination were then mounted in various refractive index oils and examined in polarized light. During this examination, all minerals and/or man-made materials were identified and the percentages of each were estimated and/or counted.

Evaluation of Asbestos-Containing Materials

In evaluating each asbestos material, the adhesion of the asbestos material to the underlying substrate, deterioration, and damage from vandalism or any other cause was assessed. Evidence of debris on horizontal surfaces, hanging material, dislodged chunks, scraping, indentations, cracking, etc. would be indicators of poor material condition.

Accidental or deliberate physical contact with asbestos materials can result in damage. Inspectors looked for any evidence that asbestos-containing materials had been disturbed. Indicators such as: finger marks in the material, graffiti, pieces dislodged or missing, scraping marks from movable equipment, or furniture, or an accumulation of suspect asbestos dust or debris on floors, shelves, or other horizontal surfaces indicate poor material condition.

Asbestos-containing materials may deteriorate as a result of either the quality of the installation or environmental factors which affect the cohesive strength of the asbestos-containing material or the strength of the adhesion to the substrate. Deterioration can result in an accumulation of dust on the surface of the asbestos-containing material, delamination of the material, or an adhesive failure of the material where it pulls away from the substrate and either hangs loosely or falls to the floor and exposes the substrate. Inspectors touch the asbestos-containing material to determine if dust is released when the material is lightly brushed or rubbed.

Conclusions & Recommendations

Asbestos Removal

ACM should be removed prior to activity that may disturb it. Prior to ACM disturbance/removal, the following should be performed:

Task		Task Description	Fee
1.	**Prepare Project Specification**	Prepare a written scope of work & instructions to bidders (site plans not included).	$800.00 - $1,200.00
2.	**Bid Review and Contractor Selection**	Select qualified contractors (prospective bidders), review bids and award contract.	$680.00
3.	**Project Monitoring & Oversight**	Monitoring asbestos abatement work and document contractor compliance.	Pricing upon request
4.	**Project Clearance**	Perform final inspection and collect air	Pricing upon request

		samples to certify work area clearance.	

LEAD

- Cal OSHA worker protection rules, CDPH certification requirements, US EPA standards, and DTSC disposal requirements need to be assessed by each contractor/employer who performs work on this project.

- Contractors, whose employees work at this site, are required to assess if their work will be subject to the requirements of the Cal OSHA lead construction standard (CCR Title 8 § 1532). Cal OSHA standards are designed to regulate and enforce on-the-job worker safety. Employers are required by law to ensure that employees are not exposed to airborne lead levels which exceed the permissible exposure limit (PEL). The standard requires worker exposure monitoring, medical surveillance, training, special work practices, etc.

- Each contractor/employer who bids and/or performs work at the site will need to assess potential lead exposure to employees performing their particular scope of work. Contractors who perform work at this site may need to obtain additional data (beyond the data presented in this report) during their assessment and Cal OSHA compliance planning. Individual contractors/sub-contractors should be allowed access to the project to obtain any needed data (samples, consultation, etc.) to complete their employee exposure assessment.

- ProTech recommends that the building owner and/or general contractor disseminate this report as well as any other lead-related information to all prospective contractors bidding work at the subject site.

- Contractors, whose employees disturbs more that 100 sq ft of lead-based paint (LBP), are required to submit written notification to Cal OHSA (per Health and Safety Code, Title 17 CCR Section 36000 (c)). The Cal OSHA LBP notification rule requires 24-hour advance notice prior to LBP disturbance.

- Any work performed at the site where LBP or LCP is likely to be disturbed should be performed by a contractor trained and qualified to perform lead-related construction work. Any work that exceeds Cal OSHA's permissible exposure limit or is performed to remediate a lead hazard must be conducted by CDPH certified personnel. All lead related work should be conducted employing lead work practices in accordance with HUD guidelines.

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Environmental Services

Job # 064.MA16

P.O. # 0226 064.33

General Information

Date: 02.26.2016

Job ID: PARKWAY MS. S.S.F.

CLASSROOMS 17-21/29-33

Collected By: RN/ED

Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold
- ☐ Other

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☑ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-05 06 07	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC - SMOOTH SRTC W/TEXT SRSURF TEXT	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 08-10 11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 CT'S W/MASTIC VAPOR BARRIER	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 12-13 14-15 16	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	PLASTER FIBROUS WOOD PANELS TSI PIPE	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 17 18 19	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TSI ELBOW TRANSITE PIPE TAR INSUL.	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 20-25 26-27	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/ MASTIC MASTIC	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 28-29 30-31	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TERRAZO FLOOR MORTAR	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 32-33	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		

CHAIN OF CUSTODY

Relinquished By:	Date/Time	Received By:	Date/Time
	02.26.2016	RECEIVED FEB 26 2016	

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: B217368
Date Received: 02/29/16
Date Analyzed: 03/02/16
Date Printed: 03/02/16
First Reported: 03/02/16

Job ID/Site: 064-MA16, 0226-064-33 - Parkway MS, SSF, Classrooms 17-21/29-33

Date(s) Collected: 02/26/2016

FALI Job ID: 1454
Total Samples Submitted: 33
Total Samples Analyzed: 33

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
01	11736090						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
02	11736091						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
03	11736092						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
04	11736093						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
05	11736094						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							

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Report Number: B217368

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
06	11736095						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Off-White Tape			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (ND)**					
07	11736096						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (ND)**					
08	11736097						
Layer: Brown Mastic			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %) Talc (Trace)		**Asbestos (ND)**					
09	11736098						
Layer: Brown Mastic			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %) Talc (Trace)		**Asbestos (ND)**					
10	11736099						
Layer: Brown Mastic			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %) Talc (Trace)		**Asbestos (ND)**					
11	11736100						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (80 %)		**Asbestos (ND)**					
12	11736101						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

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Report Number: B217368

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
13	11736102						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
14	11736103						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
15	11736104						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
16	11736105						
Layer: Tan Fibrous Material		Chrysotile	**5 %**				
Layer: Beige Woven Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (5%)**					
17	11736106						
Layer: White Semi-Fibrous Material		Chrysotile	**10 %**	Amosite	**2 %**	Crocidolite	**2 %**
Layer: Tan Woven Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (5 %)		**Asbestos (13%)**					
18	11736107						
Layer: Grey Semi-Fibrous Material		Chrysotile	**15 %**	Crocidolite	**2 %**		
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (17%)**					
19	11736108						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components: Cellulose (30 %)		**Asbestos (ND)**					
20	11736109						
Layer: Blue Tile			**ND**				
Layer: Black/Tan Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

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Report Number: B217368
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Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
21	11736110						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
22	11736111						
Layer: Blue Tile			**ND**				
Layer: Tan Mastic			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
23	11736112						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
24	11736113						
Layer: Blue Tile			**ND**				
Layer: Tan Mastic			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
25	11736114						
Layer: Blue Tile			**ND**				
Layer: Tan Mastic			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
26	11736115						
Layer: Paint			**ND**				
Layer: Off-White Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
27	11736116						
Layer: Paint			**ND**				
Layer: Off-White Mastic			**ND**				
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
28	11736117						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					

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Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
29	11736118						
Layer: Tan Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
30	11736119						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
31	11736120						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
32	11736121						
Layer: Off-White Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
33	11736122						
Layer: Off-White Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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Phone: (650) 569-4020 Fax: (650) 569-4023
info@protech-cal.com
Environmental Services

Job # 064.MA16

P.O. # 0226.064.23

General Information

Date: 02.26.2016

Job ID: PARKWAY M.S. SSF CLASSROOMS 14-16 / 26-28

Collected By: RN/ED

Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-02	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC W/ TEXT	on / off / pump#	on / end / Ave / Roto#		
03-04			SR SURF TEXT				
# 05-07	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC-SMOOTH	on / off / pump#	on / end / Ave / Roto#		
08-10			1X1 NAILED UP CTS				
# 11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 GLUED UP CT'S	on / off / pump#	on / end / Ave / Roto#		
12			VAPOR BARRIER				
# 13	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	PLASTER	on / off / pump#	on / end / Ave / Roto#		
14			VAPOR BARRIER				
# 15	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	FIBROUS WOOD PANEL	on / off / pump#	on / end / Ave / Roto#		
16-17			MASTIC				
# 18-19	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/ MASTIC ↓ ↓	on / off / pump#	on / end / Ave / Roto#		
20-21							
# 22-23	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on / off / pump#	on / end / Ave / Roto#		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on / off / pump#	on / end / Ave / Roto#		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on / off / pump#	on / end / Ave / Roto#		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: B217379
Date Received: 02/29/16
Date Analyzed: 03/02/16
Date Printed: 03/02/16
First Reported: 03/02/16

Job ID/Site: 064-MA16, 0226-064-23 - Parkway M.S., SSF, Classrooms 14-16/26-28

Date(s) Collected: 2/26/16

FALI Job ID: 1454
Total Samples Submitted: 23
Total Samples Analyzed: 23

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
01	11736318						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: Off-White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
02	11736319						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: Off-White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
03	11736320						
Layer: White Drywall			**ND**				
Layer: Off-White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
04	11736321						
Layer: White Drywall			**ND**				
Layer: Off-White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
05	11736322						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Texture		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							

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Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
06	11736323						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Texture		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (Trace)**					
07	11736324						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Texture		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (Trace)**					
08	11736325						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
09	11736326						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
10	11736327						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
11	11736328						
Layer: Brown Mastic			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
12	11736329						
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components: Cellulose (55 %)		**Asbestos (ND)**					

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Report Number: B217379

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Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
13	11736330						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
14	11736331						
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components: Cellulose (55 %)		**Asbestos (ND)**					
15	11736332						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
16	11736333						
Layer: White Mastic			**ND**				
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
17	11736334						
Layer: White Mastic			**ND**				
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
18	11736335						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
19	11736336						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
20	11736337						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

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Report Number: B217379

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
21	11736338						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
22	11736339						
Layer: Grey Non-Fibrous Material		Chrysotile	**2 %**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (2%)**					
23	11736340						
Layer: Grey Non-Fibrous Material		Chrysotile	**2 %**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (2%)**					

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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info@protech-cal.com

Environmental Services

Page 1 of 1
Job # 064.MA16
P.O. # 0226.064.20

General Information

Date: 02.26.2016
Job ID: PARKWAY MS, SSF.

ADMIN

Collected By: RN/ED
Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off.	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-05	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC - SMOOTH	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
06			SRTCW/TEXT				
# 07	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SR SURF TEXT	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
08			MASTIC				
# 09	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	ADHESIVE	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
10			MASTIC				
# 11-12	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 NAILED UP CTS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
13			FIBROUS WOOD PANEL				
# 14-15	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/ MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
16-17			↓ ↓				
# 18-19	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 20	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

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Relinquished By:	Date/Time	Received By:	Date/Time
	02.26.2016		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: B217369
Date Received: 02/29/16
Date Analyzed: 03/02/16
Date Printed: 03/02/16
First Reported: 03/02/16

Job ID/Site: 064-MA16, 0226-064-20 - Parkway MS, SSF, Admin

Date(s) Collected: 02/26/2016

FALI Job ID: 1454
Total Samples Submitted: 20
Total Samples Analyzed: 20

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
01	11736123						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: White Tape			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
02	11736124						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
03	11736125						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
04	11736126						
Layer: White Drywall			**ND**				
Layer: Tan Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Tan Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							

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Report Number: B217369

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
05	11736127						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (Trace)**					
06	11736128						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Texture		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (Trace)**					
07	11736129						
Layer: White Drywall			**ND**				
Layer: White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (ND)**					
08	11736130						
Layer: Black Mastic		Chrysotile	**2 %**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
09	11736131						
Layer: Yellow Adhesive			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
10	11736132						
Layer: Tan Mastic			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
11	11736133						
Layer: Tan Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (99 %)		**Asbestos (ND)**					
12	11736134						
Layer: Tan Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (99 %)		**Asbestos (ND)**					

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Report Number: B217369

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
13	11736135						
Layer: Tan Mastic			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
14	11736136						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
Comment: Additional sampling and/or analyses may be necessary to detect asbestos in the black mastic.							
15	11736137						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Black Mastic		Chrysotile	**Trace**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (Trace)**					
16	11736138						
Layer: Blue Tile			**ND**				
Layer: Black Mastic		Chrysotile	**Trace**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (Trace)**					
17	11736139						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
18	11736140						
Layer: Yellow/Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
19	11736141						
Layer: Yellow/Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
20	11736142						
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

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Report Number: B217369

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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ProTech
Consulting & Engineering
1208 Main Street, Redwood City, CA 94063
Phone: (650) 569-4020 Fax: (650) 569-4023
info@protech-cal.com
Environmental Services

Page 1 of 1
Job # 064-M416
P.O. #0226-064-18

General Information

Date: 02-26-16
Job ID: Parkway M.S. S.S.F.
Bldg. 9-13
Collected By: RN/ED
Lab: EMSI

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold
- ☐ Other

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-05 06-08	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SR. 1X1 C.T.	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 09 10-11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 C.T. w/Mastic B.B.M.	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 12 13-14	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	Counter top 12X12 VFT w/Mastic	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 15-16 17-18	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	" Blazing	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

CHAIN OF CUSTODY

Relinquished By:	Date/Time	Received By:	Date/Time
		RECEIVED FEB 29 2016	

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: B217362
Date Received: 02/29/16
Date Analyzed: 03/02/16
Date Printed: 03/02/16
First Reported: 03/02/16

Job ID/Site: 064-MA16, 0226-064-18 - Parkway MS. SSF, Bldg 9-13

Date(s) Collected: 02/26/2016

FALI Job ID: 1454
Total Samples Submitted: 18
Total Samples Analyzed: 18

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
01	11736027						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %)		**Asbestos (ND)**					
02	11736028						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %)		**Asbestos (ND)**					
03	11736029						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (ND)**					
04	11736030						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (ND)**					

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Report Number: B217362

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
05	11736031						
Layer: White Drywall			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: White Skimcoat/Joint Compound			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (ND)**					
06	11736032						
Layer: Brown Semi-Fibrous Material			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
07	11736033						
Layer: Brown Semi-Fibrous Material			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
08	11736034						
Layer: Brown Semi-Fibrous Material			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
09	11736035						
Layer: Yellow Mastic			**ND**				
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (70 %) Fibrous Glass (10 %)		**Asbestos (ND)**					
10	11736036						
Layer: Beige Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
11	11736037						
Layer: Beige Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
12	11736038						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					

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Report Number: B217362

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
13	11736039						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
14	11736040						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
15	11736041						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
16	11736042						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
17	11736043						
Layer: Grey Non-Fibrous Material		Chrysotile	**Trace**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
18	11736044						
Layer: Grey Non-Fibrous Material		Chrysotile	**Trace**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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ProTech
Consulting & Engineering
1208 Main Street, Redwood City, CA 94063
Phone: (650) 569-4020 Fax: (650) 569-4023
info@protech-cal.com
Environmental Services

Job # 064-MA16

P.O. # 0226-064-15

General Information

Date: 02-26-16

Job ID: Parkway M.S. S.S.F.

Library

Collected By: ~~AR~~ RN

Lab: EAST

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-03	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	Drywall	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 04-06	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	S.Text.	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 07-09	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 C.T.	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 10-11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	W. Panels	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 12-13	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT w/m	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 14-15	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	Mastic	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

CHAIN OF CUSTODY

Relinquished By:	Date/Time	Received By:	Date/Time

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: B217364
Date Received: 02/29/16
Date Analyzed: 03/02/16
Date Printed: 03/02/16
First Reported: 03/02/16

Job ID/Site: 064-MA16, 0226-064-15 - Parkway MS, SSF, Library

Date(s) Collected: 02/26/2016

FALI Job ID: 1454
Total Samples Submitted: 15
Total Samples Analyzed: 15

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
01	11736051						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
02	11736052						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
03	11736053						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
04	11736054						
Layer: White Drywall			**ND**				
Layer: Off-White Texture		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

Report Number: B217364

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
05	11736055						
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Texture		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (5 %)		**Asbestos (2%)**					
06	11736056						
Layer: White Drywall			**ND**				
Layer: Off-White Texture		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (Trace)**					
07	11736057						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
08	11736058						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
09	11736059						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
10	11736060						
Layer: Brown Mastic			**ND**				
Layer: White Fibrous Material			**ND**				
Layer: Brown Non-Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (5 %)		**Asbestos (ND)**					
11	11736061						
Layer: Brown Mastic			**ND**				
Layer: White Fibrous Material			**ND**				
Layer: Brown Non-Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (5 %)		**Asbestos (ND)**					

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Report Number: B217364

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
12	11736062						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
13	11736063						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
14	11736064						
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
15	11736065						
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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info@protech-cal.com
Environmental Services

Job # 064.MA16

P.O. # 0226.064.17

General Information

Date: 02.26.2016

Job ID: PARKWAY M.S., SSF

MAT ROOM

Collected By: RN/EA

Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-03	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC - SMOOTH	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 04.05	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 NAILED UP CTS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 06	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	VAPOR BARRIER	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
07			HVAC TAPE				
# 08	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TRANSITE WINDOW PANELS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
09			STUCCO				
# 10	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
11-12			RES. MASTIC				
# 13-14	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 15	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	STUCCO	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 16	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TERRAZO FLOOR	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 17	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MORTAR	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: B217377
Date Received: 02/29/16
Date Analyzed: 03/02/16
Date Printed: 03/02/16
First Reported: 03/02/16

Job ID/Site: 064-MA16, 0226-064-17 - Parkway M.S., SSF, Mat Room

Date(s) Collected: 02/26/2016

FALI Job ID: 1454
Total Samples Submitted: 17
Total Samples Analyzed: 17

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
01	11736276						
Layer: Tan Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Tan Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %)		**Asbestos (Trace)**					
02	11736277						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (ND)**					
03	11736278						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %)		**Asbestos (Trace)**					
04	11736279						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
05	11736280						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					

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Report Number: B217377

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
06	11736281						
Layer: Tan Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (40 %)		**Asbestos (ND)**					
07	11736282						
Layer: White Tape			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %)		**Asbestos (ND)**					
08	11736283						
Layer: Grey Semi-Fibrous Material		Chrysotile	**10 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (10%)**					
09	11736284						
Layer: Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
10	11736285						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
11	11736286						
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (5%)**					
12	11736287						
Layer: Yellow/Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
13	11736288						
Layer: Off-White Non-Fibrous Material		Chrysotile	**Trace**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
14	11736289						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					

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Report Number: B217377

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
15	11736290						
Layer: Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
16	11736291						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
17	11736292						
Layer: Off-White Mortar			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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Environmental Services

Job # 064.MA16

P.O. # 0226.064.16

General Information

Date: 02.26.2016

Job ID: PARKWAY M.S., SSF

CLASSROOMS 1-6

Collected By: RN/ED

Lab: FAST

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☑ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-03	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC - SMOOTH	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 04-06	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 NAILED UP CTS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 07-10	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	HVAC TAPE	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 12 13	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SINK UNDERCOATING MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 14	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	RES. ROOF CURB	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 15-16	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: B217380
Date Received: 02/29/16
Date Analyzed: 03/02/16
Date Printed: 03/02/16
First Reported: 03/02/16

Job ID/Site: 064-MA16, 0226-064-16 - Parkway M.S., SSF, Classrooms 1-6

Date(s) Collected: 02/26/2016

FALI Job ID: 1454
Total Samples Submitted: 16
Total Samples Analyzed: 16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
01	11736341						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %)		**Asbestos (Trace)**					
02	11736342						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %)		**Asbestos (Trace)**					
03	11736343						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %)		**Asbestos (Trace)**					
04	11736344						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
05	11736345						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					

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Report Number: B217380

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
06	11736346						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
07	11736347						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
08	11736348						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
09	11736349						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
10	11736350						
Layer: Blue Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
11	11736351						
Layer: White Tape			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %)		**Asbestos (ND)**					
12	11736352						
Layer: Black Coating		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (5%)**					
13	11736353						
Layer: Off-White Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
14	11736354						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components: Cellulose (60 %)		**Asbestos (ND)**					

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Report Number: B217380

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
15	11736355						
Layer: Grey Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
16	11736356						
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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Environmental Services

Job # 064.MA16

P.O. # 0226.064.22

General Information

Date: 02.26.2016

Job ID: PARKWAY M.S., SSF

MUR

Collected By: RN/ED

Lab: FAS1

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold
- ☐ Other

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-05 06-09	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC-SMOOTH 1X1 CT'S W/MASTIC	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 10-11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 CT's - NAILED UP	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 12-13 14-17	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MASTIC 12X12 VETW/ MASTIC	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 18 19	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TEXTURED MORTAR	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 20	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	STUCCO	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 21-22	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: B217365
Date Received: 02/29/16
Date Analyzed: 03/02/16
Date Printed: 03/02/16
First Reported: 03/02/16

Job ID/Site: 064-MA16, 0226-064-22 - Parkway MS, SSF, MUR

Date(s) Collected: 02/26/2016

FALI Job ID: 1454
Total Samples Submitted: 22
Total Samples Analyzed: 22

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
01	11736066						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %)							
02	11736067						
Layer: White Drywall			**ND**				
Layer: Tan Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Tan Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
03	11736068						
Layer: White Drywall			**ND**				
Layer: White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
04	11736069						
Layer: White Drywall			**ND**				
Layer: White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							

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Report Number: B217365

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
05	11736070						
Layer: White Drywall			**ND**				
Layer: Paint			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %)		**Asbestos (ND)**					
06	11736071						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Layer: White Mastic			**ND**				
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (60 %) Fibrous Glass (15 %)		**Asbestos (ND)**					
07	11736072						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Layer: White Mastic			**ND**				
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (60 %) Fibrous Glass (15 %)		**Asbestos (ND)**					
08	11736073						
Layer: Brown Mastic			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
09	11736074						
Layer: Brown Mastic			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
10	11736075						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					
11	11736076						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					

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Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
12	11736077						
Layer: White Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
13	11736078						
Layer: White Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
14	11736079						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
15	11736080						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
16	11736081						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
17	11736082						
Layer: Blue Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
18	11736083						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
19	11736084						
Layer: White Mortar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
20	11736085						
Layer: Light Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Layer: Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

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Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
21	11736086						
Layer: Grey Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
22	11736087						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Analytical results and reports are generated by Forensic Analytical Laboratories Inc. (FALI) at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by FALI to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by FALI. The client is solely responsible for the use and interpretation of test results and reports requested from FALI. Forensic Analytical Laboratories Inc. is not able to assess the degree of hazard resulting from materials analyzed. FALI reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. All samples were received in acceptable condition unless otherwise noted.

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ProTech
Consulting & Engineering
1208 Main Street, Redwood City, CA 94063
Phone: (650) 569-4020 Fax: (650) 569-4023
info@protech-cal.com
Environmental Services

Job # 064.MA16

P.O. # 0226.064.25

General Information

Date: 02.26.2016

Job ID: PARKWAY M.S., SSF ROOFS & BREEZEWAYS

Collected By: RN/ED

Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-18	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	T & G ROOF	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 19-20	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	ROOF CURBS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 21	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	ROOF MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 22	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SBTC - SMOOTH	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 23	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 24	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	ROOF CURB	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 25	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	Pipe Jacket	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

CHAIN OF CUSTODY

Relinquished By:	Date/Time	Received By:	Date/Time
	02.26.2016		

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Corporate Office:

Forensic Analytical
3777 Depot Road, Suite 409
Hayward, CA 94545-2761
Telephone: 510/266-8170

Send payments to:
Forensic Analytical Laboratories, Inc.
PO Box 8407
Pasadena, CA 91109-8407
Federal Tax ID #20-5804861

Invoice 30550980

Invoice Date 03/02/16
Customer # 1454

For questions, email ar@falaboratories.com or call Accounts Receivable at 310/668-5602.

Bill To: Protech Consulting & Engineers Inc.

Atn: Accounts Payable
1208 Main St.
Redwood City, CA 94063 USA
650/569-4020

Report To: Protech Consulting & Engineers Inc.
Attn: Project Manager

1208 Main St.
Redwood City, CA 94063 USA
650/569-4020

FALI Job No.	1454	PO/Contract	0226-064-25	Terms	Net 45 Days

Date	Description	Reference/Report	Qty	Unit	Unit Price	Extended Price
03/02/16	Complex Matrices (greater than 3 layers) 48 Hour	B217378	20.00	Each	14.00	280.00
	Received Date: 02/29/16 Report Date: 03/02/16					
03/02/16	PLM/Bulk Sample 48 Hour	B217378	5.00	Each	7.00	35.00
	Received Date: 02/29/16 Report Date: 03/02/16					

SILICA IN AIR

We are proud to announce that we will be offering airborne Silica Analysis by FTIR (NIOSH 7603) beginning in early 2016! Contact us for pricing and turnaround times.

ROTAMETER CALIBRATION

As a related service to asbestos air PCM analysis, we also offer rotameter calibrations. We can calibrate rotameter types typically used in asbestos, lead, and mold air sampling: Low flow meters often used in "personal" air sampling, 0.4-4 lpm(A). High flow meters often used in "area" air sampling, 2-20 lpm and 3-30 lpm(B).

Reference: 064-MA16, 0226-064-25 - Parkway M.S., SSF, Roofs + Breezeways

Subtotal	315.00
Tax	0.00
Total Due	315.00

Please reference invoice 30550980 and customer # 1454 on your payment. Thank you.

Please send payments to Forensic Analytical Laboratories, Inc., PO Box 8407, Pasadena, CA 91109-8407

Past due balances are subject to late charges of up to 1.5% per month

Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: B217378
Date Received: 02/29/16
Date Analyzed: 03/02/16
Date Printed: 03/02/16
First Reported: 03/02/16

Job ID/Site: 064-MA16, 0226-064-25 - Parkway M.S., SSF, Roofs + Breezeways

FALI Job ID: 1454
Total Samples Submitted: 25
Total Samples Analyzed: 25

Date(s) Collected: 02/26/2016

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
01	11736293						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
02	11736294						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							

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Report Number: B217378

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
03	11736295						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
04	11736296						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
05	11736297						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							

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Report Number: B217378

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
06	11736298						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
07	11736299						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
08	11736300						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							

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Report Number: B217378

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
09	11736301						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
10	11736302						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
11	11736303						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							

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Report Number: B217378

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
12	11736304						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
13	11736305						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
14	11736306						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							

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Report Number: B217378

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
15	11736307						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
16	11736308						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
17	11736309						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							

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Report Number: B217378

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
18	11736310						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
19	11736311						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
20	11736312						
Layer: White Roof Shingle			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
21	11736313						
Layer: Black Mastic		Chrysotile	**10 %**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
Cellulose (Trace)							
22	11736314						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							

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Report Number: B217378

Client Name: Protech Consulting & Engineers Inc. **Date Printed:** 03/02/16

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
23	11736315						
Layer: Grey Putty		Chrysotile	**5 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (5%)**					
Cellulose (Trace)							
24	11736316						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							
25	11736317						
Layer: Black Tar			**ND**				
Layer: Yellow Coating			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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Job # 064.MA16

P.O. # 0226.064.16

General Information

Date: 02.26.2016

Job ID: PARKWAY M.S., SSF

CLASSROOMS 1-6

Collected By: RN/ED

Lab: FAST

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☑ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-03	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC - SMOOTH	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 04-06	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 NAILED UP CTS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 07-10	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	HVAC TAPE	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 12 13	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SINK UNDERCOATING MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 14	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	RES. ROOF CURB	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 15-16	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008033
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-16 - Parkway M.S., SSF, Classrooms 1-6

PLM Report Number: B217380

FALI Job ID: 1454
Total Samples Submitted: 1
Total Samples Analyzed: 1

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
01	11736341	**Composite of ALL Layers** White Drywall Off-White Joint Compound White Tape Off-White Joint Compound Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%.

Note: Point count results are reported to the nearest percent per EPA method.

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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Page 1 of 1
Job # 064-M416
P.O. #0226-064-18

General Information

Date: 02-26-16
Job ID: Parkway M.S. S.S.F.
Bldg. 9-13
Collected By: RN/ED
Lab: EMSI

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold
- ☐ Other

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-05 06-08	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SR. 1X1 C.T.	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 09 10-11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 C.T. w/Mastic B.B.M.	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 12 13-14	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	Counter top 12X12 VFT w/Mastic	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 15-16 17-18	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	" Blazing	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008034
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-18 - Parkway MS. SSF, Bldg 9-13

PLM Report Number: B217362

FALI Job ID: 1454
Total Samples Submitted: 2
Total Samples Analyzed: 2

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
17	11736043	**Grey Non-Fibrous Material**

Point Count Results:

Number of asbestos points counted:	1
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment:

Sample ID	Lab Number	Layer Description
18	11736044	**Grey Non-Fibrous Material**

Point Count Results:

Number of asbestos points counted:	1
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment:

Note: Point count results are reported to the nearest percent per EPA method.

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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Job # 064.MA16

P.O. # 0226.064.23

General Information

Date: 02.26.2016

Job ID: PARKWAY M.S. SSF CLASSROOMS 14-16 / 26-28

Collected By: RN/ED

Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-02	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC W/ TEXT	on / off / pump#	on / end / Ave / Roto#		
03-04			SR SURF TEXT				
# 05-07	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC-SMOOTH	on / off / pump#	on / end / Ave / Roto#		
08-10			1X1 NAILED UP CTS				
# 11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 GLUED UP CT'S	on / off / pump#	on / end / Ave / Roto#		
12			VAPOR BARRIER				
# 13	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	PLASTER	on / off / pump#	on / end / Ave / Roto#		
14			VAPOR BARRIER				
# 15	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	FIBROUS WOOD PANEL	on / off / pump#	on / end / Ave / Roto#		
16-17			MASTIC				
# 18-19	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/ MASTIC ↓ ↓	on / off / pump#	on / end / Ave / Roto#		
20-21							
# 22-23	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on / off / pump#	on / end / Ave / Roto#		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on / off / pump#	on / end / Ave / Roto#		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on / off / pump#	on / end / Ave / Roto#		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008035
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-23 - Parkway M.S., SSF, Classrooms 14-16/26-28

FALI Job ID: 1454
Total Samples Submitted: 3
Total Samples Analyzed: 3

PLM Report Number: B217379

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
05	11736322	**Composite of ALL Layers** White Drywall Off-White Joint Compound White Tape Off-White Texture Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%. This point count analysis was done without the texture.

22 11736339 **Grey Non-Fibrous Material**

Point Count Results:

Number of asbestos points counted:	3
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment:

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008035
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-23 - Parkway M.S., SSF, Classrooms 14-16/26-28

FALI Job ID: 1454
Total Samples Submitted: 3
Total Samples Analyzed: 3

PLM Report Number: B217379

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
23	11736340	**Grey Non-Fibrous Material**

Point Count Results:

Number of asbestos points counted:	3
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment:

Note: Point count results are reported to the nearest percent per EPA method.

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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Environmental Services

Job # 064.MA16

P.O. # 0226 064.33

General Information

Date: 02.26.2016

Job ID: PARKWAY MS. S.S.F.

CLASSROOMS 17-21/29-33

Collected By: RN/ED

Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold
- ☐ Other

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☑ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-05 06 07	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC - SMOOTH SRTC W/TEXT SRSURF TEXT	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 08-10 11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 CT'S W/MASTIC VAPOR BARRIER	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 12-13 14-15 16	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	PLASTER FIBROUS WOOD PANELS TSI PIPE	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 17 18 19	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TSI ELBOW TRANSITE PIPE TAR INSUL.	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 20-25 26-27	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/ MASTIC MASTIC	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 28-29 30-31	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TERRAZO FLOOR MORTAR	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 32-33	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008036
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-33 - Parkway MS, SSF, Classrooms 17-21/29-33

FALI Job ID: 1454
Total Samples Submitted: 1
Total Samples Analyzed: 1

PLM Report Number: B217368

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
01	11736090	**Composite of ALL Layers** White Drywall Off-White Joint Compound Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%.

Note: Point count results are reported to the nearest percent per EPA method.

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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Consulting & Engineering
1208 Main Street, Redwood City, CA 94063
Phone: (650) 569-4020 Fax: (650) 569-4023
info@protech-cal.com

Environmental Services

Page 1 of 1
Job # 064.MA16
P.O. # 0226.064.20

General Information

Date: 02.26.2016
Job ID: PARKWAY MS, SSF.

ADMIN

Collected By: RN/ED
Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off.	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-05	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC - SMOOTH	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
06			SRTCW/TEXT				
# 07	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SR SURF TEXT	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
08			MASTIC				
# 09	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	ADHESIVE	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
10			MASTIC				
# 11-12	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 NAILED UP CTS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
13			FIBROUS WOOD PANEL				
# 14-15	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/ MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
16-17			↓ ↓				
# 18-19	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 20	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

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	02.26.2016		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008037
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-20 - Parkway MS, SSF, Admin

PLM Report Number: B217369

FALI Job ID: 1454
Total Samples Submitted: 5
Total Samples Analyzed: 2

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
02	11736124	**Composite of ALL Layers** White Drywall Off-White Joint Compound White Tape Off-White Joint Compound Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%.

Sample ID	Lab Number	Layer Description
06	11736128	**Composite of ALL Layers** White Drywall Off-White Joint Compound White Tape Off-White Texture Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%. This point count analysis was done without the texture layer.

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008037
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-20 - Parkway MS, SSF, Admin

PLM Report Number: B217369

FALI Job ID: 1454
Total Samples Submitted: 5
Total Samples Analyzed: 2

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description

Note: Point count results are reported to the nearest percent per EPA method.

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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Environmental Services

Job # 064-MA16

P.O. # 0226-064-15

General Information

Date: 02-26-16

Job ID: Parkway M.S. S.S.F.

Library

Collected By: ~~AR~~ RN

Lab: EAST

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-03	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	Drywall	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 04-06	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	S.Text.	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 07-09	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 C.T.	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 10-11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	W. Panels	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 12-13	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT w/m	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 14-15	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	Mastic	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008038
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-15 - Parkway MS, SSF, Library

FALI Job ID: 1454
Total Samples Submitted: 4
Total Samples Analyzed: 4

PLM Report Number: B217364

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
01	11736051	**Composite of ALL Layers** White Drywall Off-White Skimcoat/Joint Compound White Tape Off-White Skimcoat/Joint Compound Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%.

04 11736054 **Off-White Texture**

Point Count Results:

Number of asbestos points counted:	3
Number of non-empty points:	400
Layer percentage of entire sample:	15
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment:

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008038
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-15 - Parkway MS, SSF, Library

PLM Report Number: B217364

FALI Job ID: 1454
Total Samples Submitted: 4
Total Samples Analyzed: 4

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
05	11736055	**Off-White Texture**

Point Count Results:

Number of asbestos points counted:	3
Number of non-empty points:	400
Layer percentage of entire sample:	45
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment:

Sample ID	Lab Number	Layer Description
06	11736056	**Off-White Texture**

Point Count Results:

Number of asbestos points counted:	3
Number of non-empty points:	400
Layer percentage of entire sample:	15
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment:

Note: Point count results are reported to the nearest percent per EPA method.

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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Phone: (650) 569-4020 Fax: (650) 569-4023
info@protech-cal.com
Environmental Services

Job # 064.MA16

P.O. # 0226.064.17

General Information

Date: 02.26.2016

Job ID: PARKWAY M.S., SSF

MAT ROOM

Collected By: RN/EA

Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-03	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC - SMOOTH	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 04.05	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 NAILED UP CTS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 06	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	VAPOR BARRIER	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
07			HVAC TAPE				
# 08	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TRANSITE WINDOW PANELS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
09			STUCCO				
# 10	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
11-12			RES. MASTIC				
# 13-14	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 15	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	STUCCO	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 16	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TERRAZO FLOOR	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 17	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MORTAR	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008039
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-17 - Parkway M.S., SSF, Mat Room

FALI Job ID: 1454
Total Samples Submitted: 2
Total Samples Analyzed: 2

PLM Report Number: B217377

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
01	11736276	**Composite of ALL Layers** Tan Drywall Off-White Joint Compound White Tape Tan Joint Compound Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%.

Sample ID	Lab Number	Layer Description
13	11736288	**Off-White Non-Fibrous Material**

Point Count Results:

Number of asbestos points counted:	2
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment:

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008039
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-17 - Parkway M.S., SSF, Mat Room

PLM Report Number: B217377

FALI Job ID: 1454
Total Samples Submitted: 2
Total Samples Analyzed: 2

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description

Note: Point count results are reported to the nearest percent per EPA method.

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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ProTech
Consulting & Engineering
1208 Main Street, Redwood City, CA 94063
Phone: (650) 569-4020 Fax: (650) 569-4023
info@protech-cal.com
Environmental Services

Job # 064.MA16

P.O. # 0226.064.22

General Information

Date: 02.26.2016

Job ID: PARKWAY M.S., SSF

MUR

Collected By: RN/ED

Lab: FAS1

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold
- ☐ Other

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-05 06-09	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC-SMOOTH 1X1 CT'S W/MASTIC	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 10-11	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 CT's - NAILED UP	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 12-13 14-17	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MASTIC 12X12 VETW/ MASTIC	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 18 19	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	TEXTURED MORTAR	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 20	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	STUCCO	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
# 21-22	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	GLAZING	on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on ___ off ___ pump# ___	on ___ end ___ Ave ___ Roto# ___		

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	02.26.2016		FEB 29 2016

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008041
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-22 - Parkway MS, SSF, MUR

PLM Report Number: B217365

FALI Job ID: 1454
Total Samples Submitted: 1
Total Samples Analyzed: 1

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
01	11736066	**Composite of ALL Layers** White Drywall Off-White Joint Compound White Tape Off-White Joint Compound Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%.

Note: Point count results are reported to the nearest percent per EPA method.

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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info@protech-cal.com

Environmental Services

Page 1 of 1
Job # 064.MA16
P.O. # 0226.064.20

General Information

Date: 02.26.2016
Job ID: PARKWAY MS, SSF.

ADMIN

Collected By: RN/ED
Lab: EMSL

Analysis Requested

- ☐ PCM NIOSH 7400
- ☐ TEM
  - ○ AHERA
  - ○ Level 2
  - ○ Bulk Quantitative
  - ○ Bulk Qualitative
- ☒ PLM BULK - EPA/600/R/116
- ☐ Lead
  - ○ AA
  - ○ TTLC
  - ○ STLC
  - ○ TCLP
- ☐ Mold _____
- ☐ Other _____

Turn Around Time

- ☐ Rush
- ☐ 12 hours
- ☐ 24 hours
- ☒ 48 hours
- ☐ 3-5 days
- ☐ _____

Special Instructions

☐ Prior Positive

Filter Type: ☐ MCE, 0.8 µm, 25mm ☐ MCE, 0.45µm, 25mm ☐ MCE, 0.8µm, 37mm ☐ Other _____

Sample # / Date	Sample Type	Sample Protocol	Location / Activity / Material Description	Time On/Off.	LPM	Total Min. / Total Vol. / Fibers/Fields	Results
# 01-05	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SRTC - SMOOTH	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
06			SRTCW/TEXT				
# 07	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	SR SURF TEXT	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
08			MASTIC				
# 09	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	ADHESIVE	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
10			MASTIC				
# 11-12	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	1X1 NAILED UP CTS	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
13			FIBROUS WOOD PANEL				
# 14-15	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	12X12 VFT W/ MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
16-17			↓ ↓				
# 18-19	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
# 20	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.	MASTIC	on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		
#	☐ Post ☐ Area ☐ Background ☐ Personal ☐ Blank ☐ Bulk	☐ Amb. ☐ ALS ☐ Agg.		on _____ off _____ pump# _____	on _____ end _____ Ave _____ Roto# _____		

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Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Material Analysis

(EPA Method 600/R-93/116, Point Count Analysis)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008045
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-20 - Parkway MS, SSF, Admin

FALI Job ID: 1454
Total Samples Submitted: 3
Total Samples Analyzed: 3

PLM Report Number: B217369

Sample Preparation and Analysis:

Each sample was prepared using the gravimetric technique. A representative subsample was weighed, ashed for eight hours, and reweighed to determine the proportion of the organic component. The ashed residue was ground in concentrated hydrochloric acid, dried and reweighed to determine the acid-soluble component weight percentage. The residual material was analyzed for asbestos using polarized light microscopy. Asbestos quantitation was performed using the semi-quantitative Point Count method following the general guidelines in EPA Method 600/R-93/116. The analytical sensitivity for the method is calculated as the asbestos concentration that results from one point counted in the analysis adjusted using the residual weight of the sample. The limit of detection for this method has not been determined.

Sample ID	Lab Number	Sample Description

08 11736130 **Black Mastic**

Point Count Results:

Number of asbestos points counted:	40	Organic weight percentage:	1.31
Number of non-empty points:	400	Acid-soluble weight percentage	85.99
Percent asbestos in layer:	**1.27**	Residual weight percentage:	12.71
Analytical sensitivity (%):	0.03		
Asbestos type(s) detected:	Chrysotile		

Comment:

15 11736137 **Black Mastic**

Point Count Results:

Number of asbestos points counted:	69	Organic weight percentage:	74.91
Number of non-empty points:	400	Acid-soluble weight percentage	21.32
Percent asbestos in layer:	**0.65**	Residual weight percentage:	3.77
Analytical sensitivity (%):	0.01		
Asbestos type(s) detected:	Chrysotile		

Comment:

16 11736138 **Black Mastic**

Point Count Results:

Number of asbestos points counted:	43	Organic weight percentage:	63.00
Number of non-empty points:	400	Acid-soluble weight percentage	30.09
Percent asbestos in layer:	**0.74**	Residual weight percentage:	6.91
Analytical sensitivity (%):	0.02		
Asbestos type(s) detected:	Chrysotile		

Comment:

3777 Depot Road, Suite 409, Hayward, CA 94545 / Telephone: (510) 887-8828 (800) 827-FASI / Fax: (510) 887-4218

Forensic Analytical LABORATORIES

Final Report

Bulk Asbestos Material Analysis

(EPA Method 600/R-93/116, Point Count Analysis)

Protech Consulting & Engineers Inc.
Project Manager

1208 Main St.
Redwood City, CA 94063

Client ID: 1454
Report Number: N008045
Date Received: 02/29/16
Date Analyzed: 03/23/16
Date Printed: 03/23/16

Job ID/Site: 064-MA16, 0226-064-20 - Parkway MS, SSF, Admin

PLM Report Number: B217369

FALI Job ID: 1454
Total Samples Submitted: 3
Total Samples Analyzed: 3

Sample Preparation and Analysis:

Each sample was prepared using the gravimetric technique. A representative subsample was weighed, ashed for eight hours, and reweighed to determine the proportion of the organic component. The ashed residue was ground in concentrated hydrochloric acid, dried and reweighed to determine the acid-soluble component weight percentage. The residual material was analyzed for asbestos using polarized light microscopy. Asbestos quantitation was performed using the semi-quantitative Point Count method following the general guidelines in EPA Method 600/R-93/116. The analytical sensitivity for the method is calculated as the asbestos concentration that results from one point counted in the analysis adjusted using the residual weight of the sample. The limit of detection for this method has not been determined.

Sample ID	Lab Number	Sample Description

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

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LEGEND

HOW TO READ THE REPORT

Wall A, is the front wall of the building.
Walls B, C and D go clockwise around the building or room

REPORTS

Summary-- Gives only those readings at or above the action level of 1.0mg/cm2.

Detailed Report—Gives all reading by room and component.
Readings are not in numerical order. This report also gives comments

PAINT CONDITION

I=Intact

F=Fair

P=Poor

Comments

There were 220 readings taken, including calibrations, using the RMD XRF instrument. 20 of the readings registered at or above the action level of 1.0mg/cm2. A contractor practicing Lead Safe Practices should do any repairs or repainting of the actionable areas.

" A copy of this summary report must be provided to new lessees and purchasers of this property under Federal Law (24 CFR part 35 and 40 CFR part 745) before they become obligated under lease or sales contract. The complete report must also be provided to new purchasers and it must be made available to new tenants. Landlords and sellers are also required to distribute an educational pamphlet and include standard warning language in their leases or sales contracts to ensure that parents have the information they need to protect their children from lead-based paint hazards."

Emanuel Dounias
DPH 13095

_____
Date

LEAD PAINT INSPECTION REPORT

REPORT NUMBER: S#01369 - 02/26/16 13:39

INSPECTION FOR: South San Francisco USD.
398 B Street
S. San Francisco, CA

PERFORMED AT: Parkway Mid. School
650 Sunset Ave.
South San Francisco, CA
Old Buildings

INSPECTION DATE: 02/26/16

INSTRUMENT TYPE: R M D
MODEL LPA-1
XRF TYPE ANALYZER
Serial Number: 01369

ACTION LEVEL: 1.1 mg/cm**2

OPERATOR LICENSE: California General

STATEMENT: Lead paint survey as agreed.
No representations are made for any areas not tested.

SIGNED _____ DATE _____

ProTech Consulting & Engineering
1208 Main Street
Redwood City, Ca. 94063
Phone: 650-569-4020
Fax: 650-569-4023

SEQUENTIAL REPORT OF LEAD PAINT INSPECTION FOR: South San Francisco USD.

Inspection Date: 02/26/16
Report Date: 3/1/2016
Abatement Level: 1.1
Report No. S#01369 - 02/26/16 13:39
Total Readings: 220
Job Started: 02/26/16 13:39
Job Finished: 02/26/16 19:31

Parkway Mid. School
650 Sunset Ave.
South San Francisco, CA
Old Buildings

Read No.	Rm	Room Name	Wall	Structure	Location	Member	Paint Cond	Substrate	Paint Color	Lead (mg/cm▒)	Mode
1		CALIBRATION								1.0	TC
2		CALIBRATION								1.0	TC
3		CALIBRATION								0.9	TC
4	001	1-6	A	Wall	L Lft		I	Concrete	White	0.0	QM
5	001	1-6	A	Wall	L Rgt		I	Concrete	White	-0.1	QM
6	001	1-6	D	Wall	L Rgt		I	Drywall	White	-0.2	QM
7	001	1-6	C	Wall	L Lft		I	Drywall	White	0.3	QM
8	001	1-6	D	Wall	L Ctr		I	Wood	White	-0.1	QM
9	001	1-6	B	Wall	L Lft		I	Wood	White	0.0	QM
10	001	1-6	B	Wall	U Ctr		I	Wood	White	-0.2	QM
11	001	1-6	C	Wall	L Rgt		I	Wood	White	0.2	QM
12	001	1-6	D	Conduit	Ctr		I	Metal	White	-0.1	QM
13	001	1-6	A	Duct	Lft		I	Metal	White	-0.1	QM
14	001	1-6	A	Door	Ctr	U Ctr	I	Wood	Green	0.0	QM
15	001	1-6	A	Door	Ctr	Rgt casing	I	Wood	White	0.0	QM
16	002	9-13	B	Wall	L Lft		I	Wood	White	-0.1	QM
17	002	9-13	B	Wall	L Rgt		I	Wood	White	-0.1	QM
18	002	9-13	D	Wall	L Lft		I	Wood	White	-0.2	QM
19	002	9-13	D	Wall	U Rgt		I	Wood	White	-0.1	QM
20	002	9-13	D	Wall	L Rgt		I	Drywall	White	-0.1	QM
21	002	9-13	B	Wall	U Lft		I	Drywall	White	0.1	QM
22	002	9-13	D	Wall	U Lft		I	Drywall	White	-0.1	QM
23	002	9-13	D	Cabinet	Ctr		I	Wood	White	-0.3	QM
24	002	9-13	B	Cabinet	Ctr		I	Wood	White	-0.1	QM
25	002	9-13	B	Door	Ctr	U Rgt	I	Wood	White	0.0	QM
26	002	9-13	C	Wall	L Ctr		I	Concrete	White	-0.1	QM
27	002	9-13	A	Wall	L Lft		I	Concrete	White	0.3	QM
28	002	9-13	A	Door	Rgt	Rgt casing	I	Wood	White	0.1	QM
29	002	9-13	A	Door	Rgt	U Ctr	I	Wood	Gray	-0.1	QM
30	002	9-13	C	Door	Ctr	U Ctr	I	Wood	Gray	-0.2	QM
31	002	9-13	C	Door	Ctr	Rgt casing	I	Wood	White	-0.1	QM
32	003	Mat Room	D	Wall	U Rgt		I	Wood	White	-0.1	QM
33	003	Mat Room	D	Wall	L Lft		I	Wood	White	0.2	QM
34	003	Mat Room	B	Wall	L Ctr		I	Wood	White	0.0	QM
35	003	Mat Room	B	Wall	L Lft		I	Wood	White	-0.1	QM
36	003	Mat Room	B	Wall	L Rgt		I	Drywall	White	-0.2	QM
37	003	Mat Room	D	Wall	U Lft		I	Drywall	White	-0.1	QM
38	003	Mat Room	B	Wall	L Rgt		I	Stucco	White	-0.1	QM
39	003	Mat Room	C	Window	Ctr	Sill	I	Wood	White	0.0	QM
40	003	Mat Room	C	Door	Ctr	Rgt casing	I	Wood	White	-0.1	QM
41	003	Mat Room	C	Door	Ctr	U Ctr	I	Wood	Gray	0.1	QM
42	003	Mat Room	B	Door	Rgt	U Ctr	I	Wood	Gray	0.4	QM
43	003	Mat Room	B	Door	Rgt	Rgt casing	I	Wood	Gray	-0.2	QM
44	003	Mat Room	C	Window	Ctr	Rgt casing	I	Wood	Gray	-0.1	QM
45	003	Mat Room	A	Window	Ctr	Rgt casing	I	Metal	Gray	-0.2	QM
46	003	Mat Room	A	Column	Ctr	L column	I	Metal	Gray	0.2	QM
47	003	Mat Room	C	Column	Ctr	L column	I	Metal	Gray	4.5	QM
48	003	Mat Room	B	Wall	U Lft		I	Ceramic	Tan	>9.9	QM
49	003	Mat Room	B	Wall	U Rgt		I	Ceramic	White	-0.1	QM
50	003	Mat Room	B	Wall	U Ctr		I	Ceramic	Pink	>9.9	QM
51	004	14-16/26-28	D	Wall	L Lft		I	Wood	White	-0.2	QM

52	004	14-16/26-28	D	Wall	L	Rgt		I	Wood	White	-0.2	QM
53	004	14-16/26-28	B	Wall	L	Lft		I	Wood	White	-0.1	QM
54	004	14-16/26-28	B	Wall	L	Rgt		I	Wood	White	0.0	QM
55	004	14-16/26-28	B	Wall	U	Ctr		I	Wood	White	-0.1	QM
56	004	14-16/26-28	B	Wall	U	Rgt		I	Drywall	White	0.0	QM
57	004	14-16/26-28	D	Wall	U	Lft		I	Drywall	White	-0.1	QM
58	004	14-16/26-28	D	Wall	U	Rgt		I	Drywall	White	0.0	QM
59	004	14-16/26-28	C	Wall	L	Ctr		I	Concrete	White	0.3	QM
60	004	14-16/26-28	A	Wall	L	Ctr		I	Concrete	White	-0.1	QM
61	004	14-16/26-28	C	Column		Ctr	L column	I	Metal	White	1.1	QM
62	004	14-16/26-28	C	Window		Rgt	Sill	I	Wood	White	1.5	QM
63	004	14-16/26-28	C	Door		Rgt	Lft casing	I	Wood	White	0.1	QM
64	004	14-16/26-28	C	Door		Rgt	U Ctr	I	Wood	Gray	-0.3	QM
65	004	14-16/26-28	A	Door		Rgt	U Ctr	I	Wood	Gray	-0.1	QM
66	004	14-16/26-28	A	Door		Rgt	Lft casing	I	Wood	White	0.0	QM
67	005	17-21/29-33	C	Door		Lft	Rgt casing	I	Wood	White	0.3	QM
68	005	17-21/29-33	C	Door		Lft	U Ctr	I	Wood	Gray	0.0	QM
69	005	17-21/29-33	A	Door		Ctr	U Ctr	I	Wood	Gray	0.0	QM
70	005	17-21/29-33	A	Door		Ctr	Rgt casing	I	Wood	White	0.0	QM
71	005	17-21/29-33	A	Window		Rgt	Sill	I	Wood	White	0.4	QM
72	005	17-21/29-33	C	Window		Lft	Sill	I	Wood	White	0.5	QM
73	005	17-21/29-33	B	Wall	U	Lft		I	Wood	White	-0.3	QM
74	005	17-21/29-33	B	Wall	L	Ctr		I	Wood	White	-0.2	QM
75	005	17-21/29-33	B	Wall	L	Rgt		I	Wood	White	-0.1	QM
76	005	17-21/29-33	D	Wall	L	Lft		I	Wood	White	-0.1	QM
77	005	17-21/29-33	D	Wall	L	Ctr		I	Wood	White	0.1	QM
78	005	17-21/29-33	B	Cabinet		Ctr		I	Wood	White	0.5	QM
79	005	17-21/29-33	C	Cabinet		Ctr		I	Wood	White	0.6	QM
80	005	17-21/29-33	B	Wall	L	Rgt		I	Drywall	White	-0.2	QM
81	005	17-21/29-33	D	Wall	U	Lft		I	Drywall	White	-0.2	QM
82	005	17-21/29-33	D	Wall	L	Rgt		I	Drywall	White	-0.1	QM
83	005	17-21/29-33	A	Column		Rgt	L column	I	Metal	White	-0.4	QM
84	005	17-21/29-33	A	Column		Lft	L column	I	Metal	White	0.0	QM
85	005	17-21/29-33	B	Wall	L	Lft		I	Ceramic	White	-0.6	QM
86	005	17-21/29-33	B	Wall	U	Ctr		I	Ceramic	Tan	-0.5	QM
87	006	MUR	D	Wall	L	Ctr		I	Drywall	White	0.4	QM
88	006	MUR	C	Wall	L	Rgt		I	Drywall	White	0.1	QM
89	006	MUR	B	Wall	L	Rgt		I	Drywall	White	0.0	QM
90	006	MUR	B	Wall	L	Lft		I	Drywall	White	0.0	QM
91	006	MUR	C	Door		Ctr	U Ctr	I	Wood	White	0.3	QM
92	006	MUR	C	Door		Ctr	Rgt casing	I	Wood	Brown	0.0	QM
93	006	MUR	B	Door		Ctr	U Ctr	I	Wood	Beige	-0.1	QM
94	006	MUR	B	Door		Ctr	Lft casing	I	Wood	Beige	0.0	QM
95	006	MUR	A	Wall	L	Rgt		I	Wood	Beige	-0.1	QM
96	006	MUR	A	Wall	L	Lft		I	Wood	Beige	0.2	QM
97	006	MUR	D	Wall	L	Rgt		I	Wood	Beige	-0.2	QM
98	006	MUR	A	Louvers		Ctr		I	Wood	White	0.3	QM
99	006	MUR	C	Window		Lft	Rgt casing	I	Wood	Blue	0.0	QM
100	006	MUR	C	Window		Lft	Sill	I	Wood	Blue	-0.3	QM
101	006	MUR	B	Wall	L	Rgt		I	Ceramic	Gray	>9.9	QM
102	007	Admin	C	Wall	L	Ctr		I	Wood	White	-0.1	QM
103	007	Admin	D	Wall	L	Lft		I	Wood	White	-0.1	QM
104	007	Admin	A	Door		Ctr	U Ctr	I	Wood	White	0.0	QM
105	007	Admin	A	Door		Ctr	Rgt casing	I	Wood	White	0.0	QM
106	007	Admin	C	Door		Ctr	U Ctr	I	Wood	White	0.2	QM
107	007	Admin	C	Door		Ctr	Rgt casing	I	Wood	White	-0.1	QM
108	007	Admin	A	Wall	L	Ctr		I	Wood	White	-0.1	QM
109	007	Admin	D	Cabinet		Ctr		I	Wood	White	-0.2	QM
110	007	Admin	C	Cabinet		Ctr		I	Wood	White	-0.2	QM
111	007	Admin	B	Wall	U	Lft		I	Drywall	White	0.1	QM
112	007	Admin	D	Wall	L	Ctr		I	Drywall	White	0.1	QM
113	007	Admin	C	Wall	L	Rgt		I	Concrete	White	0.2	QM
114	007	Admin	A	Wall	L	Rgt		I	Concrete	White	0.0	QM
115	008	Library	B	Wall	L	Lft		I	Brick	White	0.1	QM
116	008	Library	C	Wall	L	Ctr		I	Brick	White	0.1	QM

117	008	Library	D	Wall	L	Lft		I	Brick	White	-0.2	QM
118	008	Library	D	Wall	L	Ctr		I	Drywall	White	-0.2	QM
119	008	Library	B	Wall	L	Ctr		I	Drywall	White	-0.2	QM
120	008	Library	B	Door		Ctr	U Ctr	I	Wood	White	0.3	QM
121	008	Library	B	Door		Ctr	Lft casing	I	Wood	White	0.0	QM
122	008	Library	C	Door		Rgt	U Ctr	I	Wood	White	0.3	QM
123	008	Library	C	Door		Rgt	Lft casing	I	Wood	White	0.0	QM
124	001	1-6	A	Wall	U	Lft		I	Concrete	White	0.1	QM
125	001	1-6	A	Wall	L	Lft		I	Concrete	Green	0.1	QM
126	001	1-6	A	Door		Ctr	U Ctr	I	Wood	Green	0.2	QM
127	001	1-6	A	Door		Ctr	Rgt casing	I	Wood	Green	1.1	QM
128	001	1-6	A	Soffit				I	Wood	White	0.7	QM
129	001	1-6	A	Fascia				I	Wood	Green	-0.1	QM
130	001	1-6	A	Column		Rgt	L column	I	Metal	White	0.4	QM
131	001	1-6	C	Downspout		Lft		I	Metal	White	-0.1	QM
132	001	1-6	C	Door		Ctr	U Ctr	I	Wood	Green	-0.1	QM
133	001	1-6	C	Wall	U	Ctr		I	Concrete	White	0.0	QM
134	001	1-6	C	Wall	L	Ctr		I	Concrete	Green	0.2	QM
135	002	9-13	C	Wall	U	Ctr		I	Concrete	White	-0.1	QM
136	002	9-13	C	Wall	L	Ctr		I	Concrete	Green	0.2	QM
137	002	9-13	C	Column		Rgt	L column	I	Metal	White	0.3	QM
138	002	9-13	C	Door		Rgt	U Ctr	I	Wood	Green	-0.2	QM
139	002	9-13	C	Door		Rgt	Rgt casing	I	Wood	Green	0.5	QM
140	002	9-13	A	Column		Ctr	L column	I	Metal	White	0.6	QM
141	002	9-13	A	Column		Rgt	L column	I	Metal	White	1.1	QM
142	002	9-13	A	Downspout		Rgt		I	Metal	White	1.1	QM
143	002	9-13	C	Louvers		Ctr		I	Metal	White	-0.1	QM
144	002	9-13	C	Louvers		Ctr		I	Wood	White	-0.3	QM
145	002	9-13	C	Soffit				I	Wood	White	1.1	QM
146	002	9-13	C	Fascia				I	Wood	Green	4.2	QM
147	002	9-13	C	Wall	U	Ctr		I	Concrete	White	0.1	QM
148	002	9-13	D	Wall	U	Ctr		I	Brick	White	-0.2	QM
149	003	Mat Room	B	Wall	U	Ctr		I	Stucco	White	-0.2	QM
150	003	Mat Room	B	Wall	L	Ctr		I	Stucco	Green	-0.3	QM
151	003	Mat Room	C	Wall	L	Lft		I	Concrete	Green	-0.1	QM
152	003	Mat Room	C	Wall	U	Lft		I	Concrete	White	-0.2	QM
153	003	Mat Room	C	Wall	U	Rgt		I	Wood	White	-0.1	QM
154	003	Mat Room	C	Door		Ctr	U Ctr	I	Wood	Green	-0.1	QM
155	003	Mat Room	C	Door		Ctr	Rgt casing	I	Wood	Green	0.0	QM
156	003	Mat Room	C	Soffit				I	Wood	White	-0.2	QM
157	003	Mat Room	C	Fascia				I	Wood	Green	1.6	QM
158	004	14-16/26-28	C	Wall	U	Ctr		I	Concrete	White	0.1	QM
159	004	14-16/26-28	C	Wall	L	Ctr		I	Concrete	Green	0.2	QM
160	004	14-16/26-28	C	Wall	L	Ctr		I	Wood	Green	-0.1	QM
161	004	14-16/26-28	C	Door		Ctr	Rgt casing	I	Wood	Green	0.3	QM
162	004	14-16/26-28	C	Fascia				I	Wood	Green	0.0	QM
163	004	14-16/26-28	C	Soffit				I	Wood	White	0.7	QM
164	004	14-16/26-28	D	Wall	U	Ctr		I	Brick	White	-0.1	QM
165	004	14-16/26-28	A	Wall	L	Ctr		I	Concrete	Green	-0.1	QM
166	004	14-16/26-28	A	Wall	L	Ctr		I	Wood	Green	-0.1	QM
167	004	14-16/26-28	A	Door		Ctr	Rgt casing	I	Wood	Green	0.0	QM
168	005	17-21/29-33	B	Wall	L	Rgt		I	Brick	White	0.0	QM
169	005	17-21/29-33	A	Wall	U	Lft		I	Concrete	White	0.0	QM
170	005	17-21/29-33	A	Wall	L	Lft		I	Concrete	Green	0.2	QM
171	005	17-21/29-33	A	Wall	L	Ctr		I	Wood	Green	0.0	QM
172	005	17-21/29-33	A	Door		Ctr	Rgt casing	I	Wood	Green	0.1	QM
173	005	17-21/29-33	C	Door		Ctr	Rgt casing	I	Wood	Green	0.0	QM
174	005	17-21/29-33	C	Door		Ctr	U Ctr	I	Wood	Green	-0.1	QM
175	005	17-21/29-33	C	Wall	L	Ctr		I	Concrete	Green	-0.1	QM
176	005	17-21/29-33	C	Wall	U	Ctr		I	Concrete	White	-0.2	QM
177	005	17-21/29-33	A	Fascia				I	Wood	White	1.1	QM
178	006	MUR	A	Column		Rgt	L column	I	Metal	White	0.3	QM
179	006	MUR	A	Wall	U	Ctr		I	Wood	White	0.0	QM
180	006	MUR	A	Wall	L	Ctr		I	Wood	Green	0.0	QM
181	006	MUR	A	Door		Rgt	Rgt casing	I	Wood	Green	-0.1	QM

182	006	MUR	B	Downspout		Rgt		I	Metal	White	1.1	QM
183	006	MUR	B	Wall	U	Ctr		I	Brick	White	0.0	QM
184	006	MUR	B	Wall	L	Ctr		I	Brick	Green	-0.2	QM
185	006	MUR	B	Door		Ctr	Rgt casing	I	Wood	Green	0.5	QM
186	006	MUR	C	Window		Ctr	Rgt casing	I	Wood	White	0.0	QM
187	006	MUR	C	Wall	U	Ctr		I	Wood	White	-0.1	QM
188	006	MUR	C	Wall	L	Ctr		I	Wood	Green	-0.1	QM
189	006	MUR	C	Wall	L	Lft		I	Stucco	White	0.0	QM
190	007	Admin	A	Column		Rgt	L column	I	Metal	White	1.1	QM
191	007	Admin	A	Wall	U	Ctr		I	Concrete	White	0.0	QM
192	007	Admin	A	Wall	L	Ctr		I	Concrete	Green	0.1	QM
193	007	Admin	D	Wall	U	Ctr		I	Brick	Green	-0.5	QM
194	007	Admin	C	Wall	L	Lft		I	Concrete	Green	-0.2	QM
195	007	Admin	C	Wall	U	Ctr		I	Concrete	White	-0.1	QM
196	007	Admin	C	Door		Rgt	U Ctr	I	Wood	Green	-0.2	QM
197	007	Admin	C	Door		Rgt	Rgt casing	I	Wood	Green	0.5	QM
198	007	Admin	C	Wall	L	Rgt		I	Wood	White	-0.2	QM
199	008	Library	C	Wall	U	Lft		I	Concrete	White	0.4	QM
200	008	Library	C	Wall	L	Lft		I	Concrete	Green	0.1	QM
201	008	Library	D	Wall	L	Ctr		I	Concrete	Green	0.1	QM
202	008	Library	D	Wall	U	Ctr		I	Concrete	White	0.0	QM
203	008	Library	D	Wall	U	Lft		I	Wood	White	0.0	QM
204	008	Library	D	Window		Ctr	Rgt casing	I	Wood	Green	-0.1	QM
205	008	Library	D	Door		Ctr	U Ctr	I	Wood	Green	0.1	QM
206	008	Library	D	Wall	U	Ctr		I	Concrete	White	-0.1	QM
207	009	Breezways	A	Fascia				I	Wood	Green	0.7	QM
208	009	Breezways	A	Deck		Ctr		I	Wood	White	1.1	QM
209	009	Breezways	C	Deck		Ctr		I	Wood	White	1.6	QM
210	009	Breezways	C	Fascia				I	Wood	Green	1.1	QM
211	009	Breezways	C	Column		Ctr	L column	I	Metal	Green	0.3	QM
212	009	Breezways	A	Column		Ctr	L column	I	Metal	Green	1.1	QM
213	009	Breezways	A	Conduit		Ctr		I	Metal	White	0.3	QM
214	009	Breezways	C	Conduit		Ctr		I	Metal	White	-0.2	QM
215	009	Breezways	A	Gutter				I	Metal	Green	-0.2	QM
216	009	Breezways	A	Gate		Ctr		I	Metal	Green	-0.2	QM
217	009	Breezways	A	Flagpole		Ctr		I	Metal	Silver	>9.9	QM
218		CALIBRATION									1.0	TC
219		CALIBRATION									0.9	TC
220		CALIBRATION									0.9	TC

---- End of Readings ----

SUMMARY REPORT OF LEAD PAINT INSPECTION FOR: South San Francisco USD.

Inspection Date: 02/26/16
Report Date: 3/1/2016
Abatement Level: 1.1
Report No. S#01369 - 02/26/16 13:39
Total Readings: 220 Actionable: 20
Job Started: 02/26/16 13:39
Job Finished: 02/26/16 19:31

Parkway Mid. School
650 Sunset Ave.
South San Francisco, CA
Old Buildings

Read No.	Wall	Structure	Location	Member	Paint Cond	Substrate	Paint Color	Lead (mg/cm▒)	Mode
Exterior Room 001 1-6									
127	A	Door	Ctr	Rgt casing	I	Wood	Green	1.1	QM
Exterior Room 002 9-13									
141	A	Column	Rgt	L column	I	Metal	White	1.1	QM
142	A	Downspout	Rgt		I	Metal	White	1.1	QM
146	C	Fascia			I	Wood	Green	4.2	QM
145	C	Soffit			I	Wood	White	1.1	QM

Read No.	Wall	Structure	Location	Member	Paint Cond	Substrate	Paint Color	Lead (mg/cm▒)	Mode
Exterior Room 003 Mat Room									
157	C	Fascia			I	Wood	Green	1.6	QM
Exterior Room 005 17-21/29-33									
177	A	Fascia			I	Wood	White	1.1	QM
Exterior Room 006 MUR									
182	B	Downspout	Rgt		I	Metal	White	1.1	QM
Exterior Room 007 Admin									
190	A	Column	Rgt	L column	I	Metal	White	1.1	QM
Exterior Room 009 Breezways									
212	A	Column	Ctr	L column	I	Metal	Green	1.1	QM
208	A	Deck	Ctr		I	Wood	White	1.1	QM
217	A	Flagpole	Ctr		I	Metal	Silver	>9.9	QM
210	C	Fascia			I	Wood	Green	1.1	QM
209	C	Deck	Ctr		I	Wood	White	1.6	QM
Interior Room 003 Mat Room									
048	B	Wall	U Lft		I	Ceramic	Tan	>9.9	QM
050	B	Wall	U Ctr		I	Ceramic	Pink	>9.9	QM
047	C	Column	Ctr	L column	I	Metal	Gray	4.5	QM
Interior Room 004 14-16/26-28									
062	C	Window	Rgt	Sill	I	Wood	White	1.5	QM
061	C	Column	Ctr	L column	I	Metal	White	1.1	QM
Interior Room 006 MUR									
101	B	Wall	L Rgt		I	Ceramic	Gray	>9.9	QM

---- End of Readings ----

DETAILED REPORT OF LEAD PAINT INSPECTION FOR: South San Francisco USD.

Inspection Date: 02/26/16
Report Date: 3/1/2016
Abatement Level: 1.1
Report No. S#01369 - 02/26/16 13:39
Total Readings: 220
Job Started: 02/26/16 13:39
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Parkway Mid. School
650 Sunset Ave.
South San Francisco, CA
Old Buildings

Read No.	Wall	Structure	Location	Member	Paint Cond	Substrate	Paint Color	Lead (mg/cm▒)	Mode
Exterior Room 001 1-6									
125	A	Wall	L Lft		I	Concrete	Green	0.1	QM
124	A	Wall	U Lft		I	Concrete	White	0.1	QM
129	A	Fascia			I	Wood	Green	-0.1	QM
128	A	Soffit			I	Wood	White	0.7	QM
127	A	Door	Ctr	Rgt casing	I	Wood	Green	1.1	QM
126	A	Door	Ctr	U Ctr	I	Wood	Green	0.2	QM
130	A	Column	Rgt	L column	I	Metal	White	0.4	QM
134	C	Wall	L Ctr		I	Concrete	Green	0.2	QM
133	C	Wall	U Ctr		I	Concrete	White	0.0	QM
132	C	Door	Ctr	U Ctr	I	Wood	Green	-0.1	QM
131	C	Downspout	Lft		I	Metal	White	-0.1	QM

Exterior Room 002 9-13									
140	A	Column		Ctr	L column	I	Metal	White	0.6	QM
141	A	Column		Rgt	L column	I	Metal	White	1.1	QM
142	A	Downspout		Rgt		I	Metal	White	1.1	QM
136	C	Wall	L	Ctr		I	Concrete	Green	0.2	QM
135	C	Wall	U	Ctr		I	Concrete	White	-0.1	QM
147	C	Wall	U	Ctr		I	Concrete	White	0.1	QM
146	C	Fascia				I	Wood	Green	4.2	QM
145	C	Soffit				I	Wood	White	1.1	QM
139	C	Door		Rgt	Rgt casing	I	Wood	Green	0.5	QM
138	C	Door		Rgt	U Ctr	I	Wood	Green	-0.2	QM
137	C	Column		Rgt	L column	I	Metal	White	0.3	QM
143	C	Louvers		Ctr		I	Metal	White	-0.1	QM
144	C	Louvers		Ctr		I	Wood	White	-0.3	QM
148	D	Wall	U	Ctr		I	Brick	White	-0.2	QM
Exterior Room 003 Mat Room										
150	B	Wall	L	Ctr		I	Stucco	Green	-0.3	QM
149	B	Wall	U	Ctr		I	Stucco	White	-0.2	QM
151	C	Wall	L	Lft		I	Concrete	Green	-0.1	QM
152	C	Wall	U	Lft		I	Concrete	White	-0.2	QM
153	C	Wall	U	Rgt		I	Wood	White	-0.1	QM
157	C	Fascia				I	Wood	Green	1.6	QM
156	C	Soffit				I	Wood	White	-0.2	QM
155	C	Door		Ctr	Rgt casing	I	Wood	Green	0.0	QM
154	C	Door		Ctr	U Ctr	I	Wood	Green	-0.1	QM
Exterior Room 004 14-16/26-28										
165	A	Wall	L	Ctr		I	Concrete	Green	-0.1	QM
166	A	Wall	L	Ctr		I	Wood	Green	-0.1	QM
167	A	Door		Ctr	Rgt casing	I	Wood	Green	0.0	QM
159	C	Wall	L	Ctr		I	Concrete	Green	0.2	QM
160	C	Wall	L	Ctr		I	Wood	Green	-0.1	QM
158	C	Wall	U	Ctr		I	Concrete	White	0.1	QM
162	C	Fascia				I	Wood	Green	0.0	QM
163	C	Soffit				I	Wood	White	0.7	QM
161	C	Door		Ctr	Rgt casing	I	Wood	Green	0.3	QM
164	D	Wall	U	Ctr		I	Brick	White	-0.1	QM
Exterior Room 005 17-21/29-33										
170	A	Wall	L	Lft		I	Concrete	Green	0.2	QM
171	A	Wall	L	Ctr		I	Wood	Green	0.0	QM
169	A	Wall	U	Lft		I	Concrete	White	0.0	QM
177	A	Fascia				I	Wood	White	1.1	QM
172	A	Door		Ctr	Rgt casing	I	Wood	Green	0.1	QM
168	B	Wall	L	Rgt		I	Brick	White	0.0	QM
175	C	Wall	L	Ctr		I	Concrete	Green	-0.1	QM
176	C	Wall	U	Ctr		I	Concrete	White	-0.2	QM
173	C	Door		Ctr	Rgt casing	I	Wood	Green	0.0	QM
174	C	Door		Ctr	U Ctr	I	Wood	Green	-0.1	QM
Exterior Room 006 MUR										
180	A	Wall	L	Ctr		I	Wood	Green	0.0	QM
179	A	Wall	U	Ctr		I	Wood	White	0.0	QM
181	A	Door		Rgt	Rgt casing	I	Wood	Green	-0.1	QM
178	A	Column		Rgt	L column	I	Metal	White	0.3	QM
184	B	Wall	L	Ctr		I	Brick	Green	-0.2	QM
183	B	Wall	U	Ctr		I	Brick	White	0.0	QM
185	B	Door		Ctr	Rgt casing	I	Wood	Green	0.5	QM
182	B	Downspout		Rgt		I	Metal	White	1.1	QM
189	C	Wall	L	Lft		I	Stucco	White	0.0	QM
188	C	Wall	L	Ctr		I	Wood	Green	-0.1	QM
187	C	Wall	U	Ctr		I	Wood	White	-0.1	QM
186	C	Window		Ctr	Rgt casing	I	Wood	White	0.0	QM

Exterior Room 007 Admin										
192	A	Wall	L	Ctr		I	Concrete	Green	0.1	QM
191	A	Wall	U	Ctr		I	Concrete	White	0.0	QM
190	A	Column		Rgt	L column	I	Metal	White	1.1	QM
194	C	Wall	L	Lft		I	Concrete	Green	-0.2	QM
198	C	Wall	L	Rgt		I	Wood	White	-0.2	QM
195	C	Wall	U	Ctr		I	Concrete	White	-0.1	QM
197	C	Door		Rgt	Rgt casing	I	Wood	Green	0.5	QM
196	C	Door		Rgt	U Ctr	I	Wood	Green	-0.2	QM
193	D	Wall	U	Ctr		I	Brick	Green	-0.5	QM
Exterior Room 008 Library										
200	C	Wall	L	Lft		I	Concrete	Green	0.1	QM
199	C	Wall	U	Lft		I	Concrete	White	0.4	QM
201	D	Wall	L	Ctr		I	Concrete	Green	0.1	QM
203	D	Wall	U	Lft		I	Wood	White	0.0	QM
202	D	Wall	U	Ctr		I	Concrete	White	0.0	QM
206	D	Wall	U	Ctr		I	Concrete	White	-0.1	QM
204	D	Window		Ctr	Rgt casing	I	Wood	Green	-0.1	QM
205	D	Door		Ctr	U Ctr	I	Wood	Green	0.1	QM
Exterior Room 009 Breezways										
207	A	Fascia				I	Wood	Green	0.7	QM
215	A	Gutter				I	Metal	Green	-0.2	QM
212	A	Column		Ctr	L column	I	Metal	Green	1.1	QM
208	A	Deck		Ctr		I	Wood	White	1.1	QM
213	A	Conduit		Ctr		I	Metal	White	0.3	QM
216	A	Gate		Ctr		I	Metal	Green	-0.2	QM
217	A	Flagpole		Ctr		I	Metal	Silver	>9.9	QM
210	C	Fascia				I	Wood	Green	1.1	QM
211	C	Column		Ctr	L column	I	Metal	Green	0.3	QM
209	C	Deck		Ctr		I	Wood	White	1.6	QM
214	C	Conduit		Ctr		I	Metal	White	-0.2	QM
Interior Room 001 1-6										
004	A	Wall	L	Lft		I	Concrete	White	0.0	QM
005	A	Wall	L	Rgt		I	Concrete	White	-0.1	QM
015	A	Door		Ctr	Rgt casing	I	Wood	White	0.0	QM
014	A	Door		Ctr	U Ctr	I	Wood	Green	0.0	QM
013	A	Duct		Lft		I	Metal	White	-0.1	QM
009	B	Wall	L	Lft		I	Wood	White	0.0	QM
010	B	Wall	U	Ctr		I	Wood	White	-0.2	QM
007	C	Wall	L	Lft		I	Drywall	White	0.3	QM
011	C	Wall	L	Rgt		I	Wood	White	0.2	QM
008	D	Wall	L	Ctr		I	Wood	White	-0.1	QM
006	D	Wall	L	Rgt		I	Drywall	White	-0.2	QM
012	D	Conduit		Ctr		I	Metal	White	-0.1	QM
Interior Room 002 9-13										
027	A	Wall	L	Lft		I	Concrete	White	0.3	QM
028	A	Door		Rgt	Rgt casing	I	Wood	White	0.1	QM
029	A	Door		Rgt	U Ctr	I	Wood	Gray	-0.1	QM
016	B	Wall	L	Lft		I	Wood	White	-0.1	QM
017	B	Wall	L	Rgt		I	Wood	White	-0.1	QM
021	B	Wall	U	Lft		I	Drywall	White	0.1	QM
025	B	Door		Ctr	U Rgt	I	Wood	White	0.0	QM
024	B	Cabinet		Ctr		I	Wood	White	-0.1	QM
026	C	Wall	L	Ctr		I	Concrete	White	-0.1	QM
031	C	Door		Ctr	Rgt casing	I	Wood	White	-0.1	QM
030	C	Door		Ctr	U Ctr	I	Wood	Gray	-0.2	QM
018	D	Wall	L	Lft		I	Wood	White	-0.2	QM
020	D	Wall	L	Rgt		I	Drywall	White	-0.1	QM
022	D	Wall	U	Lft		I	Drywall	White	-0.1	QM
019	D	Wall	U	Rgt		I	Wood	White	-0.1	QM

023	D	Cabinet		Ctr		I	Wood	White	-0.3	QM
Interior Room 003 Mat Room										
045	A	Window		Ctr	Rgt casing	I	Metal	Gray	-0.2	QM
046	A	Column		Ctr	L column	I	Metal	Gray	0.2	QM
035	B	Wall	L	Lft		I	Wood	White	-0.1	QM
034	B	Wall	L	Ctr		I	Wood	White	0.0	QM
036	B	Wall	L	Rgt		I	Drywall	White	-0.2	QM
038	B	Wall	L	Rgt		I	Stucco	White	-0.1	QM
048	B	Wall	U	Lft		I	Ceramic	Tan	>9.9	QM
050	B	Wall	U	Ctr		I	Ceramic	Pink	>9.9	QM
049	B	Wall	U	Rgt		I	Ceramic	White	-0.1	QM
043	B	Door		Rgt	Rgt casing	I	Wood	Gray	-0.2	QM
042	B	Door		Rgt	U Ctr	I	Wood	Gray	0.4	QM
044	C	Window		Ctr	Rgt casing	I	Wood	Gray	-0.1	QM
039	C	Window		Ctr	Sill	I	Wood	White	0.0	QM
040	C	Door		Ctr	Rgt casing	I	Wood	White	-0.1	QM
041	C	Door		Ctr	U Ctr	I	Wood	Gray	0.1	QM
047	C	Column		Ctr	L column	I	Metal	Gray	4.5	QM
033	D	Wall	L	Lft		I	Wood	White	0.2	QM
037	D	Wall	U	Lft		I	Drywall	White	-0.1	QM
032	D	Wall	U	Rgt		I	Wood	White	-0.1	QM
Interior Room 004 14-16/26-28										
060	A	Wall	L	Ctr		I	Concrete	White	-0.1	QM
066	A	Door		Rgt	Lft casing	I	Wood	White	0.0	QM
065	A	Door		Rgt	U Ctr	I	Wood	Gray	-0.1	QM
053	B	Wall	L	Lft		I	Wood	White	-0.1	QM
054	B	Wall	L	Rgt		I	Wood	White	0.0	QM
055	B	Wall	U	Ctr		I	Wood	White	-0.1	QM
056	B	Wall	U	Rgt		I	Drywall	White	0.0	QM
059	C	Wall	L	Ctr		I	Concrete	White	0.3	QM
062	C	Window		Rgt	Sill	I	Wood	White	1.5	QM
063	C	Door		Rgt	Lft casing	I	Wood	White	0.1	QM
064	C	Door		Rgt	U Ctr	I	Wood	Gray	-0.3	QM
061	C	Column		Ctr	L column	I	Metal	White	1.1	QM
051	D	Wall	L	Lft		I	Wood	White	-0.2	QM
052	D	Wall	L	Rgt		I	Wood	White	-0.2	QM
057	D	Wall	U	Lft		I	Drywall	White	-0.1	QM
058	D	Wall	U	Rgt		I	Drywall	White	0.0	QM
Interior Room 005 17-21/29-33										
071	A	Window		Rgt	Sill	I	Wood	White	0.4	QM
070	A	Door		Ctr	Rgt casing	I	Wood	White	0.0	QM
069	A	Door		Ctr	U Ctr	I	Wood	Gray	0.0	QM
084	A	Column		Lft	L column	I	Metal	White	0.0	QM
083	A	Column		Rgt	L column	I	Metal	White	-0.4	QM
085	B	Wall	L	Lft		I	Ceramic	White	-0.6	QM
074	B	Wall	L	Ctr		I	Wood	White	-0.2	QM
075	B	Wall	L	Rgt		I	Wood	White	-0.1	QM
080	B	Wall	L	Rgt		I	Drywall	White	-0.2	QM
073	B	Wall	U	Lft		I	Wood	White	-0.3	QM
086	B	Wall	U	Ctr		I	Ceramic	Tan	-0.5	QM
078	B	Cabinet		Ctr		I	Wood	White	0.5	QM
072	C	Window		Lft	Sill	I	Wood	White	0.5	QM
067	C	Door		Lft	Rgt casing	I	Wood	White	0.3	QM
068	C	Door		Lft	U Ctr	I	Wood	Gray	0.0	QM
079	C	Cabinet		Ctr		I	Wood	White	0.6	QM
076	D	Wall	L	Lft		I	Wood	White	-0.1	QM
077	D	Wall	L	Ctr		I	Wood	White	0.1	QM
082	D	Wall	L	Rgt		I	Drywall	White	-0.1	QM
081	D	Wall	U	Lft		I	Drywall	White	-0.2	QM
Interior Room 006 MUR										
096	A	Wall	L	Lft		I	Wood	Beige	0.2	QM

095	A	Wall	L	Rgt		I	Wood	Beige	-0.1	QM
098	A	Louvers		Ctr		I	Wood	White	0.3	QM
090	B	Wall	L	Lft		I	Drywall	White	0.0	QM
089	B	Wall	L	Rgt		I	Drywall	White	0.0	QM
101	B	Wall	L	Rgt		I	Ceramic	Gray	>9.9	QM
094	B	Door		Ctr	Lft casing	I	Wood	Beige	0.0	QM
093	B	Door		Ctr	U Ctr	I	Wood	Beige	-0.1	QM
088	C	Wall	L	Rgt		I	Drywall	White	0.1	QM
099	C	Window		Lft	Rgt casing	I	Wood	Blue	0.0	QM
100	C	Window		Lft	Sill	I	Wood	Blue	-0.3	QM
092	C	Door		Ctr	Rgt casing	I	Wood	Brown	0.0	QM
091	C	Door		Ctr	U Ctr	I	Wood	White	0.3	QM
087	D	Wall	L	Ctr		I	Drywall	White	0.4	QM
097	D	Wall	L	Rgt		I	Wood	Beige	-0.2	QM

Interior Room 007 Admin

108	A	Wall	L	Ctr		I	Wood	White	-0.1	QM
114	A	Wall	L	Rgt		I	Concrete	White	0.0	QM
105	A	Door		Ctr	Rgt casing	I	Wood	White	0.0	QM
104	A	Door		Ctr	U Ctr	I	Wood	White	0.0	QM
111	B	Wall	U	Lft		I	Drywall	White	0.1	QM
102	C	Wall	L	Ctr		I	Wood	White	-0.1	QM
113	C	Wall	L	Rgt		I	Concrete	White	0.2	QM
107	C	Door		Ctr	Rgt casing	I	Wood	White	-0.1	QM
106	C	Door		Ctr	U Ctr	I	Wood	White	0.2	QM
110	C	Cabinet		Ctr		I	Wood	White	-0.2	QM
103	D	Wall	L	Lft		I	Wood	White	-0.1	QM
112	D	Wall	L	Ctr		I	Drywall	White	0.1	QM
109	D	Cabinet		Ctr		I	Wood	White	-0.2	QM

Interior Room 008 Library

115	B	Wall	L	Lft		I	Brick	White	0.1	QM
119	B	Wall	L	Ctr		I	Drywall	White	-0.2	QM
121	B	Door		Ctr	Lft casing	I	Wood	White	0.0	QM
120	B	Door		Ctr	U Ctr	I	Wood	White	0.3	QM
116	C	Wall	L	Ctr		I	Brick	White	0.1	QM
123	C	Door		Rgt	Lft casing	I	Wood	White	0.0	QM
122	C	Door		Rgt	U Ctr	I	Wood	White	0.3	QM
117	D	Wall	L	Lft		I	Brick	White	-0.2	QM
118	D	Wall	L	Ctr		I	Drywall	White	-0.2	QM

Calibration Readings

001	1.0	TC
002	1.0	TC
003	0.9	TC
218	1.0	TC
219	0.9	TC
220	0.9	TC

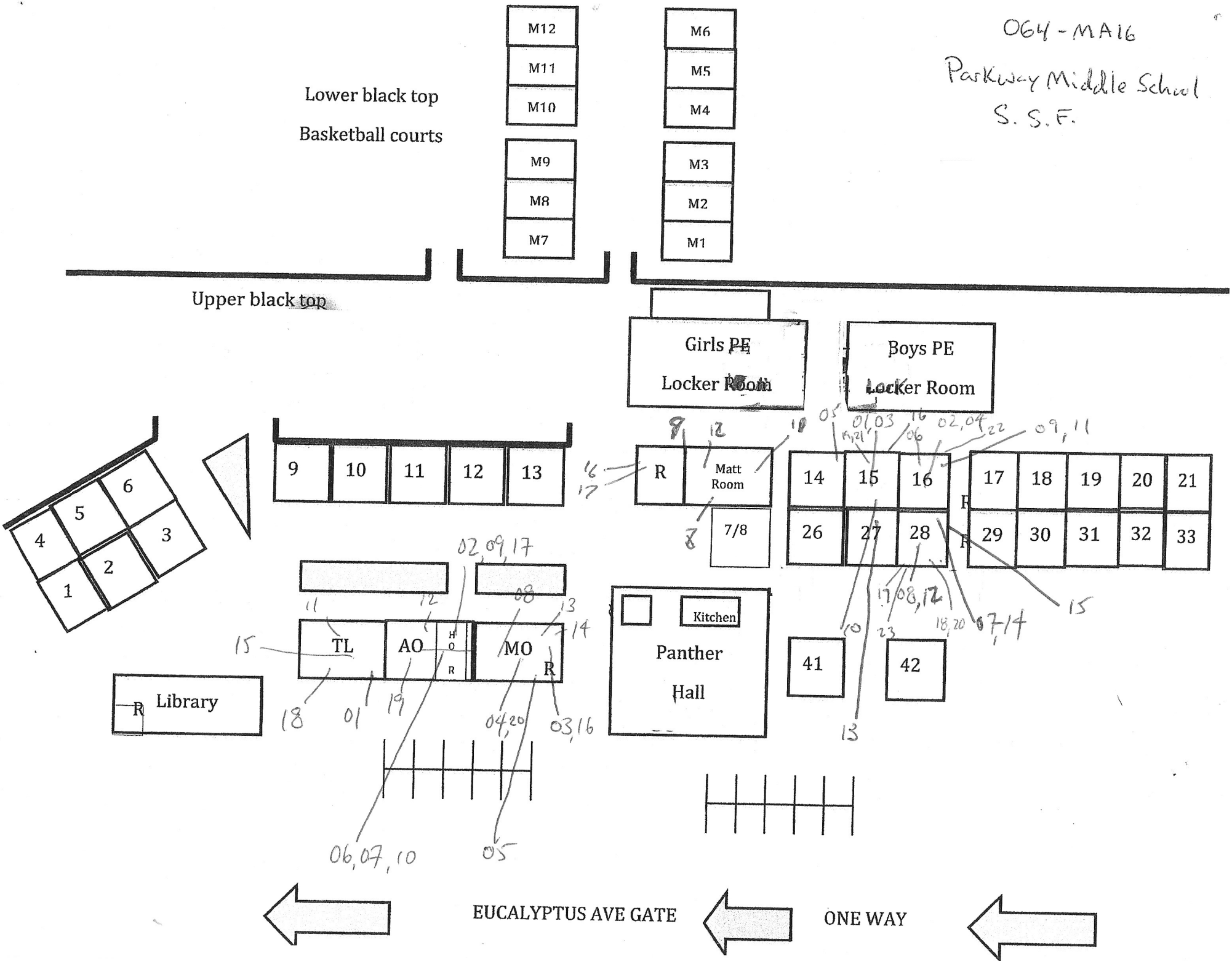
---- End of Readings ----

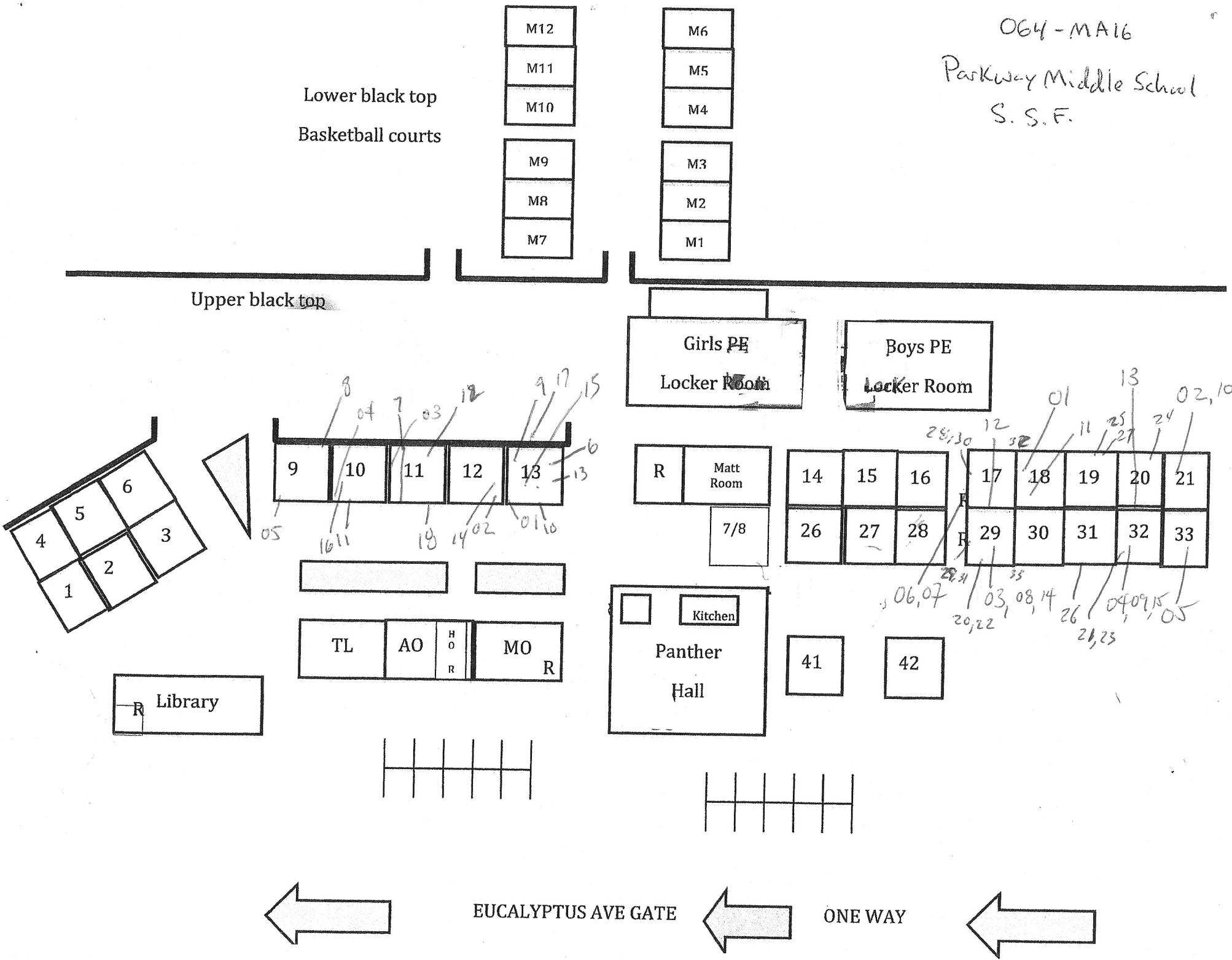
DISTRIBUTION REPORT OF LEAD PAINT INSPECTION FOR: South San Francisco USD.

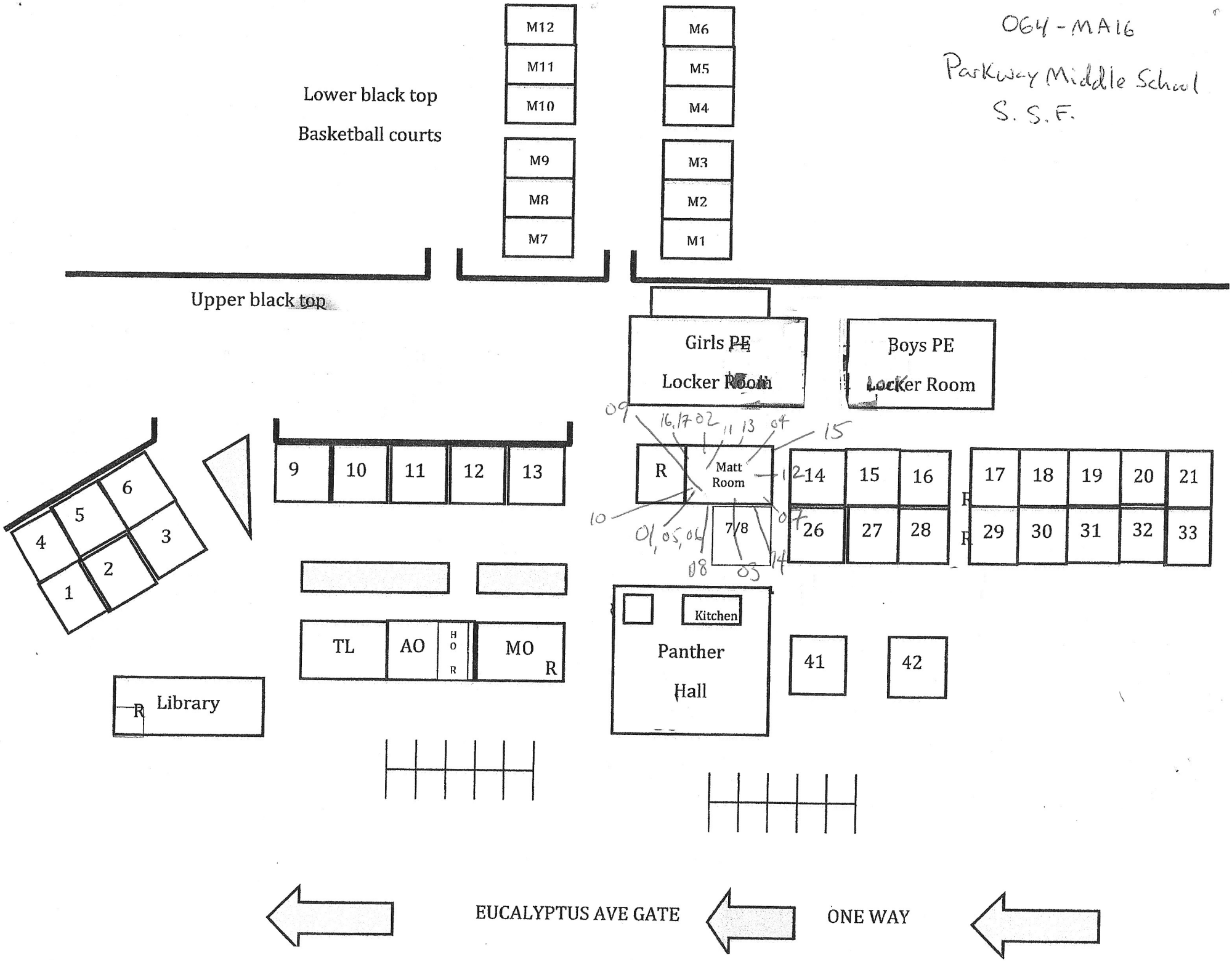
Inspection Date: 02/26/16
Report Date: 3/1/2016
Abatement Level: 1.1
Report No. S#01369 - 02/26/16 13:39
Total Reading Sets: 214
Job Started: 02/26/16 13:39
Job Finished: 02/26/16 19:31

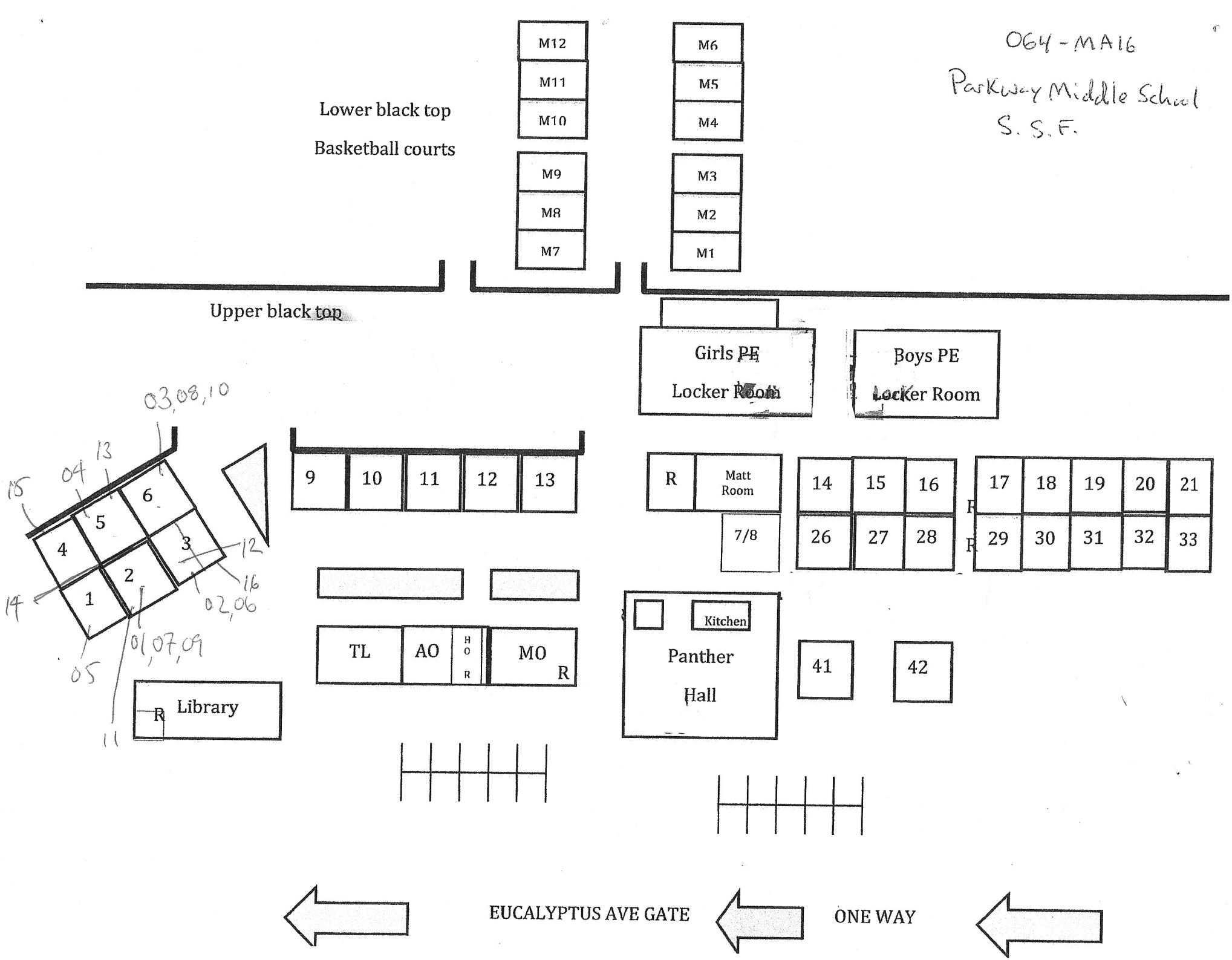
Parkway Mid. School
650 Sunset Ave.
South San Francisco, CA
Old Buildings

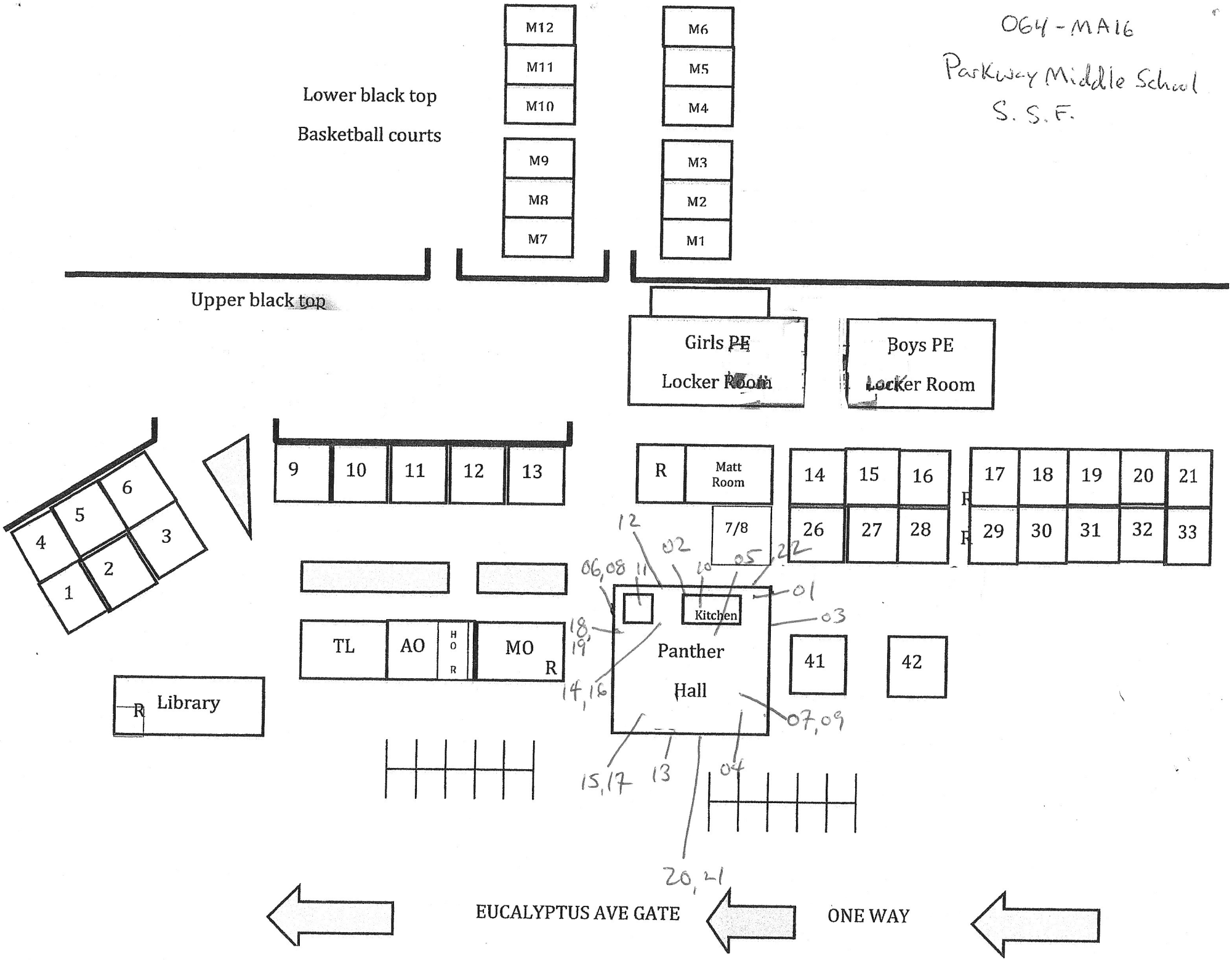
Structure	Total	Structure Distribution Positive	Negative	Inconclusive
Cabinet	6	0 <0%>	6 <100%>	0 <0%>
Column L column	13	5 <38%>	8 <62%>	0 <0%>
Conduit	3	0 <0%>	3 <100%>	0 <0%>
Deck	2	2 <100%>	0 <0%>	0 <0%>
Door Lft casing	5	0 <0%>	5 <100%>	0 <0%>
Door Rgt casing	20	1 <5%>	19 <95%>	0 <0%>
Door U Ctr	22	0 <0%>	22 <100%>	0 <0%>
Door U Rgt	1	0 <0%>	1 <100%>	0 <0%>
Downspout	3	2 <67%>	1 <33%>	0 <0%>
Duct	1	0 <0%>	1 <100%>	0 <0%>
Fascia	7	4 <57%>	3 <43%>	0 <0%>
Flagpole	1	1 <100%>	0 <0%>	0 <0%>
Gate	1	0 <0%>	1 <100%>	0 <0%>
Gutter	1	0 <0%>	1 <100%>	0 <0%>
Louvers	3	0 <0%>	3 <100%>	0 <0%>
Soffit	4	1 <25%>	3 <75%>	0 <0%>
Wall	111	3 <3%>	108 <97%>	0 <0%>
Window Rgt casing	5	0 <0%>	5 <100%>	0 <0%>
Window Sill	5	1 <20%>	4 <80%>	0 <0%>
Inspection Totals:	214	20 < 9%>	194 < 91%>	0 < 0%>


064 - MA16
Parkway Middle School
S. S. F.
Lower black top
Basketball courts
M12
M11
M10
M9
M8
M7
M6
M5
M4
M3
M2
M1
Upper black top
Girls PE
Locker Room
Boys PE
Locker Room
Matt
Room
Kitchen
Panther
Hall
Library
TL
AO
MO
HOR
EUCALYPTUS AVE GATE
ONE WAY


064 - MA16
Parkway Middle School
S. S. F.
Lower black top
Basketball courts
M12
M11
M10
M9
M8
M7
M6
M5
M4
M3
M2
M1
Upper black top
Girls PE Locker Room
Boys PE Locker Room
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33
Kitchen
Panther Hall
41
42
TL
AO
HOR
MO
R
Library
EUCALYPTUS AVE GATE
ONE WAY


064 - MA16
Parkway Middle School
S. S. F.
Lower black top
Basketball courts
M12
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Upper black top
Girls PE Locker Room
Boys PE Locker Room
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Kitchen
Panther Hall
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Library
EUCALYPTUS AVE GATE
ONE WAY


064 - MA16
Parkway Middle School
S. S. F.
Lower black top
Basketball courts
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M7
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M5
M4
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Upper black top
Girls PE Locker Room
Boys PE Locker Room
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Matt Room
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HOR
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Kitchen
Panther Hall
41
42
EUCALYPTUS AVE GATE
ONE WAY


064 - MA16
Parkway Middle School
S. S. F.
Lower black top
Basketball courts
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Upper black top
Girls PE Locker Room
Boys PE Locker Room
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EUCALYPTUS AVE GATE
ONE WAY

DOCUMENT 00 31 32

GEOTECHNICAL DATA

1. Summary

This document describes geotechnical data at or near the Project that is in the District's possession available for Contractor's review, and use of data resulting from various investigations. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. Geotechnical Reports

a. Geotechnical reports may have been prepared for and around the Site and/or in connection with the Work by soil investigation engineers hired by South San Francisco Unified School District ("District"), and its consultants, contractors, and tenants.

b. Geotechnical reports may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports are **not** part of the Contract Documents.

c. The reports and drawings of physical conditions that may relate to the Project are the following:

(1) **Analytical Sampling and Texting of Soil by Geosphere Consultants, Inc., dated January 23, 2013**
(2) **Engineering Geology and Seismology review by California Geological Survey dated June 6, 2013**

3. Use of Data

a. Geotechnical data were obtained only for use of District and its consultants, contractors, and tenants for planning and design and are **not** a part of Contract Documents.

b. Except as expressly set forth below, District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any geotechnical data. Bidder represents and agrees that in submitting a bid it is not relying on any geotechnical data supplied by District, except as specifically allowed below.

c. Under no circumstances shall District be deemed to make a warranty or representation of existing above ground conditions, as-built conditions, geotechnical conditions, or other actual conditions verifiable by independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder should perform as a condition to bidding and Bidder must not and shall not rely on information supplied by District.

4. Limited Reliance Permitted on Certain Information

a. Reference is made herein for identification of:

Reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by District in preparation of the Contract Documents.

Drawings of physical conditions in or relating to existing subsurface structures (except underground facilities) that are at or contiguous to the Site and have been utilized by District in preparation of the Contract Documents.

b. Bidder may rely upon the general accuracy of the "technical data" contained in the reports and drawings identified above, but only insofar as it relates to subsurface conditions, provided Bidder has conducted the independent investigation required pursuant to Instructions to Bidders, and discrepancies are not apparent. The term "technical data" in the referenced reports and drawings shall be limited as follows:

(1) The term "technical data" shall include actual reported depths, reported quantities, reported soil types, reported soil conditions, and reported material, equipment or structures that were encountered during subsurface exploration. The term "technical data" does not include, and Bidder may not rely upon, any other data, interpretations, opinions or information shown or indicated in such drawings or reports that otherwise relate to subsurface conditions or described structures.

(2) The term "technical data" shall not include the location of underground facilities.

(3) Bidder may not rely on the completeness of reports and drawings for the purposes of bidding or construction. Bidder may rely upon the general accuracy of the "technical data" contained in such reports or drawings.

(4) Bidder is solely responsible for any interpretation or conclusion drawn from any "technical data" or any other data, interpretations, opinions, or information provided in the identified reports and drawings.

5. Investigations/Site Examinations

a. Before submitting a bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of cons truction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.

b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

Geosphere Consultants, Inc.
AN ETS COMPANY
Geotechnical Engineering • Engineering Geology
Environmental Management • Water Resources

January 23, 2013

South San Francisco Unified School District
Measure J Bond Program
Facility Building
398 B Street
South San Francisco, California 94080

Attention: Mr. Bob Collins, Program Manager

Subject: **Analytical Sampling and Testing of Soil**
Parkway Heights Middle School
650 Sunset Avenue
South San Francisco, California 94080
Geosphere Project No. 91-02973-A

Dear Mr. Collins:

Pursuant to your request, ***Geosphere Consultants, Inc***. (Geosphere) has provided analytical sampling and testing services of on-site soil for the subject site. Our representative visited the site on January 14, 2013 in South San Francisco, California. There we collected soil cuttings from the upper three feet using a hand auger. ***Geosphere*** is not aware of any past environmental issues or concerns at the site. ***Geosphere*** was not provided a Phase I ESA report for the site. The battery of testing performed was done in accordance with our proposal dated December 6, 2012.

Our representative collected cuttings from three feet in depth from Boring B-2. The sample #1 was a discrete sample. The soil sample was transported on ice to a California State-Certified laboratory for testing. Proper chain-of-custody procedures were followed. The composite samples were analyzed for the presence of CAM 17 Metals (EPA 6020), TPH gasoline with BTEX and MTBE (EPA 8015), TPH diesel and motor oil (EPA 8015), and PCBs and Pesticides (EPA 8081 and 8082), and STLC extraction for Arsenic, Lead, and Chromium.

It is our understanding that you do not require an opinion of the results or supplemental consulting including waste profiling and/or remediation consultation. For your assistance, the attached Table 1 compares the results to San Francisco Regional Water Quality Control Board for soils less than three meters in depth in commercial areas where water is not a current or potential source of drinking water. We note that waste facilities provided their own criteria for acceptance of off-haul material and these results should be provided and screened by them for acceptance or further testing requirements.

It is our pleasure to be of service to you. If you should have any questions regarding this letter or would like to request additional sampling or testing, please contact the undersigned at (925) 314-7180, ejs@geosphereinc.net. Other testing may require additional sampling depending on the quantity of sample remaining in the labs custody.

Sincerely,
GEOSPHERE CONSULTANTS, INC.

Roger J. Wilcox
Staff Engineer

Eric J. Swenson, CEG, GE
Principal Geotechnical Engineer

Distribution: 2 plus PDF to Addressee, rcollins@ssfusd.org
PDF to Daniel Nunez, dnunez@ssfusd.org

Attachment: Table 1 – Summary of Analytical Data
Chain of Custody
Accutest Report

RJW/EJS:pmf
R:\Geotech Projects by Number\2900-2999\91-02973-78 SSFUSD - 6 School Sites\91-02973- Parkway Heights MS\91-02973-A Analytical Testing Results.doc

Table 1
Soil Sample # 1
Discrete Soil Sample of Boring B-2 upper 3 Feet
SUMMARY OF ANALYTICAL DATA

Constituent	Reported Concentration (mg/kg)	SFRWQCB ESLs* (mg/kg)
4,4'-DDE	9.4 ug/kg	NA
4,4'-DDT	0.92	NA
Acetone	32.1 ug/kg	NA
Benzene	ND	0.044
Toluene	ND	2.9
Ethyl Benzene	ND	3.3
Total Xylenes	ND	2.3
MTBE	ND	0.023
Gasoline Range Organics	ND	83
Diesel Range Organics	3.39	83
Motor Oil	ND	370
Antimony	<1.7	40
Arsenic**	**2.7**	**1.6**
Barium	30.0	1500
Beryllium	<0.85	8.0
Cadmium	<0.85	7.4
Chromium – Total	41.4	NA
Cobalt	5.3	80
Copper	6.9	230
Lead	7.4	750
Mercury	<0.039	10
Molybdenum	<1.7	40
Nickel	26.7	150
Selenium	<1.7	10
Silver	<0.85	40
Thallium	<1.7	16
Vanadium	35.6	200
Zinc	24.9	600

ND Non Detectable
NA Not Applicable/Available
*ESLs from San Francisco Regional Water Quality Control Board for Shallow Soils (<3m) Commercial/Industrial Land Use where groundwater is not a current or potential source for drinking water
**STLC results for Arsenic were <0.25 mg/l
Reported Concentrations in bold exceed the corresponding screening value also in bold

Northern California ACCUTEST LABORATORIES

01/21/13



Technical Report for

Geosphere Consultants

Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

91-02973-A

Accutest Job Number: C25717

Sampling Date: 01/14/13

Report to:

Geosphere Consultants
2001 Crow Canyon Road Suite #100
San Ramon, CA 94566
rjw@geosphereinc.net; rshrestha@geosphereinc.com

ATTN: Roger Wilcox

Total number of pages in report: **65**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

James J. Rhudy
Lab Director

Client Service contact: Nutan Kabir 408-588-0200

Certifications: CA (08258CA) AZ (AZ0762) DoD/ISO/IEC 17025:2005 (L2242)

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Sample Summary

Geosphere Consultants

Job No: C25717

Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca
Project No: 91-02973-A

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
C25717-1	01/14/13	12:30	RS	01/14/13	SO	Soil	PARKWAY HEIGHTS MS
C25717-1W	01/14/13	12:30	RS	01/14/13	SO	Soil	PARKWAY HEIGHTS MS

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Summary of Hits

Job Number: C25717
Account: Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca
Collected: 01/14/13

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
C25717-1	**PARKWAY HEIGHTS MS**					
Acetone		32.1 J	39	9.8	ug/kg	SW846 8260B
TPH (C10-C28)		3.39 J	9.9	2.5	mg/kg	SW846 8015B M
4,4'-DDE		9.4	3.3	0.60	ug/kg	SW846 8081A
4,4'-DDT		0.92 J	3.3	0.50	ug/kg	SW846 8081A
Arsenic		2.7	1.7		mg/kg	SW846 6010B
Barium		30.0	17		mg/kg	SW846 6010B
Chromium		41.4	0.85		mg/kg	SW846 6010B
Cobalt		5.3	0.85		mg/kg	SW846 6010B
Copper		6.9	2.1		mg/kg	SW846 6010B
Lead		7.4	1.7		mg/kg	SW846 6010B
Nickel		26.7	0.85		mg/kg	SW846 6010B
Vanadium		35.6	0.85		mg/kg	SW846 6010B
Zinc		24.9	1.7		mg/kg	SW846 6010B
C25717-1W	**PARKWAY HEIGHTS MS**					
No hits reported in this sample.						

Northern California ACCUTEST LABORATORIES

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID: PARKWAY HEIGHTS MS
Lab Sample ID: C25717-1 **Date Sampled:** 01/14/13
Matrix: SO - Soil **Date Received:** 01/14/13
Method: SW846 8260B **Percent Solids:** n/a [a]
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M37308.D	1	01/16/13	XB	n/a	n/a	VM1132
Run #2							

	Initial Weight
Run #1	5.09 g
Run #2	

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	32.1	39	9.8	ug/kg	J
71-43-2	Benzene	ND	4.9	0.49	ug/kg	
108-86-1	Bromobenzene	ND	4.9	0.49	ug/kg	
74-97-5	Bromochloromethane	ND	4.9	0.49	ug/kg	
75-27-4	Bromodichloromethane	ND	4.9	0.49	ug/kg	
75-25-2	Bromoform	ND	4.9	0.49	ug/kg	
104-51-8	n-Butylbenzene	ND	4.9	0.49	ug/kg	
135-98-8	sec-Butylbenzene	ND	4.9	0.49	ug/kg	
98-06-6	tert-Butylbenzene	ND	4.9	0.49	ug/kg	
108-90-7	Chlorobenzene	ND	4.9	0.49	ug/kg	
75-00-3	Chloroethane	ND	4.9	0.98	ug/kg	
67-66-3	Chloroform	ND	4.9	0.49	ug/kg	
95-49-8	o-Chlorotoluene	ND	4.9	0.49	ug/kg	
106-43-4	p-Chlorotoluene	ND	4.9	0.49	ug/kg	
56-23-5	Carbon tetrachloride	ND	4.9	0.49	ug/kg	
75-34-3	1,1-Dichloroethane	ND	4.9	0.49	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	4.9	0.49	ug/kg	
563-58-6	1,1-Dichloropropene	ND	4.9	0.49	ug/kg	
96-12-8	1,2-Dibromo-3-chloropropane	ND	4.9	1.4	ug/kg	
106-93-4	1,2-Dibromoethane	ND	4.9	0.49	ug/kg	
107-06-2	1,2-Dichloroethane	ND	4.9	0.49	ug/kg	
78-87-5	1,2-Dichloropropane	ND	4.9	0.49	ug/kg	
142-28-9	1,3-Dichloropropane	ND	4.9	0.49	ug/kg	
108-20-3	Di-Isopropyl ether	ND	4.9	0.49	ug/kg	
594-20-7	2,2-Dichloropropane	ND	4.9	0.49	ug/kg	
124-48-1	Dibromochloromethane	ND	4.9	0.49	ug/kg	
75-71-8	Dichlorodifluoromethane	ND	4.9	0.98	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	4.9	1.1	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	4.9	0.49	ug/kg	
541-73-1	m-Dichlorobenzene	ND	4.9	0.49	ug/kg	
95-50-1	o-Dichlorobenzene	ND	4.9	0.49	ug/kg	
106-46-7	p-Dichlorobenzene	ND	4.9	0.49	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: PARKWAY HEIGHTS MS
Lab Sample ID: C25717-1 **Date Sampled:** 01/14/13
Matrix: SO - Soil **Date Received:** 01/14/13
Method: SW846 8260B **Percent Solids:** n/a [a]
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

VOA 8260 List

CAS No.	Compound	Result	RL	MDL	Units	Q
156-60-5	trans-1,2-Dichloroethylene	ND	4.9	0.49	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	4.9	0.49	ug/kg	
100-41-4	Ethylbenzene	ND	4.9	0.49	ug/kg	
637-92-3	Ethyl tert-Butyl Ether	ND	4.9	0.49	ug/kg	
591-78-6	2-Hexanone	ND	20	2.0	ug/kg	
87-68-3	Hexachlorobutadiene	ND	4.9	0.98	ug/kg	
98-82-8	Isopropylbenzene	ND	4.9	0.49	ug/kg	
99-87-6	p-Isopropyltoluene	ND	4.9	0.49	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	20	2.0	ug/kg	
74-83-9	Methyl bromide	ND	4.9	0.98	ug/kg	
74-87-3	Methyl chloride	ND	4.9	0.98	ug/kg	
74-95-3	Methylene bromide	ND	4.9	0.49	ug/kg	
75-09-2	Methylene chloride	ND	20	4.9	ug/kg	
78-93-3	Methyl ethyl ketone	ND	20	2.0	ug/kg	
1634-04-4	Methyl Tert Butyl Ether	ND	4.9	0.98	ug/kg	
91-20-3	Naphthalene	ND	4.9	0.98	ug/kg	
103-65-1	n-Propylbenzene	ND	4.9	0.49	ug/kg	
100-42-5	Styrene	ND	4.9	0.49	ug/kg	
994-05-8	Tert-Amyl Methyl Ether	ND	4.9	0.49	ug/kg	
75-65-0	Tert Butyl Alcohol	ND	39	9.8	ug/kg	
630-20-6	1,1,1,2-Tetrachloroethane	ND	4.9	0.49	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	4.9	0.49	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	4.9	0.49	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	4.9	0.49	ug/kg	
87-61-6	1,2,3-Trichlorobenzene	ND	4.9	0.49	ug/kg	
96-18-4	1,2,3-Trichloropropane	ND	4.9	0.98	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	4.9	0.49	ug/kg	
95-63-6	1,2,4-Trimethylbenzene	ND	4.9	0.98	ug/kg	
108-67-8	1,3,5-Trimethylbenzene	ND	4.9	0.98	ug/kg	
127-18-4	Tetrachloroethylene	ND	4.9	0.59	ug/kg	
108-88-3	Toluene	ND	4.9	0.49	ug/kg	
79-01-6	Trichloroethylene	ND	4.9	0.49	ug/kg	
75-69-4	Trichlorofluoromethane	ND	4.9	0.98	ug/kg	
75-01-4	Vinyl chloride	ND	4.9	0.98	ug/kg	
1330-20-7	Xylene (total)	ND	9.8	0.98	ug/kg	
	TPH-GRO (C6-C10)	ND	98	49	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		71-125%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	PARKWAY HEIGHTS MS		
Lab Sample ID:	C25717-1	**Date Sampled:**	01/14/13
Matrix:	SO - Soil	**Date Received:**	01/14/13
Method:	SW846 8260B	**Percent Solids:**	n/a [a]
Project:	Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca		

VOA 8260 List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	102%		82-121%
460-00-4	4-Bromofluorobenzene	84%		80-120%

(a) All results reported on a wet weight basis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: PARKWAY HEIGHTS MS
Lab Sample ID: C25717-1 **Date Sampled:** 01/14/13
Matrix: SO - Soil **Date Received:** 01/14/13
Method: SW846 8270C SW846 3550B **Percent Solids:** n/a [a]
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Y18508.D	1	01/16/13	MT	01/14/13	OP7338	EY872
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

ABN Full List

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	660	160	ug/kg	
95-57-8	2-Chlorophenol	ND	170	71	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	170	71	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	170	77	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	170	65	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	660	130	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	330	62	ug/kg	
95-48-7	2-Methylphenol	ND	170	88	ug/kg	
	3&4-Methylphenol	ND	330	78	ug/kg	
88-75-5	2-Nitrophenol	ND	170	79	ug/kg	
100-02-7	4-Nitrophenol	ND	330	39	ug/kg	
87-86-5	Pentachlorophenol	ND	330	33	ug/kg	
108-95-2	Phenol	ND	170	69	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	170	75	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	170	70	ug/kg	
83-32-9	Acenaphthene	ND	170	73	ug/kg	
208-96-8	Acenaphthylene	ND	170	78	ug/kg	
62-53-3	Aniline	ND	170	44	ug/kg	
120-12-7	Anthracene	ND	170	53	ug/kg	
103-33-3	Azobenzene	ND	170	59	ug/kg	
92-87-5	Benzidine	ND	660	79	ug/kg	
56-55-3	Benzo(a)anthracene	ND	170	33	ug/kg	
50-32-8	Benzo(a)pyrene	ND	170	33	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	170	33	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	170	43	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	170	33	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	170	67	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	170	33	ug/kg	
100-51-6	Benzyl Alcohol	ND	170	89	ug/kg	
91-58-7	2-Chloronaphthalene	ND	170	75	ug/kg	
106-47-8	4-Chloroaniline	ND	170	50	ug/kg	
86-74-8	Carbazole	ND	170	34	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: PARKWAY HEIGHTS MS
Lab Sample ID: C25717-1 **Date Sampled:** 01/14/13
Matrix: SO - Soil **Date Received:** 01/14/13
Method: SW846 8270C SW846 3550B **Percent Solids:** n/a [a]
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

ABN Full List

CAS No.	Compound	Result	RL	MDL	Units	Q
218-01-9	Chrysene	ND	170	33	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	170	74	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	170	66	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	170	67	ug/kg	
7005-72-3	4-Chlorophenyl phenyl ether	ND	170	75	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	170	75	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	170	73	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	170	71	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	170	71	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	170	74	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	330	69	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	170	41	ug/kg	
132-64-9	Dibenzofuran	ND	170	73	ug/kg	
122-39-4	Diphenylamine	ND	170	65	ug/kg	
84-74-2	Di-n-butyl phthalate	ND	170	33	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	170	34	ug/kg	
84-66-2	Diethyl phthalate	ND	170	56	ug/kg	
131-11-3	Dimethyl phthalate	ND	170	69	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	330	66	ug/kg	
206-44-0	Fluoranthene	ND	170	33	ug/kg	
86-73-7	Fluorene	ND	170	72	ug/kg	
118-74-1	Hexachlorobenzene	ND	170	70	ug/kg	
87-68-3	Hexachlorobutadiene	ND	170	96	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	170	92	ug/kg	
67-72-1	Hexachloroethane	ND	170	70	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	170	42	ug/kg	
78-59-1	Isophorone	ND	170	69	ug/kg	
90-12-0	1-Methylnaphthalene	ND	170	76	ug/kg	
91-57-6	2-Methylnaphthalene	ND	170	79	ug/kg	
88-74-4	2-Nitroaniline	ND	170	67	ug/kg	
99-09-2	3-Nitroaniline	ND	170	50	ug/kg	
100-01-6	4-Nitroaniline	ND	170	43	ug/kg	
91-20-3	Naphthalene	ND	170	77	ug/kg	
98-95-3	Nitrobenzene	ND	170	77	ug/kg	
62-75-9	N-Nitrosodimethylamine	ND	170	66	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	170	72	ug/kg	
85-01-8	Phenanthrene	ND	170	58	ug/kg	
129-00-0	Pyrene	ND	170	33	ug/kg	
110-86-1	Pyridine	ND	330	45	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	170	75	ug/kg	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	PARKWAY HEIGHTS MS		
Lab Sample ID:	C25717-1	**Date Sampled:**	01/14/13
Matrix:	SO - Soil	**Date Received:**	01/14/13
Method:	SW846 8270C SW846 3550B	**Percent Solids:**	n/a [a]
Project:	Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca		

ABN Full List

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
367-12-4	2-Fluorophenol	68%		14-99%
4165-62-2	Phenol-d5	73%		18-100%
118-79-6	2,4,6-Tribromophenol	85%		25-107%
4165-60-0	Nitrobenzene-d5	67%		15-101%
321-60-8	2-Fluorobiphenyl	69%		15-104%
1718-51-0	Terphenyl-d14	84%		56-123%

(a) All results reported on a wet weight basis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: PARKWAY HEIGHTS MS
Lab Sample ID: C25717-1 **Date Sampled:** 01/14/13
Matrix: SO - Soil **Date Received:** 01/14/13
Method: SW846 8081A SW846 3550B **Percent Solids:** n/a [a]
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	MM013629.D	1	01/15/13	RV	01/15/13	OP7343	GMM365
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	10.0 ml
Run #2		

Pesticide PPL List

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	3.3	0.40	ug/kg	
319-84-6	alpha-BHC	ND	3.3	0.37	ug/kg	
319-85-7	beta-BHC	ND	3.3	0.80	ug/kg	
319-86-8	delta-BHC	ND	3.3	0.40	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	3.3	0.40	ug/kg	
12789-03-6	Chlordane	ND	33	3.3	ug/kg	
60-57-1	Dieldrin	ND	3.3	0.60	ug/kg	
72-54-8	4,4'-DDD	ND	3.3	0.70	ug/kg	
72-55-9	4,4'-DDE	9.4	3.3	0.60	ug/kg	
50-29-3	4,4'-DDT	0.92	3.3	0.50	ug/kg	J
72-20-8	Endrin	ND	3.3	0.60	ug/kg	
7421-93-4	Endrin aldehyde	ND	3.3	0.60	ug/kg	
959-98-8	Endosulfan-I	ND	3.3	0.57	ug/kg	
33213-65-9	Endosulfan-II	ND	3.3	0.60	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.3	0.57	ug/kg	
76-44-8	Heptachlor	ND	3.3	0.47	ug/kg	
1024-57-3	Heptachlor epoxide	ND	3.3	0.50	ug/kg	
72-43-5	Methoxychlor	ND	3.3	0.53	ug/kg	
8001-35-2	Toxaphene	ND	33	6.7	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	97%		31-113%
877-09-8	Tetrachloro-m-xylene	99%		31-113%
2051-24-3	Decachlorobiphenyl	108%		61-129%
2051-24-3	Decachlorobiphenyl	117%		61-129%

(a) All results reported on a wet weight basis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	PARKWAY HEIGHTS MS		
Lab Sample ID:	C25717-1	**Date Sampled:**	01/14/13
Matrix:	SO - Soil	**Date Received:**	01/14/13
Method:	SW846 8082 SW846 3550B	**Percent Solids:**	n/a [a]
Project:	Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	OO035784.D	1	01/15/13	AG	01/15/13	OP7344	GOO1101
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	10.0 ml
Run #2		

PCB List

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	33	6.7	ug/kg	
11104-28-2	Aroclor 1221	ND	33	17	ug/kg	
11141-16-5	Aroclor 1232	ND	33	17	ug/kg	
53469-21-9	Aroclor 1242	ND	33	17	ug/kg	
12672-29-6	Aroclor 1248	ND	33	17	ug/kg	
11097-69-1	Aroclor 1254	ND	33	17	ug/kg	
11096-82-5	Aroclor 1260	ND	33	6.7	ug/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	86%		38-109%
877-09-8	Tetrachloro-m-xylene	79%		38-109%
2051-24-3	Decachlorobiphenyl	83%		49-138%
2051-24-3	Decachlorobiphenyl	71%		49-138%

(a) All results reported on a wet weight basis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	PARKWAY HEIGHTS MS		
Lab Sample ID:	C25717-1	**Date Sampled:**	01/14/13
Matrix:	SO - Soil	**Date Received:**	01/14/13
Method:	SW846 8015B M SW846 3545A	**Percent Solids:**	n/a [a]
Project:	Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	HH029943.D	1	01/15/13	JH	01/14/13	OP7339	GHH897
Run #2							

	Initial Weight	Final Volume
Run #1	10.2 g	1.0 ml
Run #2		

TPH Extractable

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C10-C28)	3.39	9.9	2.5	mg/kg	J
	TPH (> C28-C40)	ND	20	4.9	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
630-01-3	Hexacosane	72%		37-122%

(a) All results reported on a wet weight basis.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID: PARKWAY HEIGHTS MS
Lab Sample ID: C25717-1
Matrix: SO - Soil
Date Sampled: 01/14/13
Date Received: 01/14/13
Percent Solids: n/a [a]
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Antimony	< 1.7	1.7	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Arsenic	2.7	1.7	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Barium	30.0	17	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Beryllium	< 0.85	0.85	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Cadmium	< 0.85	0.85	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Chromium	41.4	0.85	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Cobalt	5.3	0.85	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Copper	6.9	2.1	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Lead	7.4	1.7	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Mercury	< 0.039	0.039	mg/kg	1	01/16/13	01/17/13	RW	SW846 7471A [1]	SW846 7471A [4]
Molybdenum	< 1.7	1.7	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Nickel	26.7	0.85	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Selenium	< 1.7	1.7	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Silver	< 0.85	0.85	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Thallium	< 1.7	1.7	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Vanadium	35.6	0.85	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]
Zinc	24.9	1.7	mg/kg	1	01/15/13	01/17/13	RS	SW846 6010B [2]	SW846 3050B [3]

(1) Instrument QC Batch: MA2937
(2) Instrument QC Batch: MA2938
(3) Prep QC Batch: MP5733
(4) Prep QC Batch: MP5742

(a) All results reported on a wet weight basis.

RL = Reporting Limit

Report of Analysis

Client Sample ID:	PARKWAY HEIGHTS MS		
Lab Sample ID:	C25717-1W	**Date Sampled:**	01/14/13
Matrix:	SO - Soil	**Date Received:**	01/14/13
		Percent Solids:	n/a
Project:	Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca		

Metals Analysis, STLC Leachate CA WET

Analyte	Result	MCL	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	< 0.25		0.25	mg/l	1	01/19/13	01/21/13	RS	SW846 6010B [1]	SW3010A [2]
Chromium	< 0.25		0.25	mg/l	1	01/19/13	01/21/13	RS	SW846 6010B [1]	SW3010A [2]

(1) Instrument QC Batch: MA2943
(2) Prep QC Batch: MP5756

RL = Reporting Limit
MCL = Maximum Contamination Level (not available)

Northern California ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

CHAIN OF CUSTODY

ACCUTEST LABORATORIES

2105 Lundy Ave, San Jose, CA 95131
(408) 588-0200 FAX: (408) 588-0201

GEOSCASR4906

FED-EX Tracking #: | Bottle Order Control #:
Accutest Quote #: | Accutest NC Job #: C25717

Client / Reporting Information

Company Name: Geosphere Consultants, Inc.
Address: 2001 Crow Canyon Road, Suite 100
City: San Ramon | State: CA | Zip: 94583
Project Contact: Raghubar Shrestha
Phone #: 925-314-7100
Samplers's Name: Raghubar Shrestha

Project Information

Project Name: Parkway Heights MS
Street: 650 Sunset Drive
City: South San Francisco | State: CA
Project #: 91-02973-A
EMAIL: rshrestha@geosphereinc.net
Client Purchase Order #:

Requested Analysis

TPH as Gasoline ☐ 624 ☐ 8260 Full List ☐
8260Petro (Includes BTEX / MtBE / TBA / EtBE / DIPE / TAME / 1,2-DCA / EDB ☐ TPH as Gas ☐
☐ +TICs ☐ 625 ☐ PAHs only ☐ 8270 ☐
☐ TPH-Extractable ☐ Diesel - Motor Oil ☐ Other With Silica Gel Cleanup ☐
RCRA-8 ☐ METALS: CAM-17 ☐ PPM-13 ☐ LUFT-5 ☐
GC8 ☐ PCBs-8082 ☐ Pesticides-8081 ☐
GC/PID-FID ☐ BTEX-MtBE-TPH as Gasoline by 8260B
VOCs
SVOCs
STLC Arsenic, Chromium

Matrix Codes

WW- Wastewater
GW- Ground Water
SW- Surface Water
SO- Soil
OI-Oil
WP-Wipe
LIQ - Non-aqueous Liquid
AIR
DW- Drinking Water (Perchlorate Only)

Accutest Sample ID	Sample ID / Field Point / Point of Collection	Collection: Date	Time	Sampled by	Matrix	# of bottles	Number of preserved Bottles: HCl	NaOH	HNO3	H2SO4	NONE	NaHSO4	MeOH	ENCORE	TPH as Gasoline	8260 Full List	8260Petro	PAHs only	TPH-Extractable	METALS: CAM-17 / PPM-13	RCRA-8	BTEX-MtBE-TPH as Gasoline by 8260B	VOCs	SVOCs	STLC Arsenic, Chromium	LAB USE ONLY
-1	Parkway Heights MS	1-14-13	1220	RS	SO	1													X	X	X	X	X	X	X	

Turnaround Time (Business days)

Approved By:/ Date:

- [x] 5 Day
- [ ] 3 Day (125% markup)
- [ ] 2 Day (150% markup)
- [ ] 1 Day (200% markup)
- [ ] Same Day (300% markup)

Emergency T/A data available VIA Lablink

Data Deliverable Information

- [ ] Commercial "A" - Results only
- [x] Commercial "B" - Results with QC summaries
- [ ] Commercial "B+" - Results, QC, and chromatograms
- [ ] FULT1 - Level 4 data package
- [ ] EDF for Geotracker [ ] EDD Format
- Provide EDF Global ID
- Provide EDF Logcode:

Comments / Remarks

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1		1/14/13	1	1/14/13 1421	2	
3	Relinquished by:	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
5	Relinquished by:	Date Time:	Received By: 5	Custody Seal #	Appropriate Bottle / Preservation Y/N	Headspace Y/N N/A

Labels match COC Y/N | Separate Receiving Check List used: Y/N | On Ice Y/N | Cooler Temp. 18.7+1.0=17.7 oc

C25717: Chain of Custody
Page 1 of 2

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: C25717 **Client:** GEOSPHERE CONSULTANTS **Project:** PARKWAY HEIGHTS

Date / Time Received: 1/14/2013 **Delivery Method:** Client **Airbill #'s:**

Cooler Temps (Initial/Adjusted): #1: (18.7/17.7); 0

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☐		☑	3. COC Present:	☑		☐
2. Custody Seals Intact:	☐		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☐		☑
2. Cooler temp verification:	IR Gun		
3. Cooler media:	No Ice		
4. No. Coolers:	1		

Quality Control Preservation	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	☑
2. Trip Blank listed on COC:	☐		☐	☑
3. Samples preserved properly:	☐		☐	
4. VOCs headspace free:	☐		☐	☑

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume recvd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

Comments

Accutest Laboratories
V:408.588.0200
2105 Lundy Avenue
F: 408.588.0201
San Jose, CA 95131
www/accutest.com

C25717: Chain of Custody
Page 2 of 2

Northern California ACCUTEST LABORATORIES

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM1132-MB	M37298.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	40	10	ug/kg	
71-43-2	Benzene	ND	5.0	0.50	ug/kg	
108-86-1	Bromobenzene	ND	5.0	0.50	ug/kg	
74-97-5	Bromochloromethane	ND	5.0	0.50	ug/kg	
75-27-4	Bromodichloromethane	ND	5.0	0.50	ug/kg	
75-25-2	Bromoform	ND	5.0	0.50	ug/kg	
104-51-8	n-Butylbenzene	ND	5.0	0.50	ug/kg	
135-98-8	sec-Butylbenzene	ND	5.0	0.50	ug/kg	
98-06-6	tert-Butylbenzene	ND	5.0	0.50	ug/kg	
108-90-7	Chlorobenzene	ND	5.0	0.50	ug/kg	
75-00-3	Chloroethane	ND	5.0	1.0	ug/kg	
67-66-3	Chloroform	ND	5.0	0.50	ug/kg	
95-49-8	o-Chlorotoluene	ND	5.0	0.50	ug/kg	
106-43-4	p-Chlorotoluene	ND	5.0	0.50	ug/kg	
56-23-5	Carbon tetrachloride	ND	5.0	0.50	ug/kg	
75-34-3	1,1-Dichloroethane	ND	5.0	0.50	ug/kg	
75-35-4	1,1-Dichloroethylene	ND	5.0	0.50	ug/kg	
563-58-6	1,1-Dichloropropene	ND	5.0	0.50	ug/kg	
96-12-8	1,2-Dibromo-3-chloropropane	ND	5.0	1.4	ug/kg	
106-93-4	1,2-Dibromoethane	ND	5.0	0.50	ug/kg	
107-06-2	1,2-Dichloroethane	ND	5.0	0.50	ug/kg	
78-87-5	1,2-Dichloropropane	ND	5.0	0.50	ug/kg	
142-28-9	1,3-Dichloropropane	ND	5.0	0.50	ug/kg	
108-20-3	Di-Isopropyl ether	ND	5.0	0.50	ug/kg	
594-20-7	2,2-Dichloropropane	ND	5.0	0.50	ug/kg	
124-48-1	Dibromochloromethane	ND	5.0	0.50	ug/kg	
75-71-8	Dichlorodifluoromethane	ND	5.0	1.0	ug/kg	
156-59-2	cis-1,2-Dichloroethylene	ND	5.0	1.1	ug/kg	
10061-01-5	cis-1,3-Dichloropropene	ND	5.0	0.50	ug/kg	
541-73-1	m-Dichlorobenzene	ND	5.0	0.50	ug/kg	
95-50-1	o-Dichlorobenzene	ND	5.0	0.50	ug/kg	
106-46-7	p-Dichlorobenzene	ND	5.0	0.50	ug/kg	
156-60-5	trans-1,2-Dichloroethylene	ND	5.0	0.50	ug/kg	
10061-02-6	trans-1,3-Dichloropropene	ND	5.0	0.50	ug/kg	
100-41-4	Ethylbenzene	ND	5.0	0.50	ug/kg	
637-92-3	Ethyl tert-Butyl Ether	ND	5.0	0.50	ug/kg	

Method Blank Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM1132-MB	M37298.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Compound	Result	RL	MDL	Units	Q
591-78-6	2-Hexanone	ND	20	2.0	ug/kg	
87-68-3	Hexachlorobutadiene	ND	5.0	1.0	ug/kg	
98-82-8	Isopropylbenzene	ND	5.0	0.50	ug/kg	
99-87-6	p-Isopropyltoluene	ND	5.0	0.50	ug/kg	
108-10-1	4-Methyl-2-pentanone	ND	20	2.0	ug/kg	
74-83-9	Methyl bromide	ND	5.0	1.0	ug/kg	
74-87-3	Methyl chloride	ND	5.0	1.0	ug/kg	
74-95-3	Methylene bromide	ND	5.0	0.50	ug/kg	
75-09-2	Methylene chloride	ND	20	5.0	ug/kg	
78-93-3	Methyl ethyl ketone	ND	20	2.0	ug/kg	
1634-04-4	Methyl Tert Butyl Ether	ND	5.0	1.0	ug/kg	
91-20-3	Naphthalene	ND	5.0	1.0	ug/kg	
103-65-1	n-Propylbenzene	ND	5.0	0.50	ug/kg	
100-42-5	Styrene	ND	5.0	0.50	ug/kg	
994-05-8	Tert-Amyl Methyl Ether	ND	5.0	0.50	ug/kg	
75-65-0	Tert Butyl Alcohol	ND	40	10	ug/kg	
630-20-6	1,1,1,2-Tetrachloroethane	ND	5.0	0.50	ug/kg	
71-55-6	1,1,1-Trichloroethane	ND	5.0	0.50	ug/kg	
79-34-5	1,1,2,2-Tetrachloroethane	ND	5.0	0.50	ug/kg	
79-00-5	1,1,2-Trichloroethane	ND	5.0	0.50	ug/kg	
87-61-6	1,2,3-Trichlorobenzene	ND	5.0	0.50	ug/kg	
96-18-4	1,2,3-Trichloropropane	ND	5.0	1.0	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	5.0	0.50	ug/kg	
95-63-6	1,2,4-Trimethylbenzene	ND	5.0	1.0	ug/kg	
108-67-8	1,3,5-Trimethylbenzene	ND	5.0	1.0	ug/kg	
127-18-4	Tetrachloroethylene	ND	5.0	0.60	ug/kg	
108-88-3	Toluene	ND	5.0	0.50	ug/kg	
79-01-6	Trichloroethylene	ND	5.0	0.50	ug/kg	
75-69-4	Trichlorofluoromethane	ND	5.0	1.0	ug/kg	
75-01-4	Vinyl chloride	ND	5.0	1.0	ug/kg	
1330-20-7	Xylene (total)	ND	10	1.0	ug/kg	
	TPH-GRO (C6-C10)	ND	100	50	ug/kg	

Method Blank Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM1132-MB	M37298.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	97%	71-125%
2037-26-5	Toluene-D8	103%	82-121%
460-00-4	4-Bromofluorobenzene	84%	80-120%

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM1132-BS	M37295.D	1	01/16/13	XB	n/a	n/a	VM1132
VM1132-BSD	M37296.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	160	137	86	140	88	2	62-130/24
71-43-2	Benzene	40	41.3	103	41.3	103	0	81-119/20
108-86-1	Bromobenzene	40	42.8	107	43.3	108	1	79-120/22
74-97-5	Bromochloromethane	40	41.9	105	42.2	106	1	81-120/19
75-27-4	Bromodichloromethane	40	38.6	97	38.8	97	1	79-124/20
75-25-2	Bromoform	40	41.9	105	42.5	106	1	76-128/21
104-51-8	n-Butylbenzene	40	41.0	103	41.0	103	0	79-123/26
135-98-8	sec-Butylbenzene	40	39.3	98	38.9	97	1	77-122/24
98-06-6	tert-Butylbenzene	40	39.7	99	40.9	102	3	77-121/23
108-90-7	Chlorobenzene	40	38.7	97	38.9	97	1	82-121/20
75-00-3	Chloroethane	40	40.7	102	39.5	99	3	80-126/21
67-66-3	Chloroform	40	38.5	96	38.7	97	1	82-123/20
95-49-8	o-Chlorotoluene	40	40.2	101	38.3	96	5	78-125/25
106-43-4	p-Chlorotoluene	40	36.6	92	38.3	96	5	75-125/26
56-23-5	Carbon tetrachloride	40	40.9	102	39.5	99	3	82-127/22
75-34-3	1,1-Dichloroethane	40	37.5	94	37.5	94	0	80-123/20
75-35-4	1,1-Dichloroethylene	40	40.5	101	39.9	100	1	76-123/19
563-58-6	1,1-Dichloropropene	40	42.1	105	42.1	105	0	79-123/20
96-12-8	1,2-Dibromo-3-chloropropane	40	35.8	90	37.4	94	4	64-133/23
106-93-4	1,2-Dibromoethane	40	39.6	99	41.4	104	4	80-120/20
107-06-2	1,2-Dichloroethane	40	37.5	94	37.0	93	1	76-132/21
78-87-5	1,2-Dichloropropane	40	39.5	99	39.5	99	0	80-121/20
142-28-9	1,3-Dichloropropane	40	38.7	97	40.1	100	4	78-120/20
108-20-3	Di-Isopropyl ether	40	38.6	97	39.4	99	2	78-126/19
594-20-7	2,2-Dichloropropane	40	38.9	97	38.2	96	2	77-132/22
124-48-1	Dibromochloromethane	40	39.6	99	40.4	101	2	76-121/21
75-71-8	Dichlorodifluoromethane	40	36.2	91	33.7	84	7	51-135/23
156-59-2	cis-1,2-Dichloroethylene	40	41.4	104	41.7	104	1	79-123/20
10061-01-5	cis-1,3-Dichloropropene	40	45.4	114	46.0	115	1	81-124/21
541-73-1	m-Dichlorobenzene	40	38.9	97	39.5	99	2	79-123/23
95-50-1	o-Dichlorobenzene	40	39.4	99	40.1	100	2	79-124/22
106-46-7	p-Dichlorobenzene	40	41.8	105	42.1	105	1	79-123/22
156-60-5	trans-1,2-Dichloroethylene	40	42.1	105	42.1	105	0	78-120/19
10061-02-6	trans-1,3-Dichloropropene	40	37.8	95	38.3	96	1	81-123/22
100-41-4	Ethylbenzene	40	41.1	103	41.1	103	0	80-119/21
637-92-3	Ethyl tert-Butyl Ether	40	39.7	99	40.1	100	1	75-132/21

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM1132-BS	M37295.D	1	01/16/13	XB	n/a	n/a	VM1132
VM1132-BSD	M37296.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
591-78-6	2-Hexanone	160	142	89	147	92	3	68-139/24
87-68-3	Hexachlorobutadiene	40	43.5	109	43.8	110	1	81-126/32
98-82-8	Isopropylbenzene	40	38.1	95	38.2	96	0	81-122/22
99-87-6	p-Isopropyltoluene	40	39.1	98	39.0	98	0	81-121/23
108-10-1	4-Methyl-2-pentanone	160	144	90	147	92	2	74-136/23
74-83-9	Methyl bromide	40	44.9	112	41.0	103	9	82-124/20
74-87-3	Methyl chloride	40	35.1	88	33.0	83	6	60-132/26
74-95-3	Methylene bromide	40	40.0	100	40.3	101	1	82-120/20
75-09-2	Methylene chloride	40	41.5	104	43.2	108	4	75-119/20
78-93-3	Methyl ethyl ketone	160	147	92	152	95	3	71-130/22
1634-04-4	Methyl Tert Butyl Ether	40	37.7	94	39.0	98	3	79-127/19
91-20-3	Naphthalene	40	40.7	102	42.4	106	4	78-125/23
103-65-1	n-Propylbenzene	40	38.2	96	38.0	95	1	79-124/22
100-42-5	Styrene	40	41.7	104	42.3	106	1	83-122/21
994-05-8	Tert-Amyl Methyl Ether	40	39.1	98	39.4	99	1	80-127/20
75-65-0	Tert Butyl Alcohol	200	166	83	178	89	7	65-144/23
630-20-6	1,1,1,2-Tetrachloroethane	40	41.4	104	42.2	106	2	82-123/21
71-55-6	1,1,1-Trichloroethane	40	39.0	98	38.4	96	2	79-129/21
79-34-5	1,1,2,2-Tetrachloroethane	40	40.0	100	41.1	103	3	77-126/20
79-00-5	1,1,2-Trichloroethane	40	38.7	97	40.2	101	4	79-123/20
87-61-6	1,2,3-Trichlorobenzene	40	42.6	107	43.6	109	2	81-122/26
96-18-4	1,2,3-Trichloropropane	40	36.8	92	38.7	97	5	79-122/24
120-82-1	1,2,4-Trichlorobenzene	40	42.8	107	44.0	110	3	81-121/26
95-63-6	1,2,4-Trimethylbenzene	40	42.5	106	42.4	106	0	82-121/24
108-67-8	1,3,5-Trimethylbenzene	40	43.4	109	43.2	108	0	81-123/23
127-18-4	Tetrachloroethylene	40	42.4	106	42.3	106	0	80-125/25
108-88-3	Toluene	40	41.4	104	41.8	105	1	80-117/21
79-01-6	Trichloroethylene	40	43.2	108	43.3	108	0	81-122/20
75-69-4	Trichlorofluoromethane	40	39.2	98	37.5	94	4	77-133/22
75-01-4	Vinyl chloride	40	46.5	116	45.0	113	3	71-133/23
1330-20-7	Xylene (total)	120	117	98	119	99	2	81-122/22

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
1868-53-7	Dibromofluoromethane	100%	100%	71-125%

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM1132-BS	M37295.D	1	01/16/13	XB	n/a	n/a	VM1132
VM1132-BSD	M37296.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
2037-26-5	Toluene-D8	98%	100%	82-121%
460-00-4	4-Bromofluorobenzene	89%	90%	80-120%

* = Outside of Control Limits.

Laboratory Control Sample Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM1132-LCS	M37297.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Compound	Spike ug/kg	LCS ug/kg	LCS %	Limits
	TPH-GRO (C6-C10)	250	281	112	50-121

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	98%	71-125%
2037-26-5	Toluene-D8	103%	82-121%
460-00-4	4-Bromofluorobenzene	88%	80-120%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
C25725-5MS	M37313.D	1	01/16/13	XB	n/a	n/a	VM1132
C25725-5MSD	M37314.D	1	01/16/13	XB	n/a	n/a	VM1132
C25725-5 [a]	M37304.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Compound	C25725-5 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		8000	7360	92	6530	82	12	62-130/24
71-43-2	Benzene	ND		2000	1920	96	1860	93	3	81-119/20
108-86-1	Bromobenzene	ND		2000	2070	104	2040	102	1	79-120/22
74-97-5	Bromochloromethane	ND		2000	1990	100	1920	96	4	81-120/19
75-27-4	Bromodichloromethane	ND		2000	1800	90	1730	87	4	79-124/20
75-25-2	Bromoform	ND		2000	1930	97	1850	93	4	76-128/21
104-51-8	n-Butylbenzene	ND		2000	1850	93	1820	91	2	79-123/26
135-98-8	sec-Butylbenzene	ND		2000	1940	97	1930	97	1	77-122/24
98-06-6	tert-Butylbenzene	ND		2000	1960	98	1920	96	2	77-121/23
108-90-7	Chlorobenzene	ND		2000	1940	97	1900	95	2	82-121/20
75-00-3	Chloroethane	ND		2000	1890	95	1980	99	5	80-126/21
67-66-3	Chloroform	ND		2000	1760	88	1710	86	3	82-123/20
95-49-8	o-Chlorotoluene	ND		2000	1900	95	1910	96	1	78-125/25
106-43-4	p-Chlorotoluene	ND		2000	1830	92	1770	89	3	75-125/26
56-23-5	Carbon tetrachloride	ND		2000	1700	85	1640	82	4	82-127/22
75-34-3	1,1-Dichloroethane	ND		2000	1740	87	1700	85	2	80-123/20
75-35-4	1,1-Dichloroethylene	ND		2000	1800	90	1740	87	3	76-123/19
563-58-6	1,1-Dichloropropene	ND		2000	1780	89	1720	86	3	79-123/20
96-12-8	1,2-Dibromo-3-chloropropane	ND		2000	1770	89	1650	83	7	64-133/23
106-93-4	1,2-Dibromoethane	ND		2000	1950	98	1870	94	4	80-120/20
107-06-2	1,2-Dichloroethane	ND		2000	1670	84	1590	80	5	76-132/21
78-87-5	1,2-Dichloropropane	ND		2000	1880	94	1830	92	3	80-121/20
142-28-9	1,3-Dichloropropane	ND		2000	1850	93	1800	90	3	78-120/20
108-20-3	Di-Isopropyl ether	ND		2000	1950	98	1880	94	4	78-126/19
594-20-7	2,2-Dichloropropane	ND		2000	1580	79	1520	76*	4	77-132/22
124-48-1	Dibromochloromethane	ND		2000	1890	95	1820	91	4	76-121/21
75-71-8	Dichlorodifluoromethane	ND		2000	1300	65	1260	63	3	51-135/23
156-59-2	cis-1,2-Dichloroethylene	ND		2000	1950	98	1890	95	3	79-123/20
10061-01-5	cis-1,3-Dichloropropene	ND		2000	1870	94	1790	90	4	81-124/21
541-73-1	m-Dichlorobenzene	ND		2000	1970	99	1970	99	0	79-123/23
95-50-1	o-Dichlorobenzene	ND		2000	2000	100	1970	99	2	79-124/22
106-46-7	p-Dichlorobenzene	ND		2000	1980	99	1940	97	2	79-123/22
156-60-5	trans-1,2-Dichloroethylene	ND		2000	1910	96	1840	92	4	78-120/19
10061-02-6	trans-1,3-Dichloropropene	ND		2000	1790	90	1710	86	5	81-123/22
100-41-4	Ethylbenzene	ND		2000	1860	93	1830	92	2	80-119/21
637-92-3	Ethyl tert-Butyl Ether	ND		2000	1790	90	1700	85	5	75-132/21

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
C25725-5MS	M37313.D	1	01/16/13	XB	n/a	n/a	VM1132
C25725-5MSD	M37314.D	1	01/16/13	XB	n/a	n/a	VM1132
C25725-5 [a]	M37304.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Compound	C25725-5 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
591-78-6	2-Hexanone	ND		8000	6780	85	6300	79	7	68-139/24
87-68-3	Hexachlorobutadiene	ND		2000	1960	98	1890	95	4	81-126/32
98-82-8	Isopropylbenzene	ND		2000	1860	93	1830	92	2	81-122/22
99-87-6	p-Isopropyltoluene	ND		2000	1950	98	1930	97	1	81-121/23
108-10-1	4-Methyl-2-pentanone	ND		8000	6930	87	6510	81	6	74-136/23
74-83-9	Methyl bromide	ND		2000	1940	97	2130	107	9	82-124/20
74-87-3	Methyl chloride	ND		2000	1660	83	1560	78	6	60-132/26
74-95-3	Methylene bromide	ND		2000	1880	94	1800	90	4	82-120/20
75-09-2	Methylene chloride	ND		2000	1940	97	1860	93	4	75-119/20
78-93-3	Methyl ethyl ketone	ND		8000	7570	95	7020	88	8	71-130/22
1634-04-4	Methyl Tert Butyl Ether	ND		2000	1790	90	1690	85	6	79-127/19
91-20-3	Naphthalene	ND		2000	2000	100	1890	95	6	78-125/23
103-65-1	n-Propylbenzene	ND		2000	1930	97	1900	95	2	79-124/22
100-42-5	Styrene	ND		2000	1950	98	1880	94	4	83-122/21
994-05-8	Tert-Amyl Methyl Ether	ND		2000	1820	91	1750	88	4	80-127/20
75-65-0	Tert Butyl Alcohol	ND		10000	8940	89	7890	79	12	65-144/23
630-20-6	1,1,1,2-Tetrachloroethane	ND		2000	1900	95	1850	93	3	82-123/21
71-55-6	1,1,1-Trichloroethane	ND		2000	1680	84	1630	82	3	79-129/21
79-34-5	1,1,2,2-Tetrachloroethane	ND		2000	1960	98	1870	94	5	77-126/20
79-00-5	1,1,2-Trichloroethane	ND		2000	1930	97	1830	92	5	79-123/20
87-61-6	1,2,3-Trichlorobenzene	ND		2000	1970	99	1890	95	4	81-122/26
96-18-4	1,2,3-Trichloropropane	ND		2000	1830	92	1750	88	4	79-122/24
120-82-1	1,2,4-Trichlorobenzene	ND		2000	1950	98	1910	96	2	81-121/26
95-63-6	1,2,4-Trimethylbenzene	ND		2000	1920	96	1880	94	2	82-121/24
108-67-8	1,3,5-Trimethylbenzene	ND		2000	1930	97	1900	95	2	81-123/23
127-18-4	Tetrachloroethylene	ND		2000	1960	98	1950	98	1	80-125/25
108-88-3	Toluene	ND		2000	1910	96	1870	94	2	80-117/21
79-01-6	Trichloroethylene	ND		2000	2000	100	1960	98	2	81-122/20
75-69-4	Trichlorofluoromethane	ND		2000	1720	86	1690	85	2	77-133/22
75-01-4	Vinyl chloride	ND		2000	824	41*	847	42*	3	71-133/23
1330-20-7	Xylene (total)	ND		6000	5670	95	5580	93	2	81-122/22

CAS No.	Surrogate Recoveries	MS	MSD	C25725-5	Limits
1868-53-7	Dibromofluoromethane	94%	93%	93%	71-125%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
C25725-5MS	M37313.D	1	01/16/13	XB	n/a	n/a	VM1132
C25725-5MSD	M37314.D	1	01/16/13	XB	n/a	n/a	VM1132
C25725-5 [a]	M37304.D	1	01/16/13	XB	n/a	n/a	VM1132

The QC reported here applies to the following samples: **Method:** SW846 8260B

C25717-1

CAS No.	Surrogate Recoveries	MS	MSD	C25725-5	Limits
2037-26-5	Toluene-D8	94%	96%	100%	82-121%
460-00-4	4-Bromofluorobenzene	85%	85%	87%	80-120%

(a) 4 : 1 composite.

* = Outside of Control Limits.

Northern California ACCUTEST LABORATORIES

GC/MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7338-MB	Y18491.D	1	01/16/13	MT	01/14/13	OP7338	EY871

The QC reported here applies to the following samples: **Method:** SW846 8270C

C25717-1

CAS No.	Compound	Result	RL	MDL	Units	Q
65-85-0	Benzoic acid	ND	670	160	ug/kg	
95-57-8	2-Chlorophenol	ND	170	71	ug/kg	
59-50-7	4-Chloro-3-methyl phenol	ND	170	72	ug/kg	
120-83-2	2,4-Dichlorophenol	ND	170	78	ug/kg	
105-67-9	2,4-Dimethylphenol	ND	170	65	ug/kg	
51-28-5	2,4-Dinitrophenol	ND	670	130	ug/kg	
534-52-1	4,6-Dinitro-o-cresol	ND	330	62	ug/kg	
95-48-7	2-Methylphenol	ND	170	88	ug/kg	
	3&4-Methylphenol	ND	330	79	ug/kg	
88-75-5	2-Nitrophenol	ND	170	79	ug/kg	
100-02-7	4-Nitrophenol	ND	330	40	ug/kg	
87-86-5	Pentachlorophenol	ND	330	34	ug/kg	
108-95-2	Phenol	ND	170	69	ug/kg	
95-95-4	2,4,5-Trichlorophenol	ND	170	75	ug/kg	
88-06-2	2,4,6-Trichlorophenol	ND	170	71	ug/kg	
83-32-9	Acenaphthene	ND	170	73	ug/kg	
208-96-8	Acenaphthylene	ND	170	78	ug/kg	
62-53-3	Aniline	ND	170	44	ug/kg	
120-12-7	Anthracene	ND	170	54	ug/kg	
103-33-3	Azobenzene	ND	170	59	ug/kg	
92-87-5	Benzidine	ND	670	79	ug/kg	
56-55-3	Benzo(a)anthracene	ND	170	33	ug/kg	
50-32-8	Benzo(a)pyrene	36.3	170	33	ug/kg	J
205-99-2	Benzo(b)fluoranthene	ND	170	33	ug/kg	
191-24-2	Benzo(g,h,i)perylene	ND	170	43	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	170	33	ug/kg	
101-55-3	4-Bromophenyl phenyl ether	ND	170	67	ug/kg	
85-68-7	Butyl benzyl phthalate	ND	170	33	ug/kg	
100-51-6	Benzyl Alcohol	ND	170	89	ug/kg	
91-58-7	2-Chloronaphthalene	ND	170	76	ug/kg	
106-47-8	4-Chloroaniline	ND	170	50	ug/kg	
86-74-8	Carbazole	ND	170	35	ug/kg	
218-01-9	Chrysene	ND	170	33	ug/kg	
111-91-1	bis(2-Chloroethoxy)methane	ND	170	74	ug/kg	
111-44-4	bis(2-Chloroethyl)ether	ND	170	67	ug/kg	
108-60-1	bis(2-Chloroisopropyl)ether	ND	170	67	ug/kg	

Method Blank Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7338-MB	Y18491.D	1	01/16/13	MT	01/14/13	OP7338	EY871

The QC reported here applies to the following samples: **Method:** SW846 8270C

C25717-1

CAS No.	Compound	Result	RL	MDL	Units	Q
7005-72-3	4-Chlorophenyl phenyl ether	ND	170	76	ug/kg	
95-50-1	1,2-Dichlorobenzene	ND	170	75	ug/kg	
541-73-1	1,3-Dichlorobenzene	ND	170	74	ug/kg	
106-46-7	1,4-Dichlorobenzene	ND	170	72	ug/kg	
121-14-2	2,4-Dinitrotoluene	ND	170	72	ug/kg	
606-20-2	2,6-Dinitrotoluene	ND	170	75	ug/kg	
91-94-1	3,3'-Dichlorobenzidine	ND	330	70	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	170	41	ug/kg	
132-64-9	Dibenzofuran	ND	170	73	ug/kg	
122-39-4	Diphenylamine	ND	170	65	ug/kg	
84-74-2	Di-n-butyl phthalate	ND	170	33	ug/kg	
117-84-0	Di-n-octyl phthalate	ND	170	34	ug/kg	
84-66-2	Diethyl phthalate	ND	170	57	ug/kg	
131-11-3	Dimethyl phthalate	ND	170	69	ug/kg	
117-81-7	bis(2-Ethylhexyl)phthalate	ND	330	67	ug/kg	
206-44-0	Fluoranthene	ND	170	33	ug/kg	
86-73-7	Fluorene	ND	170	72	ug/kg	
118-74-1	Hexachlorobenzene	ND	170	71	ug/kg	
87-68-3	Hexachlorobutadiene	ND	170	96	ug/kg	
77-47-4	Hexachlorocyclopentadiene	ND	170	92	ug/kg	
67-72-1	Hexachloroethane	ND	170	71	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	170	43	ug/kg	
78-59-1	Isophorone	ND	170	69	ug/kg	
90-12-0	1-Methylnaphthalene	ND	170	76	ug/kg	
91-57-6	2-Methylnaphthalene	ND	170	80	ug/kg	
88-74-4	2-Nitroaniline	ND	170	67	ug/kg	
99-09-2	3-Nitroaniline	ND	170	50	ug/kg	
100-01-6	4-Nitroaniline	ND	170	43	ug/kg	
91-20-3	Naphthalene	ND	170	77	ug/kg	
98-95-3	Nitrobenzene	ND	170	78	ug/kg	
62-75-9	N-Nitrosodimethylamine	ND	170	66	ug/kg	
621-64-7	N-Nitroso-di-n-propylamine	ND	170	72	ug/kg	
85-01-8	Phenanthrene	ND	170	58	ug/kg	
129-00-0	Pyrene	ND	170	33	ug/kg	
110-86-1	Pyridine	ND	330	46	ug/kg	
120-82-1	1,2,4-Trichlorobenzene	ND	170	75	ug/kg	

Method Blank Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7338-MB	Y18491.D	1	01/16/13	MT	01/14/13	OP7338	EY871

The QC reported here applies to the following samples: **Method:** SW846 8270C

C25717-1

CAS No.	Surrogate Recoveries		Limits
367-12-4	2-Fluorophenol	66%	14-99%
4165-62-2	Phenol-d5	71%	18-100%
118-79-6	2,4,6-Tribromophenol	73%	25-107%
4165-60-0	Nitrobenzene-d5	70%	15-101%
321-60-8	2-Fluorobiphenyl	72%	15-104%
1718-51-0	Terphenyl-d14	105%	56-123%

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7338-BS	Y18489.D	1	01/15/13	MT	01/14/13	OP7338	EY871
OP7338-BSD	Y18490.D	1	01/15/13	MT	01/14/13	OP7338	EY871

The QC reported here applies to the following samples: **Method:** SW846 8270C

C25717-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
65-85-0	Benzoic acid	1670	1500	90	1640	98	9	25-112/32
95-57-8	2-Chlorophenol	833	591	71	607	73	3	31-110/31
59-50-7	4-Chloro-3-methyl phenol	833	654	78	685	82	5	33-118/27
120-83-2	2,4-Dichlorophenol	833	629	75	655	79	4	30-115/30
105-67-9	2,4-Dimethylphenol	833	599	72	638	77	6	30-116/30
51-28-5	2,4-Dinitrophenol	833	495	59	577	69	15	11-139/30
534-52-1	4,6-Dinitro-o-cresol	833	535	64	601	72	12	30-139/24
95-48-7	2-Methylphenol	833	596	72	628	75	5	30-113/31
	3&4-Methylphenol	833	621	75	646	78	4	30-113/30
88-75-5	2-Nitrophenol	833	602	72	613	74	2	29-112/32
100-02-7	4-Nitrophenol	833	724	87	817	98	12	40-127/23
87-86-5	Pentachlorophenol	833	602	72	647	78	7	43-140/20
108-95-2	Phenol	833	587	70	612	73	4	30-112/30
95-95-4	2,4,5-Trichlorophenol	833	614	74	665	80	8	33-121/27
88-06-2	2,4,6-Trichlorophenol	833	642	77	674	81	5	31-115/29
83-32-9	Acenaphthene	833	525	63	563	68	7	34-112/28
208-96-8	Acenaphthylene	833	561	67	609	73	8	33-115/28
62-53-3	Aniline	833	433	52	471	57	8	30-93/27
120-12-7	Anthracene	833	675	81	717	86	6	59-111/21
103-33-3	Azobenzene	833	635	76	672	81	6	39-114/22
92-87-5	Benzidine	1670	838	50	811	49	3	10-96/39
56-55-3	Benzo(a)anthracene	833	731	88	758	91	4	72-122/22
50-32-8	Benzo(a)pyrene	833	704	84	744	89	6	71-120/22
205-99-2	Benzo(b)fluoranthene	833	701	84	717	86	2	67-123/24
191-24-2	Benzo(g,h,i)perylene	833	706	85	768	92	8	57-134/24
207-08-9	Benzo(k)fluoranthene	833	733	88	749	90	2	74-126/25
101-55-3	4-Bromophenyl phenyl ether	833	628	75	663	80	5	45-110/22
85-68-7	Butyl benzyl phthalate	833	730	88	736	88	1	68-129/20
100-51-6	Benzyl Alcohol	833	629	75	656	79	4	25-116/31
91-58-7	2-Chloronaphthalene	833	597	72	623	75	4	33-110/30
106-47-8	4-Chloroaniline	833	460	55	477	57	4	27-92/25
86-74-8	Carbazole	833	781	94	819	98	5	64-125/21
218-01-9	Chrysene	833	703	84	726	87	3	73-125/22
111-91-1	bis(2-Chloroethoxy)methane	833	601	72	623	75	4	31-112/31
111-44-4	bis(2-Chloroethyl)ether	833	582	70	598	72	3	30-106/31
108-60-1	bis(2-Chloroisopropyl)ether	833	567	68	583	70	3	30-111/32

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7338-BS	Y18489.D	1	01/15/13	MT	01/14/13	OP7338	EY871
OP7338-BSD	Y18490.D	1	01/15/13	MT	01/14/13	OP7338	EY871

The QC reported here applies to the following samples: **Method:** SW846 8270C

C25717-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
7005-72-3	4-Chlorophenyl phenyl ether	833	634	76	670	80	6	40-111/25
95-50-1	1,2-Dichlorobenzene	833	556	67	555	67	0	28-102/32
541-73-1	1,3-Dichlorobenzene	833	542	65	552	66	2	26-99/32
106-46-7	1,4-Dichlorobenzene	833	556	67	554	66	0	27-100/32
121-14-2	2,4-Dinitrotoluene	833	697	84	734	88	5	55-115/21
606-20-2	2,6-Dinitrotoluene	833	647	78	689	83	6	45-115/21
91-94-1	3,3'-Dichlorobenzidine	1670	1470	88	1630	98	10	53-115/24
53-70-3	Dibenzo(a,h)anthracene	833	699	84	777	93	11	59-132/23
132-64-9	Dibenzofuran	833	618	74	653	78	6	37-113/26
122-39-4	Diphenylamine	833	658	79	712	85	8	51-112/24
84-74-2	Di-n-butyl phthalate	833	793	95	832	100	5	67-114/22
117-84-0	Di-n-octyl phthalate	833	749	90	729	87	3	62-138/24
84-66-2	Diethyl phthalate	833	653	78	698	84	7	52-111/22
131-11-3	Dimethyl phthalate	833	677	81	723	87	7	42-113/23
117-81-7	bis(2-Ethylhexyl)phthalate	833	751	90	752	90	0	66-130/20
206-44-0	Fluoranthene	833	744	89	777	93	4	69-117/21
86-73-7	Fluorene	833	625	75	657	79	5	42-112/24
118-74-1	Hexachlorobenzene	833	663	80	677	81	2	50-110/24
87-68-3	Hexachlorobutadiene	833	517	62	522	63	1	30-116/33
77-47-4	Hexachlorocyclopentadiene	833	398	48	458	55	14	10-108/33
67-72-1	Hexachloroethane	833	545	65	545	65	0	25-101/34
193-39-5	Indeno(1,2,3-cd)pyrene	833	735	88	749	90	2	60-131/21
78-59-1	Isophorone	833	619	74	639	77	3	32-108/30
90-12-0	1-Methylnaphthalene	833	603	72	619	74	3	33-110/30
91-57-6	2-Methylnaphthalene	833	623	75	644	77	3	33-107/30
88-74-4	2-Nitroaniline	833	624	75	680	82	9	39-120/24
99-09-2	3-Nitroaniline	833	559	67	625	75	11	41-107/24
100-01-6	4-Nitroaniline	833	645	77	700	84	8	48-132/24
91-20-3	Naphthalene	833	524	63	536	64	2	32-121/31
98-95-3	Nitrobenzene	833	594	71	619	74	4	30-109/31
62-75-9	N-Nitrosodimethylamine	833	549	66	560	67	2	27-101/32
621-64-7	N-Nitroso-di-n-propylamine	833	598	72	625	75	4	29-111/32
85-01-8	Phenanthrene	833	659	79	695	83	5	57-113/21
129-00-0	Pyrene	833	715	86	731	88	2	63-120/20
110-86-1	Pyridine	833	373	45	365	44	2	16-75/34
120-82-1	1,2,4-Trichlorobenzene	833	589	71	599	72	2	29-104/32

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7338-BS	Y18489.D	1	01/15/13	MT	01/14/13	OP7338	EY871
OP7338-BSD	Y18490.D	1	01/15/13	MT	01/14/13	OP7338	EY871

The QC reported here applies to the following samples: **Method:** SW846 8270C

C25717-1

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
367-12-4	2-Fluorophenol	73%	73%	14-99%
4165-62-2	Phenol-d5	76%	78%	18-100%
118-79-6	2,4,6-Tribromophenol	85%	91%	25-107%
4165-60-0	Nitrobenzene-d5	73%	74%	15-101%
321-60-8	2-Fluorobiphenyl	74%	77%	15-104%
1718-51-0	Terphenyl-d14	93%	93%	56-123%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7338-MS	Y18497.D	1	01/16/13	MT	01/14/13	OP7338	EY872
OP7338-MSD	Y18498.D	1	01/16/13	MT	01/14/13	OP7338	EY872
C25703-7	Y18506.D	1	01/16/13	MT	01/14/13	OP7338	EY872

The QC reported here applies to the following samples: **Method:** SW846 8270C

C25717-1

CAS No.	Compound	C25703-7 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
65-85-0	Benzoic acid	ND		1670	1070	64	1140	69	6	25-112/32
95-57-8	2-Chlorophenol	ND		833	588	71	596	72	1	31-110/31
59-50-7	4-Chloro-3-methyl phenol	ND		833	651	78	654	79	0	33-118/27
120-83-2	2,4-Dichlorophenol	ND		833	634	76	626	75	1	30-115/30
105-67-9	2,4-Dimethylphenol	ND		833	610	73	608	73	0	30-116/30
51-28-5	2,4-Dinitrophenol	ND		833	274	33	380	46	32* [a]	11-139/30
534-52-1	4,6-Dinitro-o-cresol	ND		833	415	50	506	61	20	30-139/24
95-48-7	2-Methylphenol	ND		833	615	74	623	75	1	30-113/31
	3&4-Methylphenol	ND		833	618	74	622	75	1	30-113/30
88-75-5	2-Nitrophenol	ND		833	599	72	594	71	1	29-112/32
100-02-7	4-Nitrophenol	ND		833	640	77	694	83	8	40-127/23
87-86-5	Pentachlorophenol	ND		833	515	62	524	63	2	43-140/20
108-95-2	Phenol	ND		833	592	71	598	72	1	30-112/30
95-95-4	2,4,5-Trichlorophenol	ND		833	612	73	623	75	2	33-121/27
88-06-2	2,4,6-Trichlorophenol	ND		833	630	76	649	78	3	31-115/29
83-32-9	Acenaphthene	ND		833	525	63	537	65	2	34-112/28
208-96-8	Acenaphthylene	ND		833	571	69	580	70	2	33-115/28
62-53-3	Aniline	ND		833	449	54	489	59	9	30-93/27
120-12-7	Anthracene	ND		833	646	78	666	80	3	59-111/21
103-33-3	Azobenzene	ND		833	622	75	640	77	3	39-114/22
92-87-5	Benzidine	ND		1670	718	43	734	44	2	10-96/39
56-55-3	Benzo(a)anthracene	ND		833	640	77	674	81	5	72-122/22
50-32-8	Benzo(a)pyrene	ND		833	615	74	649	78	5	71-120/22
205-99-2	Benzo(b)fluoranthene	ND		833	614	74	653	78	6	67-123/24
191-24-2	Benzo(g,h,i)perylene	ND		833	631	76	654	79	4	57-134/24
207-08-9	Benzo(k)fluoranthene	ND		833	618	74	631	76	2	74-126/25
101-55-3	4-Bromophenyl phenyl ether	ND		833	625	75	646	78	3	45-110/22
85-68-7	Butyl benzyl phthalate	ND		833	649	78	645	78	1	68-129/20
100-51-6	Benzyl Alcohol	ND		833	622	75	632	76	2	25-116/31
91-58-7	2-Chloronaphthalene	ND		833	597	72	601	72	1	33-110/30
106-47-8	4-Chloroaniline	ND		833	496	60	513	62	3	27-92/25
86-74-8	Carbazole	ND		833	725	87	756	91	4	64-125/21
218-01-9	Chrysene	ND		833	610	73	641	77	5	73-125/22
111-91-1	bis(2-Chloroethoxy)methane	ND		833	600	72	608	73	1	31-112/31
111-44-4	bis(2-Chloroethyl)ether	ND		833	578	69	593	71	3	30-106/31
108-60-1	bis(2-Chloroisopropyl)ether	ND		833	568	68	580	70	2	30-111/32

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7338-MS	Y18497.D	1	01/16/13	MT	01/14/13	OP7338	EY872
OP7338-MSD	Y18498.D	1	01/16/13	MT	01/14/13	OP7338	EY872
C25703-7	Y18506.D	1	01/16/13	MT	01/14/13	OP7338	EY872

The QC reported here applies to the following samples: **Method:** SW846 8270C

C25717-1

CAS No.	Compound	C25703-7 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
7005-72-3	4-Chlorophenyl phenyl ether	ND		833	627	75	646	78	3	40-111/25
95-50-1	1,2-Dichlorobenzene	ND		833	544	65	552	66	1	28-102/32
541-73-1	1,3-Dichlorobenzene	ND		833	529	63	536	64	1	26-99/32
106-46-7	1,4-Dichlorobenzene	ND		833	529	63	544	65	3	27-100/32
121-14-2	2,4-Dinitrotoluene	ND		833	653	78	679	82	4	55-115/21
606-20-2	2,6-Dinitrotoluene	ND		833	635	76	650	78	2	45-115/21
91-94-1	3,3'-Dichlorobenzidine	ND		1670	1340	80	1500	90	11	53-115/24
53-70-3	Dibenzo(a,h)anthracene	ND		833	629	75	648	78	3	59-132/23
132-64-9	Dibenzofuran	ND		833	616	74	625	75	1	37-113/26
122-39-4	Diphenylamine	ND		833	647	78	656	79	1	51-112/24
84-74-2	Di-n-butyl phthalate	ND		833	720	86	744	89	3	67-114/22
117-84-0	Di-n-octyl phthalate	ND		833	676	81	673	81	0	62-138/24
84-66-2	Diethyl phthalate	ND		833	616	74	645	78	5	52-111/22
131-11-3	Dimethyl phthalate	ND		833	663	80	697	84	5	42-113/23
117-81-7	bis(2-Ethylhexyl)phthalate	ND		833	667	80	668	80	0	66-130/20
206-44-0	Fluoranthene	ND		833	674	81	701	84	4	69-117/21
86-73-7	Fluorene	ND		833	619	74	630	76	2	42-112/24
118-74-1	Hexachlorobenzene	ND		833	629	75	641	77	2	50-110/24
87-68-3	Hexachlorobutadiene	ND		833	522	63	516	62	1	30-116/33
77-47-4	Hexachlorocyclopentadiene	ND		833	425	51	465	56	9	10-108/33
67-72-1	Hexachloroethane	ND		833	531	64	534	64	1	25-101/34
193-39-5	Indeno(1,2,3-cd)pyrene	ND		833	608	73	619	74	2	60-131/21
78-59-1	Isophorone	ND		833	626	75	622	75	1	32-108/30
90-12-0	1-Methylnaphthalene	ND		833	611	73	604	73	1	33-110/30
91-57-6	2-Methylnaphthalene	ND		833	624	75	620	75	1	33-107/30
88-74-4	2-Nitroaniline	ND		833	633	76	646	78	2	39-120/24
99-09-2	3-Nitroaniline	ND		833	556	67	584	70	5	41-107/24
100-01-6	4-Nitroaniline	ND		833	612	73	665	80	8	48-132/24
91-20-3	Naphthalene	ND		833	524	63	518	62	1	32-121/31
98-95-3	Nitrobenzene	ND		833	592	71	599	72	1	30-109/31
62-75-9	N-Nitrosodimethylamine	ND		833	538	65	542	65	1	27-101/32
621-64-7	N-Nitroso-di-n-propylamine	ND		833	603	72	614	74	2	29-111/32
85-01-8	Phenanthrene	ND		833	629	75	644	77	2	57-113/21
129-00-0	Pyrene	ND		833	641	77	655	79	2	63-120/20
110-86-1	Pyridine	ND		833	378	45	385	46	2	16-75/34
120-82-1	1,2,4-Trichlorobenzene	ND		833	588	71	586	70	0	29-104/32

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7338-MS	Y18497.D	1	01/16/13	MT	01/14/13	OP7338	EY872
OP7338-MSD	Y18498.D	1	01/16/13	MT	01/14/13	OP7338	EY872
C25703-7	Y18506.D	1	01/16/13	MT	01/14/13	OP7338	EY872

The QC reported here applies to the following samples: **Method:** SW846 8270C

C25717-1

CAS No.	Surrogate Recoveries	MS	MSD	C25703-7	Limits
367-12-4	2-Fluorophenol	73%	74%	70%	14-99%
4165-62-2	Phenol-d5	77%	79%	73%	18-100%
118-79-6	2,4,6-Tribromophenol	83%	88%	74%	25-107%
4165-60-0	Nitrobenzene-d5	74%	75%	70%	15-101%
321-60-8	2-Fluorobiphenyl	76%	78%	73%	15-104%
1718-51-0	Terphenyl-d14	84%	85%	94%	56-123%

(a) Outside control limits due to matrix interference.

* = Outside of Control Limits.

Northern California ACCUTEST LABORATORIES

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7343-MB	MM013642.D	1	01/16/13	RV	01/15/13	OP7343	GMM365

The QC reported here applies to the following samples: **Method:** SW846 8081A

C25717-1

CAS No.	Compound	Result	RL	MDL	Units	Q
309-00-2	Aldrin	ND	3.3	0.40	ug/kg	
319-84-6	alpha-BHC	ND	3.3	0.37	ug/kg	
319-85-7	beta-BHC	ND	3.3	0.80	ug/kg	
319-86-8	delta-BHC	ND	3.3	0.40	ug/kg	
58-89-9	gamma-BHC (Lindane)	ND	3.3	0.40	ug/kg	
12789-03-6	Chlordane	ND	33	3.3	ug/kg	
60-57-1	Dieldrin	ND	3.3	0.60	ug/kg	
72-54-8	4,4'-DDD	ND	3.3	0.70	ug/kg	
72-55-9	4,4'-DDE	ND	3.3	0.60	ug/kg	
50-29-3	4,4'-DDT	ND	3.3	0.50	ug/kg	
72-20-8	Endrin	ND	3.3	0.60	ug/kg	
7421-93-4	Endrin aldehyde	ND	3.3	0.60	ug/kg	
959-98-8	Endosulfan-I	ND	3.3	0.57	ug/kg	
33213-65-9	Endosulfan-II	ND	3.3	0.60	ug/kg	
1031-07-8	Endosulfan sulfate	ND	3.3	0.57	ug/kg	
76-44-8	Heptachlor	ND	3.3	0.47	ug/kg	
1024-57-3	Heptachlor epoxide	ND	3.3	0.50	ug/kg	
72-43-5	Methoxychlor	ND	3.3	0.53	ug/kg	
8001-35-2	Toxaphene	ND	33	6.7	ug/kg	

CAS No.	Surrogate Recoveries		Limits
877-09-8	Tetrachloro-m-xylene	101%	31-113%
877-09-8	Tetrachloro-m-xylene	100%	31-113%
2051-24-3	Decachlorobiphenyl	110%	61-129%
2051-24-3	Decachlorobiphenyl	117%	61-129%

Method Blank Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7344-MB	OO035787.D	1	01/15/13	AG	01/15/13	OP7344	GOO1101

The QC reported here applies to the following samples: **Method:** SW846 8082

C25717-1

CAS No.	Compound	Result	RL	MDL	Units	Q
12674-11-2	Aroclor 1016	ND	33	6.7	ug/kg	
11104-28-2	Aroclor 1221	ND	33	17	ug/kg	
11141-16-5	Aroclor 1232	ND	33	17	ug/kg	
53469-21-9	Aroclor 1242	ND	33	17	ug/kg	
12672-29-6	Aroclor 1248	ND	33	17	ug/kg	
11097-69-1	Aroclor 1254	ND	33	17	ug/kg	
11096-82-5	Aroclor 1260	ND	33	6.7	ug/kg	

CAS No.	Surrogate Recoveries		Limits
877-09-8	Tetrachloro-m-xylene	91%	38-109%
877-09-8	Tetrachloro-m-xylene	78%	38-109%
2051-24-3	Decachlorobiphenyl	88%	49-138%
2051-24-3	Decachlorobiphenyl	80%	49-138%

Method Blank Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7339-MB	GG40688.D	1	01/15/13	LB	01/14/13	OP7339	GGG1076

The QC reported here applies to the following samples: **Method:** SW846 8015B M

C25717-1

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C10-C28)	ND	10	2.5	mg/kg	
	TPH (> C28-C40)	ND	20	5.0	mg/kg	

CAS No.	Surrogate Recoveries		Limits
630-01-3	Hexacosane	84%	37-122%

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7343-BS2	MM013661.D	1	01/16/13	RV	01/15/13	OP7343	GMM366
OP7343-BSD2	MM013662.D	1	01/16/13	RV	01/15/13	OP7343	GMM366

The QC reported here applies to the following samples: **Method:** SW846 8081A

C25717-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
8001-35-2	Toxaphene	133	130	98	128	96	2	53-125/30

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
877-09-8	Tetrachloro-m-xylene	105%	103%	31-113%
877-09-8	Tetrachloro-m-xylene	106%	102%	31-113%
2051-24-3	Decachlorobiphenyl	116%	111%	61-129%
2051-24-3	Decachlorobiphenyl	125%	121%	61-129%

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7343-BS	MM013663.D	1	01/16/13	RV	01/15/13	OP7343	GMM366
OP7343-BSD	MM013664.D	1	01/16/13	RV	01/15/13	OP7343	GMM366

The QC reported here applies to the following samples: **Method:** SW846 8081A

C25717-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
309-00-2	Aldrin	33.3	34.4	103	35.1	105	2	35-119/28
319-84-6	alpha-BHC	33.3	34.1	102	34.6	104	1	33-126/28
319-85-7	beta-BHC	33.3	34.0	102	35.4	106	4	42-123/24
319-86-8	delta-BHC	33.3	36.0	108	36.9	111	2	40-131/23
58-89-9	gamma-BHC (Lindane)	33.3	34.4	103	35.3	106	3	37-126/26
60-57-1	Dieldrin	33.3	36.7	110	36.8	110	0	53-124/24
72-54-8	4,4'-DDD	33.3	37.6	113	37.4	112	1	65-128/26
72-55-9	4,4'-DDE	33.3	37.7	113	38.1	114	1	55-123/26
50-29-3	4,4'-DDT	33.3	37.1	111	37.5	113	1	59-129/28
72-20-8	Endrin	33.3	39.1	117	39.2	118	0	58-131/22
7421-93-4	Endrin aldehyde	33.3	36.6	110	36.7	110	0	60-130/28
959-98-8	Endosulfan-I	33.3	37.3	112	37.7	113	1	49-126/26
33213-65-9	Endosulfan-II	33.3	37.0	111	36.9	111	0	60-130/23
1031-07-8	Endosulfan sulfate	33.3	37.6	113	38.1	114	1	57-142/25
76-44-8	Heptachlor	33.3	35.3	106	36.1	108	2	43-127/25
1024-57-3	Heptachlor epoxide	33.3	36.2	109	37.0	111	2	52-121/24
72-43-5	Methoxychlor	33.3	38.1	114	38.6	116	1	69-144/30

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
877-09-8	Tetrachloro-m-xylene	102%	105%	31-113%
877-09-8	Tetrachloro-m-xylene	101%	104%	31-113%
2051-24-3	Decachlorobiphenyl	114%	117%	61-129%
2051-24-3	Decachlorobiphenyl	121%	123%	61-129%

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7344-BS	OO035785.D	1	01/15/13	AG	01/15/13	OP7344	GOO1101
OP7344-BSD	OO035786.D	1	01/15/13	AG	01/15/13	OP7344	GOO1101

The QC reported here applies to the following samples: **Method:** SW846 8082

C25717-1

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
12674-11-2	Aroclor 1016	133	124	93	121	91	2	46-114/22
11096-82-5	Aroclor 1260	133	130	98	126	95	3	54-127/21

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
877-09-8	Tetrachloro-m-xylene	96%	96%	38-109%
877-09-8	Tetrachloro-m-xylene	89%	81%	38-109%
2051-24-3	Decachlorobiphenyl	88%	89%	49-138%
2051-24-3	Decachlorobiphenyl	75%	77%	49-138%

* = Outside of Control Limits.

Blank Spike/Blank Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7339-BS	GG40689.D	1	01/15/13	LB	01/14/13	OP7339	GGG1076
OP7339-BSD	GG40690.D	1	01/15/13	LB	01/14/13	OP7339	GGG1076

The QC reported here applies to the following samples: **Method:** SW846 8015B M

C25717-1

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	BSD mg/kg	BSD %	RPD	Limits Rec/RPD
	TPH (C10-C28)	100	80.4	80	83.1	83	3	39-102/29
	TPH (> C28-C40)	100	86.2	86	91.3	91	6	42-111/26

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
630-01-3	Hexacosane	90%	90%	37-122%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7343-MS	MM013659.D	5	01/16/13	RV	01/15/13	OP7343	GMM366
OP7343-MSD	MM013660.D	5	01/16/13	RV	01/15/13	OP7343	GMM366
C25702-21	MM013630.D	1	01/15/13	RV	01/15/13	OP7343	GMM365

The QC reported here applies to the following samples: **Method:** SW846 8081A

C25717-1

CAS No.	Compound	C25702-21 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
309-00-2	Aldrin	ND		36	28.4	79	29.6	82	4	35-119/28
319-84-6	alpha-BHC	ND		36	26.3	73	27.2	75	3	33-126/28
319-85-7	beta-BHC	21.6		36	50.0	79	49.3	77	1	42-123/24
319-86-8	delta-BHC	ND		36	27.7	77	28.4	79	2	40-131/23
58-89-9	gamma-BHC (Lindane)	ND		36	27.5	76	28.3	78	3	37-126/26
60-57-1	Dieldrin	ND		36	31.4	87	32.0	89	2	53-124/24
72-54-8	4,4'-DDD	1.1	J	36	30.9	83	31.6	85	2	65-128/26
72-55-9	4,4'-DDE	52.7		36	81.5	80	78.1	70	4	55-123/26
50-29-3	4,4'-DDT	1.0	J	36	31.0	83	31.0	83	0	59-129/28
72-20-8	Endrin	ND		36	33.3	93	34.2	95	3	58-131/22
7421-93-4	Endrin aldehyde	ND		36	31.1	87	32.0	89	3	60-130/28
959-98-8	Endosulfan-I	ND		36	31.2	87	32.2	89	3	49-126/26
33213-65-9	Endosulfan-II	ND		36	31.7	88	32.1	89	1	60-130/23
1031-07-8	Endosulfan sulfate	ND		36	29.7	83	30.3	84	2	57-142/25
76-44-8	Heptachlor	ND		36	29.5	82	30.2	84	2	43-127/25
1024-57-3	Heptachlor epoxide	ND		36	32.2	90	32.9	91	2	52-121/24
72-43-5	Methoxychlor	ND		36	29.9	83	30.5	85	2	69-144/30

CAS No.	Surrogate Recoveries	MS	MSD	C25702-21	Limits
877-09-8	Tetrachloro-m-xylene	76%	77%	98%	31-113%
877-09-8	Tetrachloro-m-xylene	79%	80%	98%	31-113%
2051-24-3	Decachlorobiphenyl	95%	93%	107%	61-129%
2051-24-3	Decachlorobiphenyl	105%	102%	114%	61-129%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: C25717
Account: GEOSCASR Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP7339-MS	HH029949.D	1	01/15/13	JH	01/14/13	OP7339	GHH897
OP7339-MSD	HH029950.D	1	01/15/13	JH	01/14/13	OP7339	GHH897
C25710-1	HH029939.D	1	01/15/13	JH	01/14/13	OP7339	GHH897

The QC reported here applies to the following samples: **Method:** SW846 8015B M

C25717-1

CAS No.	Compound	C25710-1 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH (C10-C28)	ND		98.7	70.0	71	60.9	62	14	39-102/29
	TPH (> C28-C40)	ND		98.7	71.8	73	70.8	72	1	42-111/26

CAS No.	Surrogate Recoveries	MS	MSD	C25710-1	Limits
630-01-3	Hexacosane	57%	57%	68%	37-122%

* = Outside of Control Limits.

Northern California ACCUTEST LABORATORIES

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5733
Matrix Type: SOLID

Methods: SW846 6010B
Units: mg/kg

Prep Date: 01/15/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	20	1.3	2		
Antimony	2.0	.07	.087	-0.080	<2.0
Arsenic	2.0	.07	.07	-0.020	<2.0
Barium	20	.04	.035	0.21	<20
Beryllium	1.0	.02	.012	0.0	<1.0
Boron	10	.09	.2		
Cadmium	1.0	.02	.015	-0.13	<1.0
Calcium	500	.71	7.6		
Chromium	1.0	.03	.054	0.050	<1.0
Cobalt	1.0	.02	.022	-0.020	<1.0
Copper	2.5	.12	.19	0.46	<2.5
Iron	20	.64	1.6		
Lead	2.0	.07	.054	-0.10	<2.0
Magnesium	500	2.7	1.5		
Manganese	1.5	.01	.054		
Molybdenum	2.0	.02	.024	-0.040	<2.0
Nickel	1.0	.02	.024	0.0	<1.0
Potassium	1000	1.8	1.3		
Selenium	2.0	.18	.23	0.55	<2.0
Silicon		.12			
Silver	1.0	.03	.044	0.040	<1.0
Sodium	1000	1.5	4.8		
Strontium	1.0	.02	.017		
Thallium	2.0	.05	.073	-0.36	<2.0
Tin	50	.02	.41		
Titanium	1.0	.04	.079		
Vanadium	1.0	.03	.025	0.0	<1.0
Zinc	2.0	.03	.098	0.50	<2.0

Associated samples MP5733: C25717-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5733
Matrix Type: SOLID

Methods: SW846 6010B
Units: mg/kg

Prep Date: 01/15/13

Metal	C25703-7 Original	MS	Spikelot MPIR4A	% Rec	QC Limits
Aluminum					
Antimony	0.52	16.7	43.5	37.2N(a)	75-125
Arsenic	7.5	46.7	43.5	90.2	75-125
Barium	145	532	43.5	890.1N(a	75-125
Beryllium	0.46	38.3	43.5	87.0	75-125
Boron					
Cadmium	0.0	38.7	43.5	89.0	75-125
Calcium					
Chromium	13.7	51.7	43.5	87.4	75-125
Cobalt	4.6	41.2	43.5	84.2	75-125
Copper	13.0	52.0	43.5	89.7	75-125
Iron					
Lead	7.8	49.9	43.5	96.8	75-125
Magnesium					
Manganese					
Molybdenum	0.097	35.4	43.5	81.2	75-125
Nickel	13.4	54.7	43.5	95.0	75-125
Potassium					
Selenium	1.4	38.8	43.5	86.0	75-125
Silicon					
Silver	0.30	40.8	43.5	93.2	75-125
Sodium					
Strontium					
Thallium	0.0	37.9	43.5	87.2	75-125
Tin					
Titanium					
Vanadium	51.7	89.5	43.5	86.9	75-125
Zinc	29.9	67.7	43.5	86.9	75-125

Associated samples MP5733: C25717-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5733 Methods: SW846 6010B
Matrix Type: SOLID Units: mg/kg

Prep Date: 01/15/13

Metal	C25703-7 Original	MSD	Spikelot MPIR4A	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony	0.52	15.8	42.4	36.1N(a)	5.5	20
Arsenic	7.5	45.7	42.4	90.2	2.2	20
Barium	145	415	42.4	637.2N(a	24.7 (b)	20
Beryllium	0.46	37.3	42.4	86.9	2.6	20
Boron						
Cadmium	0.0	38.0	42.4	89.7	1.8	20
Calcium						
Chromium	13.7	51.0	42.4	88.0	1.4	20
Cobalt	4.6	38.6	42.4	80.2	6.5	20
Copper	13.0	51.5	42.4	90.9	1.0	20
Iron						
Lead	7.8	46.2	42.4	90.6	7.7	20
Magnesium						
Manganese						
Molybdenum	0.097	33.6	42.4	79.1	5.2	20
Nickel	13.4	53.1	42.4	93.7	3.0	20
Potassium						
Selenium	1.4	38.3	42.4	87.1	1.3	20
Silicon						
Silver	0.30	39.2	42.4	91.8	4.0	20
Sodium						
Strontium						
Thallium	0.0	36.9	42.4	87.1	2.7	20
Tin						
Titanium						
Vanadium	51.7	88.8	42.4	87.6	0.8	20
Zinc	29.9	64.1	42.4	80.7	5.5	20

Associated samples MP5733: C25717-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.
(b) High RPD indicates possible matrix interference and/or sample nonhomogeneity.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5733
Matrix Type: SOLID

Methods: SW846 6010B
Units: mg/kg

Prep Date: 01/15/13

Metal	BSP Result	Spikelot MPIR4A	% Rec	QC Limits
Aluminum				
Antimony	46.3	50	92.6	80-120
Arsenic	45.0	50	90.0	80-120
Barium	46.7	50	93.4	80-120
Beryllium	46.5	50	93.0	80-120
Boron				
Cadmium	45.6	50	91.2	80-120
Calcium				
Chromium	49.1	50	98.2	80-120
Cobalt	48.1	50	96.2	80-120
Copper	48.5	50	97.0	80-120
Iron				
Lead	44.6	50	89.2	80-120
Magnesium				
Manganese				
Molybdenum	46.7	50	93.4	80-120
Nickel	45.2	50	90.4	80-120
Potassium				
Selenium	44.5	50	89.0	80-120
Silicon				
Silver	45.4	50	90.8	80-120
Sodium				
Strontium				
Thallium	47.1	50	94.2	80-120
Tin				
Titanium				
Vanadium	47.1	50	94.2	80-120
Zinc	48.4	50	96.8	80-120

Associated samples MP5733: C25717-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5733 Methods: SW846 6010B
Matrix Type: SOLID Units: ug/l

Prep Date: 01/15/13

Metal	C25703-7 Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony	5.90	0.00	100.0(a)	0-10
Arsenic	84.9	95.3	12.2*(b)	0-10
Barium	1640	1970	19.8*(b)	0-10
Beryllium	5.20	6.50	25.0 (a)	0-10
Boron				
Cadmium	0.00	0.00	NC	0-10
Calcium				
Chromium	155	191	23.4*(b)	0-10
Cobalt	51.5	52.7	2.3	0-10
Copper	147	166	13.0*(b)	0-10
Iron				
Lead	87.6	67.7	22.7*(b)	0-10
Magnesium				
Manganese				
Molybdenum	1.10	4.30	290.9(a)	0-10
Nickel	152	159	4.5	0-10
Potassium				
Selenium	15.7	48.3	207.6(a)	0-10
Silicon				
Silver	3.40	9.70	185.3(a)	0-10
Sodium				
Strontium				
Thallium	0.00	0.00	NC	0-10
Tin				
Titanium				
Vanadium	584	689	17.9*(b)	0-10
Zinc	338	385	13.9*(b)	0-10

Associated samples MP5733: C25717-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
(b) Serial dilution indicates possible matrix interference.

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5742 Methods: SW846 7471A
Matrix Type: SOLID Units: mg/kg

Prep Date: 01/16/13

Metal	RL	IDL	MDL	MB raw	final
Mercury	0.042	.00035	.0043	0.0052	<0.042

Associated samples MP5742: C25717-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5742
Matrix Type: SOLID

Methods: SW846 7471A
Units: mg/kg

Prep Date: 01/16/13

Metal	C25703-6 Original	MS	Spikelot HGPWS1	% Rec	QC Limits
Mercury	0.028	0.36	0.313	106.2	75-125

Associated samples MP5742: C25717-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5742 Methods: SW846 7471A
Matrix Type: SOLID Units: mg/kg

Prep Date: 01/16/13

Metal	C25703-6 Original	MSD	Spikelot HGPWS1	% Rec	MSD RPD	QC Limit
Mercury	0.028	0.37	0.328	104.3	2.7	20

Associated samples MP5742: C25717-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

8.2.2
8

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5742 Methods: SW846 7471A
Matrix Type: SOLID Units: mg/kg

Prep Date: 01/16/13

Metal	BSP Result	Spikelot HGPWS1	% Rec	QC Limits
Mercury	0.20	0.167	120.0	80-120

Associated samples MP5742: C25717-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5756
Matrix Type: LEACHATE

Methods: SW846 6010B
Units: mg/l

Prep Date: 01/19/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	5.0	.34	.21		
Antimony	0.15	.018	.013		
Arsenic	0.25	.018	.016	-0.010	<0.25
Barium	5.0	.01	.0088		
Beryllium	0.13	.005	.01		
Boron	2.5	.023	.016		
Cadmium	0.050	.005	.0038		
Calcium	130	.18	.3		
Chromium	0.25	.0075	.01	-0.0075	<0.25
Cobalt	0.13	.005	.0075		
Copper	0.25	.03	.075		
Iron	5.0	.16	.31		
Lead	0.25	.018	.021		
Magnesium	130	.68	.91		
Manganese	0.38	.0025	.031		
Molybdenum	0.50	.005	.0055		
Nickel	0.13	.005	.003		
Potassium	250	.45	1.1		
Selenium	0.25	.045	.055		
Silicon	2.5	.03	.17		
Silver	0.13	.0075	.012		
Sodium	250	.37	.33		
Strontium	0.25	.005	.006		
Thallium	0.25	.013	.014		
Tin	1.3	.005	.018		
Titanium	0.25	.01	.0085		
Vanadium	0.25	.0075	.0075		
Zinc	0.50	.0075	.1		

Associated samples MP5756: C25717-1W

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5756
Matrix Type: LEACHATE

Methods: SW846 6010B
Units: mg/l

Prep Date: 01/19/13

Metal	C25717-1W Original	MS	Spikelot MPIR4A	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	0.0	13.0	12.5	104.0	75-125
Barium					
Beryllium					
Boron					
Cadmium					
Calcium					
Chromium	0.24	13.2	12.5	103.7	75-125
Cobalt					
Copper					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Potassium					
Selenium					
Silicon					
Silver					
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Vanadium					
Zinc					

Associated samples MP5756: C25717-1W

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5756 Methods: SW846 6010B
Matrix Type: LEACHATE Units: mg/l

Prep Date: 01/19/13

Metal	C25717-1W Original	MSD	Spikelot MPIR4A	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	0.0	13.0	12.5	104.0	0.0	20
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chromium	0.24	13.2	12.5	103.7	0.0	20
Cobalt						
Copper						
Iron						
Lead						
Magnesium						
Manganese						
Molybdenum						
Nickel						
Potassium						
Selenium						
Silicon						
Silver						
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Vanadium						
Zinc						

Associated samples MP5756: C25717-1W

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5756
Matrix Type: LEACHATE

Methods: SW846 6010B
Units: mg/l

Prep Date: 01/19/13

Metal	BSP Result	Spikelot MPIR4A	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	12.8	12.5	102.4	80-120
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium	12.8	12.5	102.4	80-120
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium				
Silicon				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP5756: C25717-1W

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: C25717
Account: GEOSCASR - Geosphere Consultants
Project: Parkway Heights Middle School - 650 Sunset Ave, South San Francisco, Ca

QC Batch ID: MP5756
Matrix Type: LEACHATE

Methods: SW846 6010B
Units: ug/l

Prep Date: 01/19/13

Metal	C25717-1W Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	0.00	0.00	NC	0-10
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium	9.60	10.9	13.5 (a)	0-10
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium				
Silicon				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc				

Associated samples MP5756: C25717-1W

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

DEPARTMENT OF CONSERVATION

CALIFORNIA GEOLOGICAL SURVEY

SCHOOL REVIEW UNIT • 801 K STREET, MS 12-32 • SACRAMENTO, CALIFORNIA 95814

PHONE 916 / 324-7324 • FAX 916 / 322-4765 • TDD 916 / 324-2555 • WEB SITE conservation.ca.gov/cgs

James "Larry" Scott
District Bond Program Director
South San Francisco Unified School District
Facility Building 398 B Street
South San Francisco, CA 94080

June 6, 2013

Subject: **Engineering Geology and Seismology Review for**
Parkway Heights Middle School – New Buildings Additions
650 Sunset Avenue, South San Francisco, CA 94080
CGS Application No. 01-CGS1265

Dear Mr. Scott:

In accordance with your request and transmittal of documents on March 21, 2013, the California Geological Survey has reviewed the engineering geology and seismology aspects of the consulting report prepared for Parkway Heights Middle School, in South San Francisco, California. It is our understanding this project involves the addition of a new green schoolhouse building and Multipurpose building at the site. This review was performed in accordance with Title 24, California Code of Regulations, 2010 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following report:

> **Geotechnical Engineering and Geologic Hazards Study – Parkway Heights Middle School – Proposed Green Schoolhouse and Multipurpose Building:** Geosphere Consultants, Inc., 2001 Crow Canyon Road, Suite 100, San Ramon, CA 94583, Project No. 91-02973-A, dated January 30, 2013, 26 pages, 8 figures, Appendices A through C.

Based on our review, the consultants provide a well documented assessment of the engineering geology and seismology issues with respect to the proposed improvements. The principal concerns identified by the consultants are the potential for severe ground shaking generated by earthquakes in the region. They report the following design acceleration parameters derived from their General Procedure map-based analysis: **S_S = 2.009g and S_1 = 1.074g, and S_{DS} = 1.339g and S_{D1} = 1.074g,** which are considered reasonable. Because S_1 is greater than 0.75g, **Seismic Design Category E** applies to this project.

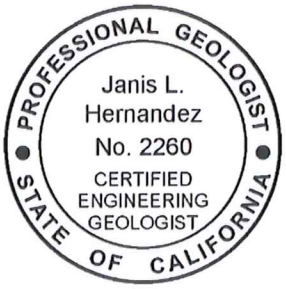
The consultants' subsurface exploration and analysis indicates very low potential for liquefaction, landslide, and fault rupture. The consultants calculate seismic settlement of

approximately 1¼ inch, and differential settlement less than ¾ inch across the structure. These values appear reasonable based on the data presented.

In conclusion, ***the engineering geology and seismology issues at this site are adequately assessed in the referenced report***. If you have any further questions about this review letter, please telephone the California Geological Survey at (213) 239-0893.

Respectfully submitted,

Janis L. Hernandez
Engineering Geologist
PG 7237, CEG 2260



Concur:

Jennifer Thornburg
Senior Engineering Geologist
PG 5476, CEG 2240



Enclosures:

Note 48 Checklist Review Comments
Keyed to: *Note 48 - Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings*

Copies to:

Gregory R. Hanson, *Registered Geotechnical Engineer, Certified Engineering Geologist*
Geosphere Consultants, Inc., 2001 Crow Canyon Road, Suite 100, San Ramon, CA 94583

Chris R. Taylor, *Architect*
HMC Architects, 3546 Concours Street, Ontario, CA 91764

Ms. Karen Van Dorn, *Senior Architect*
Division of the State Architect, 1515 Clay Street, Suite 1201, Oakland, CA 94612

Note 48 Checklist Review Comments

In the numbered paragraphs below, this review is keyed to the paragraph numbers of California Geological Survey Note 48 (January, 2011 edition), *Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings.*

Project Location

1. Site Location Map, Street Address, County Name: Adequately addressed.
2. Plot Plan with Exploration Data with Building Footprint: Adequately addressed.
3. Site Coordinates: Adequately addressed. Latitude and Longitude provided in report: 37.6631°N, 122.4280°W.

Engineering Geology/Site Characterization

4. Regional Geology and Regional Fault Maps: Adequately addressed.
5. Geologic Map of Site: Adequately addressed.
6. Subsurface Geology: Adequately addressed. The consultants report the site is underlain by early Pleistocene age older alluvium consisting of medium stiff to very stiff silty to sandy clay, and medium dense to very dense silty to clayey sands to the total depth of borings at 50 feet below the ground surface (bgs). They report groundwater was not encountered in the borings.
7. Geologic Cross Sections: Adequately addressed.
8. Active Faulting & Coseismic Deformation Across Site: Adequately addressed. The consultants report the site is not located within an Alquist-Priolo Earthquake Fault Zone, or local fault zone. They also report active or potentially active faults are not mapped to underlie the site, or project toward the site.
9. Geologic Hazard Zones (Liquefaction & Landslides): Adequately addressed. The consultants report the site is located within an area of "very low potential for liquefaction", as indicated on maps prepared by the U.S. Geological Survey and William Lettis and Associates, utilized by the Association of Bay Area Governments (ABAG). The State has not yet prepared Zones of Required Investigation for Liquefaction or Earthquake-Induced Landslide Hazards in this locality.
10. Geotechnical Testing of Representative Samples: Adequately addressed.
11. Geological Consideration of Grading Plans and Foundation Plans: Adequately addressed. The consultants state the existing modular structures and foundations will be demolished, and general grading will prepare the site for the new buildings utilizing shallow foundations.

Seismology & Calculation of Earthquake Ground Motion

12. Evaluation of Historic Seismicity: Adequately addressed.
13. Classify the Geologic Subgrade (Site Class): Adequately addressed. The consultants classify the site soil profile as Site Class D, Stiff Soil, based on the soils encountered in the borings.

14. General Procedure Seismic Parameters: Adequately addressed. The consultants report the following parameters, derived from a map-based analysis:
    S_S = 2.009g and S_1 = 1.074g, and S_{DS} = 1.339g and S_{D1} = 1.074g
    The values presented are similar to those obtained by CGS using the USGS Java Ground Motion Parameter Calculator and are in accordance with the requirements of ASCE 7-05, Chapter 11.
15. Seismic Design Category: Not reported by the consultants, however because S_1 is greater than 0.75g, **Seismic Design Category E** applies to this project.
16. Site-Specific Ground Motion Analysis: Not provided, nor required.
17. Deaggregated Seismic Source Parameters: Not applicable.
18. Time-Histories of Earthquake Ground Motion: Not applicable.

Liquefaction/Seismic Settlement Analysis

19. Geologic Setting for Occurrence of Seismically Induced Liquefaction: Adequately addressed. Groundwater was not encountered in the borings, and has not been reported in this area according to DWR. Based on the density of the site soils, the consultants conclude the site has very low potential for liquefaction hazards. The data appear to support this conclusion.
20. Seismic Settlement Calculations: Adequately addressed. The consultants calculate seismic settlement of approximately 1¼ inch and differential seismic settlement less than ¾ inch across the structure. These values appear reasonable based on the data presented.
21. Other Liquefaction Effects: Not applicable.
22. Mitigation Options for Liquefaction: Not applicable.

Slope Stability Analysis

23. Geologic Setting for Occurrence of Landslides: Adequately addressed. The consultants report the site is not located in an area of mapped landslides, and conclude landslide hazards are low at the site.
24. Determination of Static and Dynamic Strength Parameters: Not applicable.
25. Determination of Pseudo-Static Coefficient (Keq): Not applicable.
26. Identify Critical Slip Surfaces for Static and Dynamic Analyses: Not applicable.
27. Dynamic Site Conditions: Not applicable.
28. Mitigation Options/Other Slope Failure: Not applicable.

Other Geologic Hazards or Adverse Site Conditions

29. Expansive Soils: Adequately addressed. The consultants report the site soils have "low" expansion potential.
30. Corrosive/Reactive Geochemistry of the Geologic Subgrade: Adequately addressed. The consultants report the soils have low corrosion potential to ferrous metals, and soluble sulfate concentration should have negligible impact to concrete elements.
31. Conditional Geologic Assessment: Selected geologic hazards addressed by the consultant are listed below:

C. Flooding: Adequately addressed. The consultants report the site is located in Flood Zone X, outside the 0.2% annual chance floodplain, according to FEMA.
D. Tsunami and Seiche Inundation: Adequately addressed. The consultants report the site is inland, elevated and not downstream of any water reservoirs, therefore seiche and tsunami hazards are low.

Report Documentation

32. Geology, Seismology, and Geotechnical References: Adequately addressed.
33. Certified Engineering Geologist: Adequately addressed.
Gregory R. Hanson, Certified Engineering Geologist #1469
34. Registered Geotechnical Engineer: Adequately addressed.
Gregory R. Hanson, Registered Geotechnical Engineer #2304

DOCUMENT 00 41 13

BID FORM AND PROPOSAL

To: Governing Board of the South San Francisco Unified School District ("District" or "Owner")

From: _____
(Proper Name of Bidder)

The undersigned declares that Bidder has read and understands the Contract Documents, including, without limitation, the Notice to Bidders and the Instructions to Bidders, and agrees and proposes to furnish all necessary labor, materials, and equipment to perform and furnish all work in accordance with the terms and conditions of the Contract Documents, including, without limitation, the Drawings and Specifications of Bid No. 01-18

PROJECT: Parkway Heights Middle School Modernization, Phase 2

("Project" or "Contract") and will accept in full payment for that Work the following total lump sum amount, all taxes included:

_____ dollars $ _____

BASE BID

Bidder acknowledges and agrees that the Base Bid accounts for any and all Allowance(s), Total Cost for Unit Price.

Additive:

Alternate #1

_____ dollars $ _____

Additive

Alternate #! Site work as indicated on contract documents.

Descriptions of alternates are primarily scope definitions and do not necessarily detail the full range of materials and processes needed to complete the construction.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

Additional Detail Regarding Calculation of Base Bid

1. The undersigned has reviewed the Work outlined in the Contract Documents and fully understands the scope of Work required in this Proposal, understands the construction and project management function(s) is described in the Contract Documents, and that each Bidder who is awarded a contract shall be in fact a prime contractor, not a subcontractor, to the District, and agrees that its Proposal, if accepted by the District, will be the basis for the Bidder to enter into a contract with the District in accordance with the intent of the Contract Documents.

2. The undersigned has notified the District in writing of any discrepancies or omissions or of any doubt, questions, or ambiguities about the meaning of any of the Contract Documents, and has contacted the Construction Manager before bid date to verify the issuance of any clarifying Addenda.

3. The undersigned agrees to commence work under this Contract on the date established in the Contract Documents and to complete all work within the time specified in the Contract Documents.

4. The liquidated damages clause of the General Conditions and Agreement is hereby acknowledged.

5. It is understood that the District reserves the right to reject this bid and that the bid shall remain open to acceptance and is irrevocable for a period of ninety (90) days.

6. The following documents are attached hereto:

   - Bid Bond on the District's form or other security
   - Designated Subcontractors List
   - Site Visit Certification
   - Non-Collusion Declaration
   - Iran Contracting Act Certification

7. Receipt and acceptance of the following Addenda is hereby acknowledged:

No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____

8. Bidder acknowledges that the license required for performance of the Work is a _____ _____ license.

9. The undersigned hereby certifies that Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work.

10. Bidder specifically acknowledges and understands that if it is awarded the Contract, that it shall perform the Work of the Project while complying with all requirements of the Department of Industrial Relations and with all requirements of the Project Labor Agreement.

11. The Bidder represents that it is competent, knowledgeable, and has special skills with respect to the nature, extent, and inherent conditions of the Work to be performed. Bidder further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the Work that may create, during the Work, unusual or peculiar unsafe conditions hazardous to persons and property.

12. Bidder expressly acknowledges that it is aware of such peculiar risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the Work with respect to such hazards.

13. Bidder expressly acknowledges that it is aware that if a false claim is knowingly submitted (as the terms "claim" and "knowingly" are defined in the California False Claims Act, Gov. Code, § 12650 et seq.), the District will be entitled to civil remedies set forth in the California False Claim Act. It may also be considered fraud and the Contractor may be subject to criminal prosecution.

14. The undersigned Bidder certifies that it is, at the time of bidding, and shall be throughout the period of the Contract, licensed by the State of California to do the type of work required under the terms of the Contract Documents and registered as a public works contractor with the Department of Industrial Relations. Bidder further certifies that it is regularly engaged in the general class and type of work called for in the Contract Documents.

Furthermore, Bidder hereby certifies to the District that all representations, certifications, and statements made by Bidder, as set forth in this bid form, are true and correct and are made under penalty of perjury.

Dated this _____ day of _____ 20 ____

Name of Bidder: _____

Type of Organization: _____

Signed by: _____

Title of Signer: _____

Address of Bidder: _____

Taxpayer Identification No. of Bidder: _____

Telephone Number: _____

Fax Number: _____

E-mail: _____ Web Page: _____

Contractor's License No(s): No.: _____ Class: _____ Expiration Date: _____

No.: _____ Class:_____ Expiration Date: _____

No.: _____ Class:_____ Expiration Date: _____

Public Works Contractor Registration No.: _____

END OF DOCUMENT

DOCUMENT 00 43 13

BID BOND

(Note: If Bidder is providing a bid bond as its bid security, Bidder must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

That the undersigned,_____, as Principal ("Principal"),

and _____, as Surety ("Surety"), a corporation organized and existing under and by virtue of the laws of the State of California and authorized to do business as a surety in the State of California, are held and firmly bound unto the South San Francisco Unified School District ("District") of San Mateo County, State of California, as Obligee, in an amount equal to ten percent (10%) of the Base Bid plus alternates, in the sum of

_____ Dollars ($ _____)

lawful money of the United States of America, for the payment of which sum well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted a bid to the District for all Work specifically described in the accompanying bid for the following project: _____ ("Project" or "Contract").

NOW, THEREFORE, if the Principal is awarded the Contract and, within the time and manner required under the Contract Documents, after the prescribed forms are presented to Principal for signature, enters into a written contract, in the prescribed form in accordance with the bid, and files two bonds, one guaranteeing faithful performance and the other guaranteeing payment for labor and materials as required by law, and meets all other conditions to the Contract between the Principal and the Obligee becoming effective, or if the Principal shall fully reimburse and save harmless the Obligee from any damage sustained by the Obligee through failure of the Principal to enter into the written contract and to file the required performance and labor and material bonds, and to meet all other conditions to the Contract between the Principal and the Obligee becoming effective, then this obligation shall be null and void; otherwise, it shall be and remain in full force and effect. The full payment of the sum stated above shall be due immediately if Principal fails to execute the Contract within seven (7) days of the date of the District's Notice of Award to Principal.

Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the call for bids, or to the work to be performed thereunder, or the specifications accompanying the same, shall in any way affect its obligation under this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or the call for bids, or to the work, or to the specifications.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the Surety shall pay all costs incurred by the Obligee in such suit, including a reasonable attorneys' fee to be fixed by the Court.

If the District awards the bid, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

IN WITNESS WHEREOF, this instrument has been duty executed by the Principal and Surety above named, on the _____ day of _____, 20___.

_____
Principal

_____
By

_____
Surety

_____
By

_____
Name of California Agent of Surety

_____
Address of California Agent of Surety

_____
Telephone Number of California Agent of Surety

Bidder must attach Power of Attorney and Certificate of Authority for Surety and a Notarial Acknowledgment for all Surety's signatures. The California Department of Insurance must authorize the Surety to be an admitted Surety Insurer.

END OF DOCUMENT

DOCUMENT 00 43 36

DESIGNATED SUBCONTRACTORS LIST
(Public Contact Code Sections 4100-4114)

PROJECT: _____

Bidder acknowledges and agrees that it must clearly set forth below the name, location and California contractor license number of each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the Work or who will specially fabricate and install a portion of the Work according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of one percent (0.5%) of Bidder's total Base Bid and the kind of Work that each will perform. Vendors or suppliers of materials only do not need to be listed.

Bidder acknowledges and agrees that, if Bidder fails to list as to any portion of Work, or if Bidder lists more than one subcontractor to perform the same portion of Work, Bidder must perform that portion itself or be subjected to penalty under applicable law. In case more than one subcontractor is named for the same kind of Work, state the portion of the kind of Work that each subcontractor will perform.

If alternate bid(s) is/are called for and Bidder intends to use subcontractors different from or in addition to those subcontractors listed for work under the Base Bid, Bidder must list subcontractors that will perform Work in an amount in excess of one half of one percent (0.5%) of Bidder's total Base Bid plus alternate(s).

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 01

SITE VISIT CERTIFICATION

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID
IF SITE VISIT WAS MANDATORY

PROJECT: _____

Check option that applies:

_____ I certify that I visited the Site of the proposed Work and became fully acquainted with the conditions relating to construction and labor. I fully understand the facilities, difficulties, and restrictions attending the execution of the Work under contract.

_____ I certify that _____ (Bidder's representative) visited the Site of the proposed Work and became fully acquainted with the conditions relating to construction and labor. The Bidder's representative fully understood the facilities, difficulties, and restrictions attending the execution of the Work under contract.

Bidder fully indemnifies the South San Francisco Unified School District, its Architect, its Engineer, its Construction Manager, and all of their respective officers, agents, employees, and consultants from any damage, or omissions, related to conditions that could have been identified during my visit and/or the Bidder's representative's visit to the Site.

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 19

NON-COLLUSION DECLARATION
(Public Contract Code Section 7106)

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.
[Title] [Name of Firm]

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____,
[Date]

at _____, _____.
[City] [State]

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 19.01

IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code Sections 2202-2208)

PROJECT/CONTRACT NO.: _____ between the South San Francisco Unified School District ("District") and _____ _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Prior to bidding on or submitting a proposal for a contract for goods or services of $1,000,000 or more, the bidder/proposer must submit this certification pursuant to Public Contract Code section 2204.

The bidder/proposer must complete **ONLY ONE** of the following two options. To complete OPTION 1, check the corresponding box **and** complete the certification below. To complete OPTION 2, check the corresponding box, complete the certification below, and attach documentation demonstrating the exemption approval.

☐ **OPTION 1.** Bidder/Proposer is not on the current list of persons engaged in investment activities in Iran created by the California Department of General Services ("DGS") pursuant to Public Contract Code section 2203(b), and we are not a financial institution extending twenty million dollars ($20,000,000) or more in credit to another person, for 45 days or more, if that other person will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS.

☐ **OPTION 2.** Bidder/Proposer has received a written exemption from the certification requirement pursuant to Public Contract Code sections 2203(c) and (d). *A copy of the written documentation demonstrating the exemption approval is included with our bid/proposal.*

CERTIFICATION:

I, the official named below, CERTIFY UNDER PENALTY OF PERJURY, that I am duly authorized to legally bind the bidder/proposer to the OPTION selected above. This certification is made under the laws of the State of California.

Vendor Name/Financial Institution (Printed)	*Federal ID Number (or n/a)*
By (Authorized Signature)	
Printed Name and Title of Person Signing	*Date Executed*

END OF DOCUMENT

DOCUMENT 00 45 26

WORKERS' COMPENSATION CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the South San Francisco Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Labor Code section 3700, in relevant part, provides:

> Every employer except the State shall secure the payment of compensation in one or more of the following ways:
>
> a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this state; and/or
>
> b. By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees.

I am aware of the provisions of section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the Work of this Contract.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

(In accordance with Labor Code sections 1860 and 1861, the above certificate must be signed and filed with the awarding body prior to performing any Work under this Contract.)

END OF DOCUMENT

DOCUMENT 00 45 46.01

PREVAILING WAGE AND RELATED LABOR REQUIREMENTS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the South San Francisco Unified School District ("District") and _____ _____ ("Contractor" or "Bidder") ("Contract" or "Project").

I hereby certify that I will conform to the State of California Public Works Contract requirements regarding prevailing wages, benefits, on-site audits with 48-hours' notice, payroll records, and apprentice and trainee employment requirements, for all Work on the above Project including, without limitation, labor compliance monitoring and enforcement by the Department of Industrial Relations.

[IF THIS PROJECT USES FEDERAL FUNDS, DISTRICT SHOULD INCLUDE THE FOLLOWING] I hereby certify that I will also conform to the Federal Labor Standards Provisions regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon and Related Act requirements, Contract Work Hours and Safety Standards Act requirements, and any and all other applicable requirements for federal funding for all Work on the above Project.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.02

DISABLED VETERAN BUSINESS ENTERPRISE PARTICIPATION CERTIFICATION

PROJECT/CONTRACT NO.: Parkway Heights Middle School Modernization, Phase II, Proejct 01-18, between the South San Francisco Unified School District ("District") and

_____ ("Contractor" or "Bidder") ("Contract" or "Project").

GENERAL INSTRUCTIONS

Section 17076.11 of the Education Code requires school districts using, or planning to use, funds allocated pursuant to the State of California School Facility Program ("Program") for the construction and/or modernization of school buildings to have a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended each year by the school district on projects that receive state funding. Therefore, the lowest responsive responsible Bidder awarded the Contract must submit this document to the District with its executed Agreement, identifying the steps contractor took to solicit DVBE participation in conjunction with this Contract. **This form must be provided to the District no later than four (4) calendar days after bid opening.**

PART I – Method of Compliance with DVBE Participation Goals. Check the appropriate box to indicate your method of committing the contract dollar amount.

YOUR BUSINESS ENTERPRISE IS:	AND YOU WILL	AND YOU WILL
A. ☐ Disabled veteran owned and your forces will perform at least 3% of this Contract	Include a copy of your DVBE letter from Office of Small Business and Disabled Veterans Business Enterprise Services ("OSDS")*	Complete Part 1 of this form and the Certification
B. ☐ Disabled veteran owned but is unable to perform 3% of this Contract with your forces	Use DVBE subcontractors /suppliers to bring the Contract participation to at least 3%	Include a copy of each DVBE's letter from OSDS (including yours, if applicable), and complete Part 1 of this form and the Certification
C. ☐ **NOT** disabled veteran owned	Use DVBE subcontractors /suppliers for at least 3% of this Contract	
D. ☐ Unable to meet the required participation goals	Complete all of this form and the Certification	

* A DVBE letter from OSDS is obtained from the participating DVBE.

You must complete the following table to show the dollar amount of DVBE participation:

	TOTAL CONTRACT PRICE
A. Prime Bidder, if DVBE (own participation)	$
B. DVBE Subcontractor or Supplier	
1.	
2.	
3.	
4.	
C. Subtotal (A & B)	
D. Non-DVBE	
E. Total Bid	

PART II – Contacts. To identify DVBE subcontractors/suppliers for participation in your contract, you must contact each of the following categories. You should contact several DVBE organizations.

CATEGORY	**TELEPHONE NUMBER**	**DATE CONTACTED**	**PERSON CONTACTED**
1. The District, if any			*
2. OSDS, provides assistance locating DVBEs at https://caleprocure.ca.gov/pages/PublicSearch/supplier-search.aspx	(916) 375-4940		*
3. DVBE Organization (List)			*

*Write "recorded message" in this column, if applicable.

PART III – Advertisement. You must advertise for DVBE participation in both a trade and focus paper. List the advertisement you place to solicit DVBE participation. Advertisements should be published at least fourteen (14) days prior to bid/proposal opening; if you cannot advertise fourteen (14) days prior, advertisements should be published as soon as possible. Advertisements must include that your firm is seeking DVBE participation, the project name and location, and your firm's name, your contact person, and telephone number. Attach copies of advertisements to this form.

FOCUS/TRADE PAPER NAME	CHECK ONE		DATE OF ADVERTISEMENT
	TRADE	FOCUS	

PART IV – DVBE Solicitations. List DVBE subcontractors/suppliers that were invited to bid. Use the following instructions to complete the remainder of this section (read the three columns as a sentence from left to right). If you need additional space to list DVBE solicitations, please use a separate page and attach to this form.

IF THE DVBE…..	THEN…..	AND…..
was selected to participate	Check "YES" in the "SELECTED" column	include a copy of their DVBE letter(s) from OSDS
was **NOT** selected to participate	Check "NO" in the "SELECTED" column	state why in the "REASON NOT SELECTED" column
did not respond to your solicitation	Check the "NO RESPONSE" column.	

DVBE CONTACTED	SELECTED		REASON NOT SELECTED	NO RESPONSE
	YES	NO		

A copy of this form must be retained by you and may be subject to a future audit.

CERTIFICATION

I, _____, certify that I am the bidder's _____ and that I have made a diligent effort to ascertain the facts with regard to the representations made herein. In making this certification, I am aware of section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.04

TOBACCO-FREE ENVIRONMENT CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the South San Francisco Unified School District ("District") and _____ _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This Tobacco-Free Environment Certification form is required from the successful Bidder.

Pursuant to, without limitation, 20 U.S.C section 6083, Labor Code section 6400 et seq., Health & Safety Code section 104350 et seq., and District Board policies, all District sites, including the Project site, are tobacco-free environments. Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property.

I acknowledge that I am aware of the District's policy regarding tobacco-free environments at District sites, including the Project site and hereby certify that I will adhere to the requirements of that policy and not permit any of my firm's employees, agents, subcontractors, or my firm's subcontractors' employees or agents, to use tobacco and/or smoke on the Project site.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.05

HAZARDOUS MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between South San Francisco Unified School District ("District") and _____ _____ ("Contractor" or "Bidder") ("Contract" or "Project").

1. Contractor hereby certifies that no asbestos, or asbestos-containing materials, polychlorinated biphenyl (PCB), or any material listed by the federal or state Environmental Protection Agency or federal or state health agencies as a hazardous material, or any other material defined as being hazardous under federal or state laws, rules, or regulations, ("New Hazardous Material"), shall be furnished, installed, or incorporated in any way into the Project or in any tools, devices, clothing, or equipment used to affect any portion of Contractor's work on the Project for District.

2. Contractor further certifies that it has instructed its employees with respect to the above-mentioned standards, hazards, risks, and liabilities.

3. Asbestos and/or asbestos-containing material shall be defined as all items containing but not limited to chrysotile, crocidolite, amosite, anthophyllite, tremolite, and actinolite. Any or all material containing greater than one-tenth of one percent (0.1%) asbestos shall be defined as asbestos-containing material.

4. Any disputes involving the question of whether or not material is New Hazardous Material shall be settled by electron microscopy or other appropriate and recognized testing procedure, at the District's determination. The costs of any such tests shall be paid by Contractor if the material is found to be New Hazardous Material.

5. All Work or materials found to be New Hazardous Material or Work or material installed with equipment containing New Hazardous Material will be immediately rejected and this Work will be removed at Contractor's expense at no additional cost to the District.

6. Contractor has read and understood the document titled Hazardous Materials Procedures & Requirements, and shall comply with all the provisions outlined therein.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.06

LEAD-BASED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the South San Francisco Unified School District ("District") and _____ _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This certification provides notice to the Contractor that:

(1) Contractor's work may disturb lead-containing building materials.

(2) Contractor shall notify the District if any work may result in the disturbance of lead-containing building materials.

(3) Contractor shall comply with the Renovation, Repair and Painting Rule, if lead-based paint is disturbed in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors.

1. Lead as a Health Hazard

Lead poisoning is recognized as a serious environmental health hazard facing children today. Even at low levels of exposure, much lower than previously believed, lead can impair the development of a child's central nervous system, causing learning disabilities, and leading to serious behavioral problems. Lead enters the environment as tiny lead particles and lead dust disburses when paint chips, chalks, peels, wears away over time, or is otherwise disturbed. Ingestion of lead dust is the most common pathway of childhood poisoning; lead dust gets on a child's hands and toys and then into a child's mouth through common hand-to-mouth activity. Exposures may result from construction or remodeling activities that disturb lead paint, from ordinary wear and tear of windows and doors, or from friction on other surfaces.

Ordinary construction and renovation or repainting activities carried out without lead-safe work practices can disturb lead-based paint and create significant hazards. Improper removal practices, such as dry scraping, sanding, or water blasting painted surfaces, are likely to generate high volumes of lead dust.

Because the Contractor and its employees will be providing services for the District, and because the Contractor's work may disturb lead-containing building materials, CONTRACTOR IS HEREBY NOTIFIED of the potential presence of lead-containing materials located within certain buildings utilized by the District. All school buildings built prior to 1978 are presumed to contain some lead-based paint until sampling proves otherwise.

2. Overview of California Law

Education Code section 32240 et seq. is known as the Lead-Safe Schools Protection Act. Under this act, the Department of Health Services is to conduct a sample

survey of schools in the State of California for the purpose of developing risk factors to predict lead contamination in public schools. (Ed. Code, § 32241.)

Any school that undertakes any action to abate existing risk factors for lead is required to utilize trained and state-certified contractors, inspectors, and workers. (Ed. Code, § 32243, subd. (b).) Moreover, lead-based paint, lead plumbing, and solders, or other potential sources of lead contamination, shall not be utilized in the construction of any new school facility or the modernization or renovation of any existing school facility. (Ed. Code, § 32244.)

Both the Federal Occupational Safety and Health Administration ("Fed/OSHA") and the California Division of Occupational Safety and Health ("Cal/OSHA") have implemented safety orders applicable to all construction work where a contractor's employee may be occupationally exposed to lead.

The OSHA Regulations apply to all construction work where a contractor's employee may be occupationally exposed to lead. The OSHA Regulations contain specific and detailed requirements imposed on contractors subject to those regulations. The OSHA Regulations define construction work as work for construction, alteration, and/or repair, including painting and decorating. Regulated work includes, but is not limited to, the following:

a. Demolition or salvage of structures where lead or materials containing lead are present;

b. Removal or encapsulation of materials containing lead;

c. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;

d. Installation of products containing lead;

e. Lead contamination/emergency cleanup;

f. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed; and

g. Maintenance operations associated with the construction activities described in the subsection.

Because it is assumed by the District that all painted surfaces (interior as well as exterior) within the District contain some level of lead, it is imperative that the Contractor, its workers and subcontractors fully and adequately comply with all applicable laws, rules and regulations governing lead-based materials (including title 8, California Code of Regulations, section 1532.1).

Contractor shall notify the District if any Work may result in the disturbance of lead-containing building materials. Any and all Work that may result in the disturbance of lead-containing building materials shall be coordinated through the District. A signed copy of this Certification shall be on file prior

to beginning Work on the Project, along with all current insurance certificates.

3. Renovation, Repair and Painting Rule, Section 402(c)(3) of the Toxic Substances Control Act

The EPA requires lead safe work practices to reduce exposure to lead hazards created by renovation, repair and painting activities that disturb lead-based paint. Pursuant to the Renovation, Repair and Painting Rule (RRP), renovations in homes, childcare facilities, and schools built prior to 1978 must be conducted by certified renovations firms, using renovators with training by a EPA-accredited training provider, and fully and adequately complying with all applicable laws, rules and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).

The RRP requirements apply to all contractors who disturb lead-based paint in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors. If a DPH-certified inspector or risk assessor determines that a home constructed before 1978 is lead-free, the federal certification is not required for anyone working on that particular building.

4. Contractor's Liability

If the Contractor fails to comply with any applicable laws, rules, or regulations, and that failure results in a site or worker contamination, the Contractor will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify, and hold harmless the District, pursuant to the indemnification provisions of the Contract, for all damages and other claims arising therefrom.

If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses, and training shall conduct this Work.

It shall be the responsibility of the Contractor to properly dispose of any and all waste products, including, but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of the Contractor to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any school site within the District.

The Contractor shall provide the District with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The District may request to examine, prior to the commencement of the Work, the lead training records of each employee of the Contractor.

THE CONTRACTOR HEREBY ACKNOWLEDGES, UNDER PENALTY OF PERJURY, THAT IT:

1. HAS RECEIVED NOTIFICATION OF POTENTIAL LEAD-BASED MATERIALS ON THE OWNER'S PROPERTY;

2. IS KNOWLEDGEABLE REGARDING AND WILL COMPLY WITH ALL APPLICABLE LAWS, RULES, AND REGULATIONS GOVERNING WORK WITH, AND DISPOSAL, OF LEAD.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND THE CONTRACTOR. THE DISTRICT MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.07

IMPORTED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the South San Francisco Unified School District ("District") and _____ _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This form shall be executed by all entities that, in any way, provide or deliver and/or supply any soils, aggregate, or related materials ("Fill") to the Project Site and shall be provided to the District at least ten (10) days before delivery. All Fill shall satisfy all requirements of any environmental review of the Project performed pursuant to the statutes and guidelines of the California Environmental Quality Act, section 21000 et seq. of the Public Resources Code ("CEQA"), and all requirements of section 17210 et seq. of the Education Code, including requirements for a Phase I environmental assessment acceptable to the State of California Department of Education and Department of Toxic Substances Control.

Certification of:
- □ Delivery Firm/Transporter
- □ Supplier
- □ Manufacturer
- □ Wholesaler
- □ Broker
- □ Retailer
- □ Distributor
- □ Other _____

Type of Entity
- □ Corporation
- □ General Partnership
- □ Limited Partnership
- □ Limited Liability Company
- □ Sole Proprietorship
- □ Other _____

Name of firm ("Firm"): _____

Mailing address: _____

Addresses of branch office used for this Project: _____

If subsidiary, name and address of parent company: _____

_____

By my signature below, I hereby certify that I am aware of section 25260 of the Health and Safety Code and the sections referenced therein regarding the definition of hazardous material. I further certify on behalf of the Firm that all soils, aggregates, or related materials provided, delivered, and/or supplied or that will be provided, delivered, and/or supplied by this Firm to the Project Site are free of any and all hazardous material as defined in section 25260 of the Health and Safety Code. I further certify that I am authorized to make this certification on behalf of the Firm.

Date: _____

Proper Name of Firm: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.08

CRIMINAL BACKGROUND INVESTIGATION /FINGERPRINTING CERTIFICATION

PROJECT/CONTRACT NO.: _____between the South San Francisco Unified School District ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

The undersigned does hereby certify to the governing board of the District as follows:

That I am a representative of the Contractor currently under contract with the District; that I am familiar with the facts herein certified; and that I am authorized and qualified to execute this certificate on behalf of Contractor.

Contractor certifies that it has taken at least one of the following actions with respect to the construction Project that is the subject of the Contract (check all that apply):

☐ The Contractor is a sole proprietor and intends to comply with the fingerprinting requirements of Education Code section 45125.1(k) with respect to all Contractor's employees who may have contact with District pupils in the course of providing services pursuant to the Contract, and hereby agrees to the District's preparation and submission of fingerprints such that the California Department of Justice may determine that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1. No work shall commence until such determination by DOJ has been made.

As an authorized District official, I am familiar with the facts herein certified, and am authorized to execute this certificate on behalf of the District and undertake to prepare and submit Contractor's fingerprints as if he or she was an employee of the District.

Date: _____

District Representative's Name and Title: _____

District Representative's Signature: _____

☐ The Contractor, who is not a sole proprietor, has complied with the fingerprinting requirements of Education Code section 45125.1 with respect to all Contractor's employees and all of its Subcontractors' employees who may have contact with District pupils in the course of providing services pursuant to the Contract, and the California Department of Justice has determined that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1. A complete and accurate list of Contractor's employees and of all of its subcontractors' employees who may come in contact with District pupils during the course and scope of the Contract is attached hereto; and/or

☐ Pursuant to Education Code section 45125.2, Contractor has installed or will install, prior to commencement of Work, a physical barrier at the Work Site, that will limit contact between Contractor's employees and District pupils at all times; and/or

☐ Pursuant to Education Code section 45125.2, Contractor certifies that all employees will be under the continual supervision of, and monitored by, an employee of the Contractor who the California Department of Justice has ascertained, or as described below, will ascertain, has not been convicted of a violent or serious felony. The name and title of the employee who will be supervising Contractor's and its subcontractors' employees is:

Name: _____

Title: _____

NOTE: If the Contractor is a sole proprietor, and elects the above option, Contractor must have the above-named employee's fingerprints prepared and submitted by the District, in accordance with Education Code section 45125.1(k). No work shall commence until such determination by DOJ has been made.

As an authorized District official, I am familiar with the facts herein certified, and am authorized to execute this certificate on behalf of the District and undertake to prepare and submit Contractor's fingerprints as if he or she was an employee of the District.

Date: _____

District Representative's Name and Title: _____

District Representative's Signature: _____

☐ *The Work on the Contract is either (i) at an unoccupied school site and no employee and/or subcontractor or supplier of any tier of the Contract shall come in contact with the District pupils or (ii) Contractor's employees or any subcontractor or supplier of any tier of the Contract will have only limited contact, if any, with District pupils and the District will take appropriate steps to protect the safety of any pupils that may come in contact with Consultant's employees, subcontractors or suppliers so that the fingerprinting and criminal background investigation requirements of Education Code section 45125.1 shall not apply to Contractor under the Contract.*

As an authorized District official, I am familiar with the facts herein certified, and am authorized to execute this certificate on behalf of the District.

Date: _____

District Representative's Name and Title: _____

District Representative's Signature: _____

Contractor's responsibility for background clearance extends to all of its employees, Subcontractors, and employees of Subcontractors coming into contact with District pupils regardless of whether they are designated as employees or acting as independent contractors of the Contractor.

Date: _____
Proper Name of Contractor: _____
Signature: _____
Print Name: _____

Title: _____

DOCUMENT 00 45 46.09

BUY AMERICAN CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the South San Francisco Unified School District ("District") and _____ _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Federal regulations require that all of the iron, steel, and manufactured goods used in projects for the construction, installation, repairs, renovation, modernization, or maintenance of a public building or public work funded in part or in whole by federal stimulus funds, with the exception of projects funded by Qualified School Construction Bonds, be produced in the United States of America, unless a federal department waives this requirement because (1) it is inconsistent with the public interest, (2) the goods are not produced in sufficient quantities or of satisfactory quality in the United States, or (3) the requirement would increase the cost of the Project overall by more than twenty-five percent (25%) ("Buy American").

Contractor shall submit this Certification with its executed agreement, identifying the steps Contractor will take to use goods produced in the United States of America in carrying out this Contract. Bidder should not submit this form with its bid.

Contractor shall retain a copy of this form and may be subject to a future audit.

CERTIFICATION

On behalf of Contractor, I represent and covenant that Contractor will use on the Project only iron, steel and manufactured goods produced in the United States of America except goods for which a federal department has waived this requirement.

I, _____, certify that I am the Contractor's _____ _____ and that the representations and covenants made herein are true and correct. In making this certification, I am aware of section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 49

REGISTERED SUBCONTRACTORS LIST
(Labor Code Section 1771.1)

PROJECT: Parkway Heights Middle School Modernization, Phase II, Project 01-18

Date Submitted (for Updates): _____

Contractor acknowledges and agrees that it must clearly set forth below the name and Department of Industrial Relations (DIR) registration number of each subcontractor **for all tiers** who will perform work or labor or render service to Contractor or its subcontractors in or about the construction of the Work **at least two (2) weeks before the subcontractor is scheduled to perform work**. This document is to be updated as all tiers of subcontractors are identified.

Contractor acknowledges and agrees that, if Contractor fails to list as to any subcontractor of any tier who performs any portion of Work, the Contract is subject to cancellation and the Contractor will be subjected to penalty under applicable law.

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Date: _____

Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 90

POST BID INTERVIEW

PART 1 – GENERAL

1.01 SUMMARY

If requested by the District, this Section requires the apparent low bidder to attend and participate in a Post Bid Interview with the Construction Manager, prior to award of any contract by the District. The Post Bid Interview will be scheduled by the Construction Manager within three (3) calendar days after the date of bid.

1.02 REQUIRED ATTENDANCE

A. A duly authorized representative of the apparent low bidder is required to attend the Post Bid Interview, in person.

B. The apparent low bidder's authorized representative must have signatory authority on behalf of the apparent low bidder.

C. Failure to attend the Post Bid Interview will be considered just cause for the District to reject the Bid.

1.03 POST BID INTERVIEW PROCEDURE

A. The Construction Manager will review the Bid with the attendees.

B. The Construction Manager will review the Contract Documents with the attendees, including but not limited to:

(1) Insurance

(2) Bonding

(3) Addenda

(4) Pre-Bid Clarifications

(5) Scope of Work

(6) Bid Packages Descriptions

(7) Bid Alternates

(8) Contract Plans

(9) Contract Specifications

(10) Project Schedule and Schedule Requirements

(11) Critical Dates Requirement for Other Bid Packages

(12) Prevailing Wage Requirements

(13) Liquidated Damages

(14) Required Documentation for Contract Administration

(15) Contract Coordination Requirements

1.04 POST BID INTERVIEW DOCUMENTATION

The Construction Manager will document the Post Bid Interview on the form attached to this Section. Both the apparent low bidder and the Construction Manager are required to sign the Post Bid Interview Documentation.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

POST BID INTERVIEW

CONSTRUCTION MANAGER

[Name]
[Address 1]
[Address 2]
[Phone] [Fax]

BIDDER: _____

DATE: _____ TIME: _____ PHONE: _____

I. INTRODUCTIONS:

A. Present

_____	_____
CONTRACTOR	CONTRACTOR
_____	_____
_____	_____
[CM]	[CM]

II. PROPOSED CONTRACT:

III. PURPOSE OF INTERVIEW IS TO ASSURE A MUTUAL UNDERSTANDING OF THE FOLLOWING:

A. Do you acknowledge submission of a complete and accurate bid? Yes No

B. Do you acknowledge the Bid Document submittal timelines after NOA and NTP and can you meet those timelines? Yes No

C. Do you acknowledge the requirements for the escrow of bid documents? Yes No

D. Are you comfortable with your listed subcontractors? Yes No

IV. CONTRACTUAL REQUIREMENTS:

A. Do you understand you are a prime contractor? Yes No

B. Can you meet specified insurance requirements? Yes No

1. Do any of your policies that require Additional Insured endorsements exceed the minimum coverage requirements? Yes No

2. Are you requesting that the District accept an Umbrella or Excess Liability Insurance Policy to meet the policy limit? Yes No

3. Will there be a gap between the per occurrence amount of any underlying policy and the start of the coverage under the Umbrella or Excess Liability Insurance Policy? Yes No

C. Will you provide the Performance Bond and Labor and Material Bond for 100% of the Contract Price as stipulated? Yes No

1. Cost for bond: _____% Yes No

2. Is the cost of your bond in your base bid? Yes No

3. Is your surety licensed to issue bonds in California? Yes No

D. Do you understand the fingerprinting requirements? Yes No

E. Is it understood that all workers must be paid prevailing wage? Yes No

F. Is it understood that all subcontractors of every tier must be registered as a public works contractor with the Department of Industrial Relations? Yes No

V. SCOPE OF WORK:

A. Acknowledged Receipt of Addenda #1-__ Yes No

B. Are the costs for addenda items included in your bid? (if applicable) Yes No

C. Do you have a complete understanding of your Scope of Work under the proposed Agreement? Yes No

D. You have re-reviewed the documents and understand the Scope of the Work. Are there any items that require clarification? Yes No

If yes, please identify them.

1. _____

_____

2. _____

_____

3. _____

_____

Is (are) there additional cost(s) for the above item(s)? Yes No

E. Have you reviewed bid alternative(s) #1-___? (if applicable) Yes No

F. Are the costs for bid alternatives included in your bid? Yes No

G. Are the plans and specifications clear and understandable to your satisfaction? Yes No

H. Do you acknowledge that the time to submit notice of requests for substitution of specified materials has expired? Yes No

VI. SCHEDULE:

A. Do you acknowledge and agree to the stipulated completion dates and milestones in the contract? Yes No

1. Will you provide a detailed construction schedule to _____ within the required ten (10) days of the Notice to Proceed, per the contract? Yes No

2. Can you meet the submittal deadline? Yes No

3. It is understood that the Project schedule is critical and that that weekend and overtime work may be required to meet the milestones. Yes No

4. It is understood that if rain does occur, then all dewatering and protection of work is required, per the contract. Yes No
If not, what do you believe must change and why? _____

_____

_____

B. Identify critical materials, deliveries, long lead items and other dependencies, including Owner Furnished items that could affect the completion of your work. Yes No

1. _____
2. _____
3. _____
4. _____
5. _____

C. Do you understand that there is going to be maintenance and other construction taking place on site during the course of the project? Yes No

VII. EXECUTION OF WORK

A. Do you understand the access to the site? Yes No

B. Do you understand the staging area restrictions? Yes No

C. Have you included protection of [asphalt, floors, and roofs]? Yes No

D. Do you understand that the site is occupied by students, teachers, Yes No

administrators, parents, etc.?

VIII. CONTRACTOR COMMENTS/SUGGESTIONS:

1. _____

2. _____

3. _____

4. _____

5. _____

IX. CONTRACTOR

You agree the information contained herein is part of your contractual obligations. Your signature acknowledges your agreement to perform all Work in the Contract Documents, and that costs for all Work are included in your bid.

The foregoing information is true and accurate, and I am authorized to sign as an officer of the company I am representing.

[Company Name]

_____

Signature _____ Title: _____

Date: _____

X. CONSTRUCTION MANAGER

Signature _____ Title: _____

Date: _____

Title of Document: POST BID INTERVIEW
Number of Pages: _____
Date of Document: _____

END OF DOCUMENT

DOCUMENT 00 45 90

POST BID INTERVIEW

PART 1 – GENERAL

1.01 SUMMARY

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C. Failure to attend the Post Bid Interview will be considered just cause for the District to reject the Bid.

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A. The Construction Manager will review the Bid with the attendees.

B. The Construction Manager will review the Contract Documents with the attendees, including but not limited to:

(1) Insurance

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(5) Scope of Work

(6) Bid Packages Descriptions

(7) Bid Alternates

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(13) Liquidated Damages

(14) Required Documentation for Contract Administration

(15) Contract Coordination Requirements

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The Construction Manager will document the Post Bid Interview on the form attached to this Section. Both the apparent low bidder and the Construction Manager are required to sign the Post Bid Interview Documentation.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

POST BID INTERVIEW

CONSTRUCTION MANAGER

[Name]
[Address 1]
[Address 2]
[Phone] [Fax]

BIDDER: _____

DATE: _____ TIME: _____ PHONE: _____

I. INTRODUCTIONS:

A. Present

_____	_____
CONTRACTOR	CONTRACTOR
_____	_____
_____	_____
[CM]	[CM]

II. PROPOSED CONTRACT:

III. PURPOSE OF INTERVIEW IS TO ASSURE A MUTUAL UNDERSTANDING OF THE FOLLOWING:

A. Do you acknowledge submission of a complete and accurate bid? Yes No

B. Do you acknowledge the Bid Document submittal timelines after NOA and NTP and can you meet those timelines? Yes No

C. Do you acknowledge the requirements for the escrow of bid documents? Yes No

D. Are you comfortable with your listed subcontractors? Yes No

IV. CONTRACTUAL REQUIREMENTS:

A. Do you understand you are a prime contractor? Yes No

B. Can you meet specified insurance requirements? Yes No

1. Do any of your policies that require Additional Insured endorsements exceed the minimum coverage requirements? Yes No

2. Are you requesting that the District accept an Umbrella or Excess Liability Insurance Policy to meet the policy limit? Yes No

3. Will there be a gap between the per occurrence amount of any underlying policy and the start of the coverage under the Umbrella or Excess Liability Insurance Policy? Yes No

C. Will you provide the Performance Bond and Labor and Material Bond for 100% of the Contract Price as stipulated? Yes No

1. Cost for bond: _____% Yes No

2. Is the cost of your bond in your base bid? Yes No

3. Is your surety licensed to issue bonds in California? Yes No

D. Do you understand the fingerprinting requirements? Yes No

E. Is it understood that all workers must be paid prevailing wage? Yes No

F. Is it understood that all subcontractors of every tier must be registered as a public works contractor with the Department of Industrial Relations? Yes No

V. SCOPE OF WORK:

A. Acknowledged Receipt of Addenda #1-__ Yes No

B. Are the costs for addenda items included in your bid? (if applicable) Yes No

C. Do you have a complete understanding of your Scope of Work under the proposed Agreement? Yes No

D. You have re-reviewed the documents and understand the Scope of the Work. Are there any items that require clarification? Yes No

If yes, please identify them.

1. _____

_____

2. _____

_____

3. _____

_____

Is (are) there additional cost(s) for the above item(s)? Yes No

E. Have you reviewed bid alternative(s) #1-___? (if applicable) Yes No

F. Are the costs for bid alternatives included in your bid? Yes No

G. Are the plans and specifications clear and understandable to your satisfaction? Yes No

H. Do you acknowledge that the time to submit notice of requests for substitution of specified materials has expired? Yes No

VI. SCHEDULE:

A. Do you acknowledge and agree to the stipulated completion dates and milestones in the contract? Yes No

1. Will you provide a detailed construction schedule to _____ within the required ten (10) days of the Notice to Proceed, per the contract? Yes No

2. Can you meet the submittal deadline? Yes No

3. It is understood that the Project schedule is critical and that that weekend and overtime work may be required to meet the milestones. Yes No

4. It is understood that if rain does occur, then all dewatering and protection of work is required, per the contract. Yes No
If not, what do you believe must change and why? _____

_____

_____

B. Identify critical materials, deliveries, long lead items and other dependencies, including Owner Furnished items that could affect the completion of your work. Yes No

1. _____
2. _____
3. _____
4. _____
5. _____

C. Do you understand that there is going to be maintenance and other construction taking place on site during the course of the project? Yes No

VII. EXECUTION OF WORK

A. Do you understand the access to the site? Yes No

B. Do you understand the staging area restrictions? Yes No

C. Have you included protection of [asphalt, floors, and roofs]? Yes No

D. Do you understand that the site is occupied by students, teachers, administrators, parents, etc.? Yes No

VIII. CONTRACTOR COMMENTS/SUGGESTIONS:

1. _____

2. _____

3. _____

4. _____

5. _____

IX. CONTRACTOR

You agree the information contained herein is part of your contractual obligations. Your signature acknowledges your agreement to perform all Work in the Contract Documents, and that costs for all Work are included in your bid.

The foregoing information is true and accurate, and I am authorized to sign as an officer of the company I am representing.

[Company Name]

_____

Signature _____ Title: _____

Date: _____

X. CONSTRUCTION MANAGER

Signature _____ Title: _____

Date: _____

Title of Document: POST BID INTERVIEW
Number of Pages: _____
Date of Document: _____

END OF DOCUMENT

DOCUMENT 00 51 00

NOTICE OF AWARD

Dated: _____ 20__

To: _____ (Contractor)

To: _____
(Address)

From: Governing Board ("Board") of the South San Francisco Unified School District ("District" or "Owner")

PROJECT: **Parkway Heights Middle School Modernization, Project No. 01-18** ("Project").

Contractor has been awarded the referenced Contract on _____, 20__, by action of the District's Board.

The Contract Price is _____ Dollars ($_____), and includes alternates _____.

Three (3) copies of each of the Contract Documents (except Drawings) accompany this Notice of Award. Three (3) sets of the Drawings will be delivered separately or otherwise made available. Additional copies are available at cost of reproduction.

You must comply with the following conditions precedent within **SEVEN (7)** calendar days of the date of this Notice of Award.

The Contractor shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7th)** calendar day following the date of the Notice of Award.

a. Agreement: To be executed by successful Bidder. Submit four (4) copies, each bearing an original signature.

b. Escrow of Bid Documentation: This must include all required documentation. See the document titled Escrow Bid Documentation for more information.

c. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

d. Payment Bond (Contractor's Labor & Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

e. Insurance Certificates and Endorsements as required.

f. Workers' Compensation Certification.

g. Prevailing Wage and Related Labor Requirements Certification.

h. Disabled Veteran Business Enterprise Participation Certification.

i. Drug-Free Workplace Certification.

j. Tobacco-Free Environment Certification.

k. Hazardous Materials Certification.

l. Lead-Based Materials Certification.

m. Imported Materials Certification.

n. Criminal Background Investigation/Fingerprinting Certification.

o. Buy American Certification.

p. Registered Subcontractors List: Must include Department of Industrial Relations (DIR) registration number of each subcontractor for all tiers.

Failure to comply with these conditions within the time specified will entitle District to consider your bid abandoned, to annul this Notice of Award, and to declare your Bid Security forfeited, as well as any other rights the District may have against the Contractor.

After you comply with those conditions, District will return to you one fully signed counterpart of the Agreement.

SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

DOCUMENT 00 52 13

AGREEMENT

THIS AGREEMENT IS MADE AND ENTERED INTO THIS _____ DAY OF _____ _____, 20___, by and between the South San Francisco Unified School District ("District") and _____ ("Contractor") ("Agreement").

WITNESSETH: That the parties hereto have mutually covenanted and agreed, and by these presents do covenant and agree with each other, as follows:

1. **The Work**: Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, and material necessary to perform and complete in a good and workmanlike manner, the work of the following project:

   Parkway Heights Middle School Modernization, Phase II, Project 01-18

("Project" or "Contract" or "Work")

It is understood and agreed that the Work shall be performed and completed as required in the Contract Documents including, without limitation, the Drawings and Specifications and submission of all documents required to secure funding or by the Division of the State Architect for close-out of the Project, under the direction and supervision of, and subject to the approval of, the District or its authorized representative.

2. **The Contract Documents**: The complete Contract consists of all Contract Documents as defined in the General Conditions and incorporated herein by this reference. Any and all obligations of the District and Contractor are fully set forth and described in the Contract Documents. All Contract Documents are intended to cooperate so that any Work called for in one and not mentioned in the other or vice versa is to be executed the same as if mentioned in all Contract Documents.

3. **Interpretation of Contract Documents**: Should any question arise concerning the intent or meaning of Contract Documents, including the Drawings or Specifications, the question shall be submitted to the District for interpretation. If a conflict exists in the Contract Documents, valid, written modifications, beginning with the most recent, shall control over this Agreement (if any), which shall control over the Special Conditions, which shall control over any Supplemental Conditions, which shall control over the General Conditions, which shall control over the remaining Division 0 documents, which shall control over Division 1 Documents which shall control over Division 2 through Division 49 documents, which shall control over figured dimensions, which shall control over large-scale drawings, which shall control over small-scale drawings. In no case shall a document calling for lower quality and/or quantity material or workmanship control. The decision of the District in the matter shall be final.

4. **Time for Completion**: It is hereby understood and agreed that the Work under this Contract shall be completed by **July 31, 2018.**

5. **Completion - Extension of Time**: Should the Contractor fail to complete this Contract, and the Work provided herein, within the time fixed for completion, due allowance being made for the contingencies provided for herein, the Contractor shall become liable to the District for all loss and damage that the District may suffer on account thereof. The Contractor shall coordinate its Work with the Work of all other contractors. The District shall not be liable for delays resulting from Contractor's failure to coordinate its Work with other contractors in a manner that will allow timely completion of Contractor's Work. Contractor shall be liable for delays to other contractors caused by Contractor's failure to coordinate its Work with the Work of other contractors.

6. **Liquidated Damages**: Time is of the essence for all work under this Agreement. It is hereby understood and agreed that it is and will be difficult and/or impossible to ascertain and determine the actual damage that the District will sustain in the event of and by reason of Contractor's delay; therefore, Contractor agrees that it shall pay to the District the sum of **TWO THOUSAND DOLLARS ($2,000.)**per day as liquidated damages for each and every day's delay beyond the time herein prescribed in finishing the Work.

   It is hereby understood and agreed that this amount is not a penalty.

   In the event that any portion of the liquidated damages is not paid to the District, the District may deduct that amount from any money due or that may become due the Contractor under this Agreement, and such deduction does not constitute a withholding or penalty. The District's right to assess liquidated damages is as indicated herein and in the General Conditions.

   The time during which the Contract is delayed for cause, as hereinafter specified, may extend the time of completion for a reasonable time as the District may grant, provided that Contractor has complied with the claims procedure of the Contract Documents. This provision does not exclude the recovery of damages by either party under other provisions in the Contract Documents.

7. **Loss Or Damage**: The District and its agents and authorized representatives shall not in any way or manner be answerable or suffer loss, damage, expense, or liability for any loss or damage that may happen to the Work, or any part thereof, or in or about the same during its construction and before acceptance, and the Contractor shall assume all liabilities of every kind or nature arising from the Work, either by accident, negligence, theft, vandalism, or any cause whatsoever; and shall hold the District and its agents and authorized representatives harmless from all liability of every kind and nature arising from accident, negligence, or any cause whatsoever.

8. **Insurance and Bonds**: Prior to issuance of the Notice to Proceed by the District, Contractor shall provide all required certificates of insurance, insurance endorsements, and payment and performance bonds as evidence thereof.

9. **Prosecution of Work**: If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this Contract, the District, may, pursuant to the General Conditions and without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

10. **Authority of Architect, Project Inspector, and DSA**: Contractor hereby acknowledges that the Architect(s), the Project Inspector(s), and the Division of the State Architect ("DSA") have authority to approve and/or suspend Work if the Contractor's Work does not comply with the requirements of the Contract Documents, Title 24 of the California Code of Regulations, and all applicable laws and regulations. The Contractor shall be liable for any delay caused by its non-compliant Work.

11. **Assignment of Contract**: Neither the Contract, nor any part thereof, nor any moneys due or to become due thereunder, may be assigned by the Contractor without the prior written approval of the District, nor without the written consent of the Surety on the Contractor's Performance Bond (the "Surety"), unless the Surety has waived in writing its right to notice of assignment.

12. **Classification of Contractor's License**: Contractor hereby acknowledges that it currently holds valid Type B Contractor's license(s) issued by the State of California, Contractors' State License Board, in accordance with division 3, chapter 9, of the Business and Professions Code and in the classification called for in the Contract Documents.

13. **Registration as Public Works Contractor**: The Contractor and all Subcontractors currently are registered as public works contractors with the Department of Industrial Relations, State of California, in accordance with Labor Code section 1771.1.

14. **Payment of Prevailing Wages**: The Contractor and all Subcontractors shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code.

15. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and Title 8 of the California Code of Regulations. Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code, including, without limitation, the requirement that the Contractor and all of its Subcontractors shall timely submit complete and accurate electronic certified payroll records as required by the Contract Documents, or the District may not issue payment.

16. **Contract Price**: In consideration of the foregoing covenants, promises, and agreements on the part of the Contractor, and the strict and literal fulfillment of each and every covenant, promise, and agreement, and as compensation agreed upon for the Work and construction, erection, and completion as aforesaid, the District covenants, promises, and agrees that it will well and truly pay and cause to be paid to the Contractor in full, and as the full Contract Price and compensation for construction, erection, and completion of the Work hereinabove agreed to be performed by the Contractor, the following price:

_____ **Dollars**

($_____),

in lawful money of the United States, which sum is to be paid according to the schedule provided by the Contractor and accepted by the District and subject to additions and deductions as provided in the Contract. This amount supersedes any previously stated and/or agreed to amount(s).

17. No Representations: No representations have been made other than as set forth in writing in the Contract Documents, including this Agreement. Each of the Parties to this Agreement warrants that it has carefully read and understood the terms and conditions of this Agreement and all Contract Documents, and that it has not relied upon the representations or advice of any other Party or any attorney not its own.

18. Entire Agreement: The Contract Documents, including this Agreement, set forth the entire agreement between the parties hereto and fully supersede any and all prior agreements, understandings, written or oral, between the parties hereto pertaining to the subject matter thereof.

19. Severability: If any term, covenant, condition, or provision in any of the Contract Documents is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions in the Contract Documents shall remain in full force and effect and shall in no way be affected, impaired, or invalidated thereby.

IN WITNESS WHEREOF, accepted and agreed on the date indicated above:

CONTRACTOR	**SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT**
_____	_____
By: _____	By: _____
Title: _____	Title: _____

NOTE: If the party executing this Contract is a corporation, a certified copy of the by-laws, or of the resolution of the Board of Directors, authorizing the officers of said corporation to execute the Contract and the bonds required thereby must be attached hereto.

END OF DOCUMENT

DOCUMENT 00 55 00

NOTICE TO PROCEED

Dated: _____, 20___

TO: _____
("Contractor")

ADDRESS: _____

PROJECT:_____

PROJECT/CONTRACT NO.: **Parkway Heights Middle School Modernization, Phase II, Project 01-18** between the South San Francisco Unified School District and Contractor ("Contract").
You are notified that the Contract Time under the above Contract will commence to run on _____, 20___. By that date, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement executed by Contractor, the date of completion is _____, 20___.

You must submit the following documents by 5:00 p.m. of the TENTH (10th) calendar day following the date of this Notice to Proceed:

a. Contractor's preliminary schedule of construction.

b. Contractor's preliminary schedule of values for all of the Work.

c. Contractor's preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals

d. Contractor's Safety Plan specifically adapted for the Project.

e. A complete subcontractors list, including the name, address, telephone number, email address, facsimile number, California State Contractors License number, license classification, Department of Industrial Relations registration number, and monetary value of all Subcontracts.

Thank you. We look forward to a very successful Project.

SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

DOCUMENT 00 57 00

ESCROW AGREEMENT IN LIEU OF RETENTION
(Public Contact Code Section 22300)

(Note: Contractor must use this form.)

This Escrow Agreement in Lieu of Retention ("Escrow Agreement") is made and entered into this _____ day of _____, 20___, by and between the South San Francisco Unified School District ("District"), whose address is 398 B Street, South San Francisco, California 94080, and _____ ("Contractor"), whose address is _____ , and _____ _____ ("Escrow Agent"), a state or federally chartered bank in the state of California, whose address is _____.

For the consideration hereinafter set forth, District, Contractor, and Escrow Agent agree as follows:

1. Pursuant to section 22300 of Public Contract Code of the State of California, which is hereby incorporated by reference, Contractor has the following two (2) options:

   ☐ Deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by District pursuant to the Construction Contract No.___ entered into between District and Contractor for the _____ _____ Project, in the amount of _____ Dollars ($_____) dated, _____, 20_____, (the "Contract"); **or**

   ☐ On written request of Contractor, District shall make payments of the retention earnings for the above referenced Contract directly to Escrow Agent.

   When Contractor deposits the securities as a substitute for Contract earnings (first option), Escrow Agent shall notify District within ten (10) calendar days of the deposit. The market value of the securities at the time of substitution and at all times from substitution until the termination of the Escrow Agreement shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between District and Contractor.

   Securities shall be held in the name of South San Francisco Unified School District, and shall designate Contractor as beneficial owner.

2. District shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments pursuant to Contract provisions, provided that Escrow Agent holds securities in form and amount specified above.

3. When District makes payment of retentions earned directly to Escrow Agent, Escrow Agent shall hold them for the benefit of Contractor until the time that the escrow created under this Escrow Agreement is terminated. Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the Parties shall be equally applicable and binding when District pays Escrow Agent directly.

4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account, and all expenses of District. The District will charge Contractor $_____ for each of District's deposits to the escrow account. These expenses and payment terms shall be determined by District, Contractor, and Escrow Agent.

5. Interest earned on securities or money market accounts held in escrow and all interest earned on that interest shall be for sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to District.

6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from District to Escrow Agent that District consents to withdrawal of amount sought to be withdrawn by Contractor.

7. District shall have the right to draw upon the securities and/or withdraw amounts from the Escrow Account in the event of default by Contractor. Upon seven (7) days' written notice to Escrow Agent from District of the default, if applicable, Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by District.

8. Upon receipt of written notification from District certifying that the Contract is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all monies and securities on deposit and payments of fees and charges.

9. Escrow Agent shall rely on written notifications from District and Contractor pursuant to Paragraphs 5 through 8, inclusive, of this Escrow Agreement and District and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of securities and interest as set forth above.

10. Names of persons who are authorized to give written notice or to receive written notice on behalf of District and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

On behalf of District:	On behalf of Contractor:
_____	_____
Title	Title
_____	_____
Name	Name
_____	_____
Signature	Signature
_____	_____
Address	Address

On behalf of Escrow Agent:

_____
Title

_____
Name

_____
Signature

_____
Address

At the time that the Escrow Account is opened, District and Contractor shall deliver to Escrow Agent a fully executed copy of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

On behalf of District:	On behalf of Contractor:
_____	_____
Title	Title
_____	_____
Name	Name
_____	_____
Signature	Signature
_____	_____
Address	Address

END OF DOCUMENT

DOCUMENT 00 61 13.13

PERFORMANCE BOND
(100% of Contract Price)

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the South San Francisco Unified School District, ("District") and _____ ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

Parkway Heights Middle School Modernization, Phase II, Project No. 01-18
("Project" or "Contract") which Contract dated , 20___, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, said Principal is required under the terms of the Contract to furnish a bond for the faithful performance of the Contract.

NOW, THEREFORE, the Principal and _____ _____ ("Surety") are held and firmly bound unto the Board of the District in the penal sum of

_____

Dollars ($_____), lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents, to:

- Promptly perform all the work required to complete the Project; and
- Pay to the District all damages the District incurs as a result of the Principal's failure to perform all the Work required to complete the Project.

Or, at the District's sole discretion and election, the Surety shall obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the District of the lowest responsible bidder, arrange for a contract between such bidder and the District and make available as Work progresses sufficient funds to pay the cost of completion less the "balance of the Contract Price," and to pay and perform all obligations of Principals under the Contract, including, without limitation, all obligations with respect to warranties, guarantees and the payment of liquidated damages. The term "balance of the Contract Price," as used in this paragraph, shall mean the total amount payable to Principal by the District under the Contract and any modifications thereto, less the amount previously paid by the District to the Principal, less any withholdings by the District allowed under the Contract. District shall not be required or obligated to accept a tender of a completion contractor from the Surety for any or no reason.

The condition of the obligation is such that, if the above bound Principal, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in the Contract and any alteration thereof made as therein provided, on its part to be kept and performed at the time and in the intent

and meaning, including all contractual guarantees and warrantees of materials and workmanship, and shall indemnify and save harmless the District, its trustees, officers and agents, as therein stipulated, then this obligation shall become null and void, otherwise it shall be and remain in full force and virtue.

Surety expressly agrees that the District may reject any contractor or subcontractor proposed by Surety to fulfill its obligations in the event of default by the Principal. Surety shall not utilize Principal in completing the Work nor shall Surety accept a Bid from Principal for completion of the Work if the District declares the Principal to be in default and notifies Surety of the District's objection to Principal's further participation in the completion of the Work.

As a condition precedent to the satisfactory completion of the Contract, the above obligation shall hold good for a period equal to the warranty and/or guarantee period of the Contract, during which time Surety's obligation shall continue if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the District from loss or damage resulting from or caused by defective materials or faulty workmanship. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the District's rights or the Contractor or Surety's obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure section 337.15.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond. The Surety also stipulates and agrees that it shall not be exonerated or released from the obligation of this bond by any overpayment or underpayment by the District that is based upon estimates approved by the Architect. The Surety does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the specifications.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20___.

Principal	Surety
By	By
	Name of California Agent of Surety
	Address of California Agent of Surety
	Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

DOCUMENT 00 61 13.16

PAYMENT BOND
Contractor's Labor & Material Bond
(100% Of Contract Price)

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the South San Francisco Unified School District, ("District") and _____, ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

Parkway Heights Middle School Modernization, Phase II, Project No. 01-18 ("Project" or "Contract") which Contract dated , 20___, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, pursuant to law and the Contract, the Principal is required, before entering upon the performance of the work, to file a good and sufficient bond with the body by which the Contract is awarded in an amount equal to one hundred percent (100%) of the Contract price, to secure the claims to which reference is made in sections 9000 through 9510 and 9550 through 9566 of the Civil Code, and division 2, part 7, of the Labor Code.

NOW, THEREFORE, the Principal and _____ _____ ("Surety") are held and firmly bound unto all laborers, material men, and other persons referred to in said statutes in the sum of _____ Dollars ($_____), lawful money of the United States, being a sum not less than the total amount payable by the terms of Contract, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally, by these presents.

The condition of this obligation is that if the Principal or any of its subcontractors, or their heirs, executors, administrators, successors, or assigns of any, all, or either of them shall fail to pay for any labor, materials, provisions, or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Principal or any of his or its subcontractors of any tier under Section 13020 of the Unemployment Insurance Code with respect to such work or labor, that the Surety will pay the same in an amount not exceeding the amount herein above set forth, and also in case suit is brought upon this bond, will pay a reasonable attorney's fee to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under section 9100 of

the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void; otherwise it shall be and remain in full force and affect.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of Contract or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20___.

Principal	Surety
By	By
	Name of California Agent of Surety
	Address of California Agent of Surety
	Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

DOCUMENT 00 63 57

PROPOSED CHANGE ORDER FORM

South San Francisco Unified School District
398 B Street
South San Francisco, CA 94080

PCO NO.:

Project: Parkway Heights Middle School Modernization, Phase II, Project Number 01-18
RFI #:

Date:
DSA File No.: 41-28
DSA Appl. No.:01-0116522

Contractor hereby submits for District's review and evaluation this Proposed Change Order ("PCO"), submitted in accordance with and subject to the terms of the Contract Documents, including Sections 17.7 and 17.8 of the General Conditions. Any spaces left blank below are deemed no change to cost or time.

Contractor understands and acknowledges that documentation supporting Contractor's PCO must be attached and included for District review and evaluation. Contractor further understands and acknowledges that failure to include documentation sufficient to, in District's discretion, support some or all of the PCO, shall result in a rejected PCO.

	WORK PERFORMED OTHER THAN BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach suppliers' invoice or itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add overhead and profit for any and all tiers of Subcontractor**, the total not to exceed ten percent (10%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Overhead and Profit for Contractor**, not to exceed five percent (5%) of Item (f)		
(h)	**Subtotal**		
(i)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (h)		
(j)	**TOTAL**		
(k)	**Time** (zero unless indicated; "TBD" not permitted)	**____ Calendar Days**	

[REMAINDER OF PAGE LEFT BLANK INTENTIONALLY]

	WORK PERFORMED BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add Overhead and Profit for Contractor**, not to exceed fifteen percent (15%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (f)		
(h)	**TOTAL**		
(i)	**Time** (zero unless indicated; "TBD" not permitted)	**____ Calendar Days**	

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 *et seq*. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the District.

It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

SUBMITTED BY:

Contractor:

_____ _____

[Name] Date

END OF DOCUMENT

DOCUMENT 00 63 63

CHANGE ORDER FORM

South San Francisco Unified School District
398 B Street South
San Francisco , CA 94080

CHANGE ORDER NO.:

CHANGE ORDER

Project: Parkway Heights Middle School Modernization, Phase II, Project Number 01-18

Date:
DSA File No.: 41-28
DSA Appl. No.:01-0116522

The following parties agree to the terms of this Change Order:

Owner: [Name / Address]

Contractor: [Name / Address]

Architect: [Name / Address]

Project Inspector: [Name / Address]

Reference	**Description**	**Cost**	**Days Ext.**
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	$	

Contract time will be adjusted as follows: Previous Completion Date: [Date] [#] Calendar Days Extension (zero unless otherwise indicated) Current Completion Date: [Date]	Original Contract Amount:	$
	Amount of Previously Approved Change Order(s):	$
	Amount of this Change Order:	$
	Contract Amount:	$

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire work as stated therein, and agrees to furnish all labor, materials and services and perform all work necessary to complete any additional work specified for the consideration stated therein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650, et seq.

This change order is subject to approval by the governing board of this District and must be signed by the District. Until such time as this change order is approved by the District's governing board and executed by a duly authorized District representative, this change order is not effective and not binding.

It is expressly understood that the compensation and time, if any, granted herein represent a full accord and satisfaction for any and all time and cost impacts of the items herein, and Contractor waives any and all further compensation or time extension based on the items herein. The value of the extra work or changes expressly includes any and all of the Contractor's costs and expenses, and its subcontractors, both direct and indirect, resulting from additional time required on the project or resulting from delay to the project. Any costs, expenses, damages or time extensions not included are deemed waived.

Signatures:

District:		Contractor:	
_____	_____	_____	_____
[Name]	Date	[Name]	Date
Architect:		Project Inspector:	
_____	_____	_____	_____
[Name]	Date	[Name]	Date

END OF DOCUMENT

DOCUMENT 00 65 19.26

AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS

THIS AGREEMENT AND RELEASE OF CLAIMS ("Agreement and Release") IS MADE AND ENTERED INTO THIS _____ DAY OF _____, 20___ by and between the SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT ("District") and _____ _____ ("Contractor"), whose place of business is _____ _____.

RECITALS:

1. District and Contractor entered into PROJECT/CONTRACT NO.: _____ ("Contract" or "Project") in the County of _____, California.

2. The Work under the Contract was completed on _____, and a Notice of Completion was recorded with the County Recorder on _____.

NOW, THEREFORE, it is mutually agreed between District and Contractor as follows:

AGREEMENT AND RELEASE

3. Contractor will only be assessed liquidated damages as detailed below:

Original Contract Sum	$_____
Modified Contract Sum	$_____
Payment to Date	$_____
Liquidated Damages	$_____
Payment Due Contractor	$_____

4. Subject to the provisions hereof, District shall forthwith pay to Contractor the undisputed sum of _____ Dollars ($_____) under the Contract, less any amounts represented by any notice to withhold funds on file with District as of the date of such payment.

5. Contractor acknowledges and hereby agrees that there are no unresolved or outstanding claims in dispute against District arising from the performance of work under the Contract, except for the claims described in Paragraph 6 and continuing obligations described in Paragraph 8. It is the intention of the parties in executing this Agreement and Release that this Agreement and Release shall be effective as a full, final and general release of all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities of Contractor against District and all of its respective agents, employees, trustees, inspectors, assignees, consultants and transferees, except for any Disputed Claim that may be set forth in Paragraph 6 and the continuing obligations described in Paragraph 8 hereof.

6. The following claims are disputed (hereinafter, the "Disputed Claims") and are specifically excluded from the operation of this Agreement and Release:

Claim No.	Description of Claim	Amount of Claim	Date Claim Submitted
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____

[If further space is required, attach additional sheets showing the required information.]

7. Consistent with California Public Contract Code section 7100, Contractor hereby agrees that, in consideration of the payment set forth in Paragraph 4 hereof, Contractor hereby releases and forever discharges District, all its agents, employees, inspectors, assignees, and transferees from any and all liability, claims, demands, actions, or causes of action of whatever kind or nature arising out of or in any way concerned with the Work under the Contract.

8. Guarantees and warranties for the Work, and any other continuing obligation of Contractor, shall remain in full force and effect as specified in the Contract Documents.

9. To the furthest extent permitted by California law, Contractor shall defend, indemnify, and hold harmless the District, its agents, representatives, officers, consultants, employees, trustees, and volunteers (the "indemnified parties") from any and all losses, liabilities, claims, suits, and actions of any kind, nature, and description, including, but not limited to, attorneys' fees and costs, directly or indirectly arising out of, connected with, or resulting from the performance of the Contract unless caused wholly by the sole negligence or willful misconduct of the District.

10. Contractor hereby waives the provisions of California Civil Code section 1542 which provides as follows:

> A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH IF KNOWN BY HIM OR HER MUST HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR.

11. The provisions of this Agreement and Release are contractual in nature and not mere recitals and shall be considered independent and severable. If any such provision or any part thereof shall be at any time held invalid in whole or in part under any federal, state, county, municipal, or other law, ruling, or regulations, then such provision, or part thereof, shall remain in force and effect to the extent permitted by

law, and the remaining provisions of this Agreement and Release shall also remain in full force and effect, and shall be enforceable.

12. All rights of District shall survive completion of the Work or termination of Contract, and execution of this Release.

* * * CAUTION: THIS IS A RELEASE - READ BEFORE EXECUTING * * *

SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT

Signature: _____

Print Name: _____

Title: _____

CONTRACTOR: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 65 36

GUARANTEE FORM

_____ ("Contractor") hereby agrees that the _____ _____ ("Work" of Contractor) which Contractor has installed for the South San Francisco Unified School District ("District") for the following project:

PROJECT:_____

("Project" or "Contract") has been performed in accordance with the requirements of the Contract Documents and that the Work as installed will fulfill the requirements of the Contract Documents.

The undersigned agrees to repair or replace any or all of such Work that may prove to be defective in workmanship or material together with any other adjacent Work that may be displaced in connection with such replacement within a period of one year from the date of completion as defined in Public Contract Code section 7107, subdivision (c), ordinary wear and tear and unusual abuse or neglect excepted. The date of completion is _____, 20___.

In the event of the undersigned's failure to comply with the above-mentioned conditions within a reasonable period of time, as determined by the District, but not later than seven (7) days after being notified in writing by the District, the undersigned authorizes the District to proceed to have said defects repaired and made good at the expense of the undersigned. The undersigned shall pay the costs and charges therefor upon demand.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

Representatives to be contacted for service subject to terms of Contract:

Name: _____

Address: _____

Phone No.: _____

Email: _____

END OF DOCUMENT

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GENERAL CONDITIONS

1. CONTRACT TERMS AND DEFINITIONS

1.1 Definitions

Wherever used in the Contract Documents, the following terms shall have the meanings indicated, which shall be applicable to both the singular and plural thereof:

1.1.1 Adverse Weather: Shall be only weather that satisfies all of the following conditions: (1) unusually severe precipitation, sleet, snow, hail, or extreme temperature conditions in excess of the norm for the location and time of year it occurred based on the closest weather station data averaged over the past five years, (2) that is unanticipated and would cause unsafe work conditions and/or is unsuitable for scheduled work that should not be performed during inclement weather (i.e., exterior finishes), and (3) at the Project.

1.1.2 Allowance Expenditure Directive: Written authorization for expenditure of allowance, if any.

1.1.3 Approval, Approved, and/or Accepted: Written authorization, unless stated otherwise.

1.1.4 Architect (or "Design Professional in General Responsible Charge"): The individual, partnership, corporation, joint venture, or any combination thereof, named as Architect, who will have the rights and authority assigned to the Architect in the Contract Documents. The term Architect means the Design Professional in General Responsible Charge as defined in DSA PR 13-02 on this Project or the Architect's authorized representative.

1.1.5 As-Builts: Reproducible blue line prints of drawings to be prepared on a monthly basis pursuant to the Contract Documents, that reflect changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed since the preceding monthly submittal. See **Record Drawings**.

1.1.6 Bidder: A contractor who intends to provide a proposal to the District to perform the Work of this Contract.

1.1.7 Change Order: A written order to the Contractor authorizing an addition to, deletion from, or revision in the Work, and/or authorizing an adjustment in the Contract Price or Contract Time.

1.1.8 Claim: A Dispute that remains unresolved at the conclusion of the all the applicable Dispute Resolution requirements provided herein.

1.1.9 Construction Change Directive: A written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work.

1.1.10 Construction Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Construction Manager is used on the Project that is the subject of this Contract, then all references to Construction Manager herein shall be read to refer to District.

1.1.11 Construction Schedule: The progress schedule of construction of the Project as provided by Contractor and approved by District.

1.1.12 Contract, Contract Documents: The Contract consists exclusively of the documents evidencing the agreement of the District and Contractor, identified as the Contract Documents. The Contract Documents consist of the following documents:

1.1.12.1 Notice to Bidders
1.1.12.2 Instructions to Bidders
1.1.12.3 Bid Form and Proposal
1.1.12.4 Bid Bond
1.1.12.5 Designated Subcontractors List
1.1.12.6 Site Visit Certification (if a site visit was required)
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1.1.12.17 Project Labor Agreement (if applicable)
1.1.12.18 Hazardous Materials Procedures and Requirements
1.1.12.19 Workers' Compensation Certification
1.1.12.20 Prevailing Wage Certification
1.1.12.21 Disabled Veteran Business Enterprise Participation Certification (if applicable)
1.1.12.22 Drug-Free Workplace Certification (if applicable)
1.1.12.23 Tobacco-Free Environment Certification
1.1.12.24 Hazardous Materials Certification (if applicable)
1.1.12.25 Lead-Based Materials Certification (if applicable)
1.1.12.26 Imported Materials Certification (if applicable)
1.1.12.27 Criminal Background Investigation/Fingerprinting Certification
1.1.12.28 Buy American Certification (if applicable)
1.1.12.29 Roofing Project Certification (if applicable)
1.1.12.30 Registered Subcontractors List
1.1.12.31 Iran Contracting Act Certification (if applicable)
1.1.12.32 Post Bid Interview

1.1.12.33 All Plans, Technical Specifications, and Drawings
1.1.12.34 Any and all addenda to any of the above documents
1.1.12.35 Any and all change orders or written modifications to the above documents if approved in writing by the District

1.1.13 Contract Price: The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

1.1.14 Contract Time: The time period stated in the Agreement for the completion of the Work.

1.1.15 Contractor: The person or persons identified in the Agreement as contracting to perform the Work to be done under this Contract, or the legal representative of such a person or persons.

1.1.16 Daily Job Report(s): Daily Project reports prepared by the Contractor's employee(s) who are present on Site, which shall include the information required herein.

1.1.17 Day(s): Unless otherwise designated, day(s) means calendar day(s).

1.1.18 Department of Industrial Relations (or "DIR"): is responsible, among other things, for labor compliance monitoring and enforcement of California prevailing wage laws and regulations for public works contracts.

1.1.19 Design Professional in General Responsible Charge: See definition of **Architect** above.

1.1.20 Dispute: A separate demand by Contractor for a time extension, or payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or Contractor is not otherwise entitled to; or an amount of payment disputed by the District.

1.1.21 District: The public agency or the school district for which the Work is performed. The governing board of the District or its designees will act for the District in all matters pertaining to the Contract. The District may, at any time,

1.1.21.1 Direct the Contractor to communicate with or provide notice to the Construction Manager or the Architect on matters for which the Contract Documents indicate the Contractor will communicate with or provide notice to the District; and/or

1.1.21.2 Direct the Construction Manager or the Architect to communicate with or direct the Contractor on matters for which the Contract Documents indicate the District will communicate with or direct the Contractor.

1.1.22 Drawings (or "Plans"): The graphic and pictorial portions of the Contract Documents showing the design, location, scope and dimensions of the work, generally including plans, elevations, sections, details, schedules, sequence of operation, and diagrams.

1.1.23 DSA: Division of the State Architect.

1.1.24 Force Account Directive: A process that may be used when the District and the Contractor cannot agree on a price for a specific portion of work or before the Contractor prepares a price for a specific portion of work and whereby the Contractor performs the work as indicated herein on a time and materials basis.

1.1.25 Job Cost Reports: Any and all reports or records detailing the costs associated with work performed on or related to the Project that Contractor shall maintain for the Project. Specifically, Job Cost Reports shall contain, but are not limited by or to, the following information: a description of the work performed or to be performed on the Project; quantity, if applicable, of work performed (hours, square feet, cubic yards, pounds, etc.) for the Project; Project budget; costs for the Project to date; estimated costs to complete the Project; and expected costs at completion. The Job Cost Reports shall also reflect all Contract cost codes, change orders, elements of non-conforming work, back charges, and additional services.

1.1.26 Labor Commissioner's Office (or "Labor Commissioner", also known as the Division of Labor Standards Enforcement ("DLSE")): Division of the DIR responsible for adjudicating wage claims, investigating discrimination and public works complaints, and enforcing Labor Code statutes and Industrial Welfare Commission orders.

1.1.27 Municipal Separate Storm Sewer System (or "MS4"): A system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

1.1.28 Plans: See **Drawings**.

1.1.29 Premises: The real property owned by the District on which the Site is located.

1.1.30 Product(s): New material, machinery, components, equipment, fixtures and systems forming the Work, including existing materials or components required and approved by the District for reuse.

1.1.31 Product Data: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.

1.1.32 Program Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Program Manager is designated for Project that is the subject of this Contract, then all references to Project Manager herein shall be read to refer to District.

1.1.33 Project: The planned undertaking as provided for in the Contract Documents.

1.1.34 Project Inspector (or "Inspector"): The individual(s) retained by the District in accordance with title 24 of the California Code of Regulations to monitor and inspect the Project.

1.1.35 Project Labor Agreement (or "PLA"): a prehire collective bargaining agreement in accordance with Public Contract Code section 2500 et seq. that establishes terms and conditions of employment for a specific construction project or projects and/or is an agreement described in Section 158(f) of Title 29 of the United States Code.

1.1.36 Proposed Change Order (or "PCO"): a written request prepared by the Contractor requesting that the District and the Architect issue a Change Order based upon a proposed change to the Work.

1.1.37 Provide: Shall include "provide complete in place," that is, "furnish and install," and "provide complete and functioning as intended in place" unless specifically stated otherwise.

1.1.38 Qualified SWPPP Practitioners (or "QSP"): certified personnel that attended a State Water Resources Control Board sponsored or approved training class and passed the qualifying exam.

1.1.39 Record Drawings: Reproducible drawings (or Plans) prepared pursuant to the requirements of the Contract Documents that reflect all changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed upon completion of the Project. See also **As-Builts**.

1.1.40 Request for Information (or "RFI"): A written request prepared by the Contractor requesting that the Architect provide additional information necessary to clarify or amplify an item in the Contract Documents that the Contractor believes is not clearly shown or called for in the Drawings or Specifications or other portions of the Contract Documents, or to address problems that have arisen under field conditions.

1.1.41 Request for Substitution for Specified Item: A request by Contractor to substitute an equal or superior material, product, thing, or service for a specific material, product, thing, or service that has been designated in the Contract Documents by a specific brand or trade name.

1.1.42 Safety Orders: Written and/or verbal orders for construction issued by the California Division of Occupational Safety and Health ("CalOSHA") or by the United States Occupational Safety and Health Administration ("OSHA").

1.1.43 Safety Plan: Contractor's safety plan specifically adapted for the Project. Contractor's Safety Plan shall comply with all provisions regarding Project safety, including all applicable provisions in these General Conditions.

1.1.44 Samples: Physical examples that illustrate materials, products, equipment, finishes, colors, or workmanship and that, when approved in accordance with the Contract Documents, establish standards by which portions of the Work will be judged.

1.1.45 Shop Drawings: All drawings, prints, diagrams, illustrations, brochures, schedules, and other data that are prepared by the Contractor, a subcontractor,

manufacturer, supplier, or distributor, that illustrate how specific portions of the Work shall be fabricated or installed.

1.1.46 Site: The Project site as shown on the Drawings.

1.1.47 Specifications: That portion of the Contract Documents, Division 1 through Division 49, and all technical sections, and addenda to all of these, if any, consisting of written descriptions and requirements of a technical nature of materials, equipment, construction methods and systems, standards, and workmanship.

1.1.48 State: The State of California.

1.1.49 Storm Water Pollution Prevention Plan (or "SWPPP"): A document which identifies sources and activities at a particular facility that may contribute pollutants to storm water and contains specific control measures and time frames to prevent or treat such pollutants.

1.1.50 Subcontractor: A contractor and/or supplier who is under contract with the Contractor or with any other subcontractor, regardless of tier, to perform a portion of the Work of the Project.

1.1.51 Submittal Schedule: The schedule of submittals as provided by Contractor and approved by District.

1.1.52 Surety: The person, firm, or corporation that executes as surety the Contractor's Performance Bond and Payment Bond, and must be a California admitted surety insurer as defined in the Code of Civil Procedure section 995.120.

1.1.53 Work: All labor, materials, equipment, components, appliances, supervision, coordination, and services required by, or reasonably inferred from, the Contract Documents, that are necessary for the construction and completion of the Project.

1.2 Laws Concerning the Contract

Contract is subject to all provisions of the Constitution and laws of California and the United States governing, controlling, or affecting District, or the property, funds, operations, or powers of District, and such provisions are by this reference made a part hereof. Any provision required by law to be included in this Contract shall be deemed to be inserted.

1.3 No Oral Agreements

No oral agreement or conversation with any officer, agent, or employee of District, either before or after execution of Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract.

1.4 No Assignment

Contractor shall not assign this Contract or any part thereof including, without limitation, any services or money to become due hereunder without the prior written consent of the District. Assignment without District's prior written consent shall be null and void. Any

assignment of money due or to become due under this Contract shall be subject to a prior lien for services rendered or material supplied for performance of work called for under this Contract in favor of all persons, firms, or corporations rendering services or supplying material to the extent that claims are filed pursuant to the Civil Code, Code of Civil Procedure, Government Code, Labor Code, and/or Public Contract Code, and shall also be subject to deductions for liquidated damages or withholding of payments as determined by District in accordance with this Contract. Contractor shall not assign or transfer in any manner to a Subcontractor or supplier the right to prosecute or maintain an action against the District.

1.5 Notice and Service Thereof

1.5.1 Any notice from one party to the other or otherwise under Contract shall be in writing and shall be dated and signed by the party giving notice or by a duly authorized representative of that party. Any notice shall not be effective for any purpose whatsoever unless served in one of the following manners:

1.5.1.1 If notice is given by personal delivery thereof, it shall be considered delivered on the day of delivery.

1.5.1.2 If notice is given by overnight delivery service, it shall be considered delivered one (1) day after date deposited, as indicated by the delivery service.

1.5.1.3 If notice is given by depositing same in United States mail, enclosed in a sealed envelope, it shall be considered delivered three (3) days after date deposited, as indicated by the postmarked date.

1.5.1.4 If notice is given by registered or certified mail with postage prepaid, return receipt requested, it shall be considered delivered on the day the notice is signed for.

1.5.1.5 Electronic mail may be used for convenience but is not a substitute for the notice and service requirements herein.

1.6 No Waiver

The failure of District in any one or more instances to insist upon strict performance of any of the terms of this Contract or to exercise any option herein conferred shall not be construed as a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion. No action or failure to act by the District, Architect, or Construction Manager shall constitute a waiver of any right or duty afforded the District under the Contract, nor shall any action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

1.7 Substitutions for Specified Items

Unless the Special Conditions contain different provisions, Contractor shall not substitute different items for any items identified in the Contract Documents without prior written approval of the District.

1.8 Materials and Work

1.8.1 Except as otherwise specifically stated in this Contract, Contractor shall provide and pay for all materials, labor, tools, equipment, transportation, supervision, temporary constructions of every nature, and all other services, management, and facilities of every nature whatsoever necessary to execute and complete this Contract, in a good and workmanlike manner, within the Contract Time.

1.8.2 Unless otherwise specified, all materials shall be new and of the best quality of their respective kinds and grades as noted or specified, workmanship shall be of good quality, and Contractor shall use all diligence to inform itself fully as to the required manufacturer's instructions and to comply therewith.

1.8.3 Materials shall be furnished in ample quantities and at such times as to insure uninterrupted progress of Work and shall be stored properly and protected from the elements, theft, vandalism, or other loss or damage as required.

1.8.4 For all materials and equipment specified or indicated in the Drawings, the Contractor shall provide all labor, materials, equipment, and services necessary for complete assemblies and complete working systems, functioning as intended. Incidental items not indicated on Drawings, nor mentioned in the Specifications, that can legitimately and reasonably be inferred to belong to the Work described, or be necessary in good practice to provide a complete assembly or system, shall be furnished as though itemized here in every detail. In all instances, material and equipment shall be installed in strict accordance with each manufacturer's most recent published recommendations and specifications.

1.8.5 Contractor shall, after award of Contract by District and after relevant submittals have been approved, place orders for materials and/or equipment as specified so that delivery of same may be made without delays to the Work. Contractor shall, upon demand from District, present documentary evidence showing that orders have been placed.

1.8.6 District reserves the right but has no obligation, in response to Contractor's neglect or failure in complying with the above instructions, to place orders for such materials and/or equipment as the District may deem advisable in order that the Work may be completed at the date specified in the Agreement, and all expenses incidental to the procuring of said materials and/or equipment shall be paid for by Contractor or deducted from payment(s) to Contractor.

1.8.7 Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver the Site to District, together with all improvements and appurtenances constructed or placed thereon by it, and free from any claims, liens, or charges. Contractor further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any work covered by the Contract shall have any right to lien any portion of the Premises or any improvement or appurtenance thereon, except that Contractor may install metering devices or other equipment of utility companies or of political subdivision, title to which is commonly retained by utility company or political subdivision. In the event of installation of any such metering device or equipment, Contractor shall advise District as to owner thereof.

1.8.7.1 If a lien or a claim based on a stop payment notice of any nature should at any time be filed against the Work or any District property, by any entity that has supplied material or services at the request of the Contractor, Contractor and Contractor's Surety shall promptly, on demand by District and at Contractor's and Surety's own expense, take any and all action necessary to cause any such lien or a claim based on a stop payment notice to be released or discharged immediately therefrom.

1.8.7.2 If the Contractor fails to furnish to the District within ten (10) calendar days after demand by the District, satisfactory evidence that a lien or a claim based on a stop payment notice has been so released, discharged, or secured, the District may discharge such indebtedness and deduct the amount required therefor, together with any and all losses, costs, damages, and attorney's fees and expense incurred or suffered by District from any sum payable to Contractor under the Contract.

1.8.8 Nothing contained in this Article, however, shall defeat or impair the rights of persons furnishing materials or labor under any bond given by Contractor for their protection or any rights under any law permitting such protection or any rights under any law permitting such persons to look to funds due Contractor in hands of District (e.g., stop payment notices), and this provision shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing material for work when no formal contract is entered into for such material.

1.8.9 Title to new materials and/or equipment for the Work of this Contract and attendant liability for its protection and safety shall remain with Contractor until incorporated in the Work of this Contract and accepted by District. No part of any materials and/or equipment shall be removed from its place of storage except for immediate installation in the Work of this Contract. Should the District, in its discretion, allow the Contractor to store materials and/or equipment for the Work off-site, Contractor will store said materials and/or equipment at a bonded warehouse and with appropriate insurance coverage at no cost to District. Contractor shall keep an accurate inventory of all materials and/or equipment in a manner satisfactory to District or its authorized representative and shall, at the District's request, forward it to the District.

2. [RESERVED]

3. ARCHITECT

3.1 The Architect shall represent the District during the Project and will observe the progress and quality of the Work on behalf of the District. Architect shall have the authority to act on behalf of District to the extent expressly provided in the Contract Documents and to the extent determined by District. Architect shall have authority to reject materials, workmanship, and/or the Work whenever rejection may be necessary, in Architect's reasonable opinion, to insure the proper execution of the Contract.

3.2 Architect shall, with the District and on behalf of the District, determine the amount, quality, acceptability, and fitness of all parts of the Work, and interpret the Specifications, Drawings, and shall, with the District, interpret all other Contract Documents.

3.3 Architect shall have all authority and responsibility established by law, including title 24 of the California Code of Regulations.

3.4 Contractor shall provide District and the Construction Manager with a copy of all written communication between Contractor and Architect at the same time as that communication is made to Architect, including, without limitation, all RFIs, correspondence, submittals, claims, and proposed change orders.

4. CONSTRUCTION MANAGER

4.1 If a Construction Manager is used on this Project ("Construction Manager" or "CM"), the Construction Manager will provide administration of the Contract on the District's behalf. After execution of the Contract and Notice to Proceed, all correspondence and/or instructions from Contractor and/or District shall be forwarded through the Construction Manager. The Construction Manager will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences, or procedures or for safety precautions in connection with the Work, which shall all remain the Contractor's responsibility.

4.2 The Construction Manager, however, will have authority to reject materials and/or workmanship not conforming to the Contract Documents, as determined by the District, the Architect, and/or the Project Inspector. The Construction Manager shall also have the authority to require special inspection or testing of any portion of the Work, whether it has been fabricated, installed, or fully completed. Any decision made by the Construction Manager, in good faith, shall not give rise to any duty or responsibility of the Construction Manager to: the Contractor; any Subcontractor; the Contractor or Subcontractor's respective agents, employees; or other persons performing any of the Work. The Construction Manager shall have free access to any or all parts of Work at any time.

4.3 If the District does not use a Construction Manager on this Project, all references to Construction Manager or CM shall be read as District.

5. INSPECTOR, INSPECTIONS, AND TESTS

5.1 Project Inspector

5.1.1 One or more Project Inspector(s), including special Project Inspector(s), as required, will be assigned to the Work by District, in accordance with requirements of title 24, part 1, of the California Code of Regulations, to enforce the building code and monitor compliance with Plans and Specifications for the Project previously approved by the DSA. Duties of Project Inspector(s) are specifically defined in section 4-342 of said part 1 of title 24.

5.1.2 No Work shall be carried on except with the knowledge and under the inspection of the Project Inspector(s). The Project Inspector(s) shall have free access to any or all parts of Work at any time. Contractor shall furnish Project Inspector(s) reasonable opportunities for obtaining such information as may be necessary to keep Project Inspector(s) fully informed respecting progress and manner of work and character of materials, including, but not limited to, submission of form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector at least 48 hours in advance of the

commencement and completion of construction of each and every aspect of the Work. Forms are available on the DSA's website at: http://www.dgs.ca.gov/dsa/Forms.aspx. Inspection of Work shall not relieve Contractor from an obligation to fulfill this Contract. Project Inspector(s) and the DSA are authorized to suspend work whenever the Contractor and/or its Subcontractor(s) are not complying with the Contract Documents. Any work stoppage by the Project Inspector(s) and/or DSA shall be without liability to the District. Contractor shall instruct its Subcontractors and employees accordingly.

5.1.3 If Contractor and/or any Subcontractor requests that the Project Inspector(s) perform any inspection off-site, this shall only be done if it is allowable pursuant to applicable regulations and DSA approval, if the Project Inspector(s) agree to do so, and at the expense of the Contractor.

5.2 Tests and Inspections

5.2.1 Tests and Inspections shall comply with title 24, part 1, California Code of Regulations, group 1, article 5, section 4-335, and with the provisions of the Specifications.

5.2.2 The District will select an independent testing laboratory to conduct the tests. Selection of the materials required to be tested shall be by the laboratory or the District's representative and not by the Contractor. The Contractor shall notify the District's representative a sufficient time in advance of its readiness for required observation or inspection.

5.2.3 The Contractor shall notify the District's representative a sufficient time in advance of the manufacture of material to be supplied under the Contract Documents, which must by terms of the Contract Documents be tested, in order that the District may arrange for the testing of same at the source of supply. This notice shall be provided, at a minimum, seventy-two (72) hours prior to the manufacture of the material that needs to be tested.

5.2.4 Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required, shall not be incorporated into and/or onto the Project.

5.2.5 The District will select the testing laboratory and pay for the cost of all tests and inspections. Contractor shall reimburse the District for any and all laboratory costs or other testing costs for any materials found to be not in compliance with the Contract Documents. At the District's discretion, District may elect to deduct laboratory or other testing costs for noncompliant materials from the Contract Price, and such deduction shall not constitute a withholding.

5.3 Costs for After Hours and/or Off Site Inspections

If the Contractor performs Work outside the Inspector's regular working hours or requests the Inspector to perform inspections off Site, costs of any inspections required outside regular working hours or off Site shall be borne by the Contractor and may be invoiced to the Contractor by the District or the District may deduct those expenses from the next Progress Payment.

6. CONTRACTOR

Contractor shall construct and complete, in a good and workmanlike manner, the Work for the Contract Price including any adjustment(s) to the Contract Price pursuant to provisions herein regarding changes to the Contract Price. Except as otherwise noted, Contractor shall provide and pay for all labor, materials, equipment, permits (excluding DSA), fees, licenses, facilities, transportation, taxes, bonds and insurance, and services necessary for the proper execution and completion of the Work, except as indicated herein.

6.1 Status of Contractor

6.1.1 Contractor is and shall at all times be deemed to be an independent contractor and shall be wholly responsible for the manner in which it and its Subcontractors perform the services required of it by the Contract Documents. Nothing herein contained shall be construed as creating the relationship of employer and employee, or principal and agent, between the District, or any of the District's employees or agents, and Contractor or any of Contractor's Subcontractors, agents or employees. Contractor assumes exclusively the responsibility for the acts of its agents, and employees as they relate to the services to be provided during the course and scope of their employment. Contractor, its Subcontractors, agents, and its employees shall not be entitled to any rights or privileges of District employees. District shall be permitted to monitor the Contractor's activities to determine compliance with the terms of this Contract.

6.1.2 As required by law, Contractor and all Subcontractors shall be properly licensed and regulated by the Contractors State License Board, 9821 Business Park Drive, Sacramento, California 95827, http://www.cslb.ca.gov.

6.1.3 As required by law, Contractor and all Subcontractors shall be properly registered as public works contractors by the Department of Industrial Relations at: https://efiling.dir.ca.gov/PWCR/ActionServlet?action=displayPWCRegistrationForm or current URL.

6.1.4 Contractor represents that it has no existing interest and will not acquire any interest, direct or indirect, which could conflict in any manner or degree with the performance of Work required under this Contractor and that no person having any such interest shall be employed by Contractor.

6.2 Project Inspection Card(s)

Contractor shall verify that forms DSA 152 (or the current version applicable at the time the Work is performed) are issued for the Project prior to the commencement of construction.

6.3 Contractor's Supervision

6.3.1 During progress of the Work, Contractor shall keep on the Premises, and at all other locations where any Work related to the Contract is being performed, an experienced and competent project manager and construction superintendent who are employees of the Contractor, to whom the District does not object and at least one of whom shall be fluent in English, written and verbal.

6.3.2 The project manager and construction superintendent shall both speak fluently the predominant language of the Contractor's employees.

6.3.3 Before commencing the Work herein, Contractor shall give written notice to District of the name of its project manager and construction superintendent. Neither the Contractor's project manager nor construction superintendent shall be changed except with prior written notice to District. If the Contractor's project manager and/or construction superintendent proves to be unsatisfactory to Contractor, or to District, any of the District's employees, agents, the Construction Manager, or the Architect, Contractor shall notify District in writing before any change occurs, but no less than two (2) business days prior. Any replacement of the project manager and/or construction superintendent shall be made promptly and must be satisfactory to the District. The Contractor's project manager and construction superintendent shall each represent Contractor, and all directions given to Contractor's project manager and/or construction superintendent shall be as binding as if given to Contractor.

6.3.4 Contractor shall give efficient supervision to Work, using its best skill and attention. Contractor shall carefully study and compare all Contract Documents, Drawings, Specifications, and other instructions and shall at once report to District, Construction Manager, and Architect any error, inconsistency, or omission that Contractor or its employees and Subcontractors may discover, in writing, with a copy to District's Project Inspector(s). The Contractor shall have responsibility for discovery of errors, inconsistencies, or omissions.

6.4 Duty to Provide Fit Workers

6.4.1 Contractor and Subcontractor(s) shall at all times enforce strict discipline and good order among their employees and shall not employ or work any unfit person or anyone not skilled in work assigned to that person. It shall be the responsibility of Contractor to ensure compliance with this requirement. District may require Contractor to permanently remove unfit persons from Project Site.

6.4.2 Any person in the employ of Contractor or Subcontractor(s) whom District may deem incompetent or unfit shall be excluded from working on the Project and shall not again be employed on the Project except with the prior written consent of District.

6.4.3 The Contractor shall furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work.

6.4.4 If Contractor intends to make any change in the name or legal nature of the Contractor's entity, Contractor must first notify the District in writing prior to making any contemplated change. The District shall determine in writing if Contractor's intended change is permissible while performing this Contract.

6.5 Field Office

6.5.1 Contractor shall provide a temporary office on the Work Site for the District's use exclusively, during the term of the Contract.

6.6 Purchase of Materials and Equipment

The Contractor is required to order, obtain, and store materials and equipment sufficiently in advance of its Work at no additional cost or advance payment from District to assure that there will be no delays.

6.7 Documents on Work

6.7.1 Contractor shall at all times keep on the Work Site, or at another location as the District may authorize in writing, one legible copy of all Contract Documents, including Addenda and Change Orders, and Titles 19 and 24 of the California Code of Regulations, the specified edition(s) of the Uniform Building Code, all approved Drawings, Plans, Schedules, and Specifications, and all codes and documents referred to in the Specifications, and made part thereof. These documents shall be kept in good order and available to District, Construction Manager, Architect, Architect's representatives, the Project Inspector(s), and all authorities having jurisdiction. Contractor shall be acquainted with and comply with the provisions of these titles as they relate to this Project. (See particularly the duties of Contractor, Title 24, Part 1, California Code of Regulations, section 4-343.) Contractor shall also be acquainted with and comply with all California Code of Regulations provisions relating to conditions on this Project, particularly Titles 8 and 17. Contractor shall coordinate with Architect and Construction Manager and shall submit its verified report(s) according to the requirements of Title 24.

6.7.2 Daily Job Reports.

6.7.2.1 Contractor shall maintain, at a minimum, at least one (1) set of Daily Job Reports on the Project. These must be prepared by the Contractor's employee(s) who are present on Site, and must include, at a minimum, the following information:

- **6.7.2.1.1** A brief description of all Work performed on that day.
- **6.7.2.1.2** A summary of all other pertinent events and/or occurrences on that day.
- **6.7.2.1.3** The weather conditions on that day.
- **6.7.2.1.4** A list of all Subcontractor(s) working on that day, including DIR registration numbers.
- **6.7.2.1.5** A list of each Contractor employee working on that day and the total hours worked for each employee.
- **6.7.2.1.6** A complete list of all equipment on Site that day, whether in use or not.
- **6.7.2.1.7** A complete list of all materials, supplies, and equipment delivered on that day.
- **6.7.2.1.8** A complete list of all inspections and tests performed on that day.

6.7.2.2 Each day Contractor shall provide a copy of the previous day's Daily Job Report to the District or the Construction Manager.

6.8 Preservation of Records

Contractor shall maintain, and District shall have the right to inspect, Contractor's financial records for the Project, including, without limitation, Job Cost Reports for the Project in compliance with the criteria set forth herein. The District shall have the right to examine and audit all Daily Job Reports or other Project records of Contractor's project manager(s), project superintendent(s), and/or project foreperson(s), all certified payroll records and/or related documents including, without limitation, Job Cost Reports, payroll, payment, timekeeping and tracking documents; all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports, and other data of the Contractor, any Subcontractor, and/or supplier, including computations and projections related to bidding, negotiating, pricing, or performing the Work or Contract modification, in order to evaluate the accuracy, completeness, and currency of the cost, manpower, coordination, supervision, or pricing data at no additional cost to the District. These documents may be duplicative and/or be in addition to any Bid Documents held in escrow by the District. The Contractor shall make available at its office at all reasonable times the materials described in this paragraph for the examination, audit, or reproduction until three (3) years after final payment under this Contract. Notwithstanding the provisions above, Contractor shall provide any records requested by any governmental agency, if available, after the time set forth above.

6.9 Integration of Work

6.9.1 Contractor shall do all cutting, fitting, patching, and preparation of Work as required to make its several parts come together properly, to fit it to receive or be received by work of other contractors, and to coordinate tolerances to various pieces of work, showing upon, or reasonably implied by, the Drawings and Specifications for the completed structure, and shall conform them as District and/or Architect may direct.

6.9.2 Contractor shall make its own layout of lines and elevations and shall be responsible for the accuracy of both Contractor's and Subcontractors' work resulting therefrom.

6.9.3 Contractor and all Subcontractors shall take all field dimensions required in performance of the Work, and shall verify all dimensions and conditions on the Site. All dimensions affecting proper fabrication and installation of all Work must be verified prior to fabrication by taking field measurements of the true conditions. If there are any discrepancies between dimensions in drawings and existing conditions which will affect the Work, Contractor shall bring such discrepancies to the attention of the District and Architect for adjustment before proceeding with the Work. In doing so, it is recognized that Contractor is not acting in the capacity of a licensed design professional, and that Contractor's examination is made in good faith to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies in the Contract Documents or to ascertain compliance with applicable laws, building codes or regulations. Following receipt of written notice from Contractor, the District and/or Architect shall inform Contractor what action, if any, Contractor shall take with regard to such discrepancies.

6.9.4 All costs caused by noncompliant, defective, or delayed Work shall be borne by Contractor, inclusive of repair work.

6.9.5 Contractor shall not endanger any work performed by it or anyone else by cutting, excavating, or otherwise altering work and shall not cut or alter work of any other contractor except with consent of District.

6.10 Notifications

6.10.1 Contractor shall notify the Architect and Project Inspector, in writing, of the commencement of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector. Forms are available on the DSA's website at: http://www.dgs.ca.gov/dsa/Forms.aspx.

6.10.2 Contractor shall notify the Architect and Project Inspector, in writing, of the completion of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or current version) to the Project Inspector.

6.11 Obtaining of Permits, Licenses and Registrations

Contractor shall secure and pay for all permits (except DSA), licenses, registrations, approvals and certificates necessary for prosecution of Work, including but not limited to those listed in the Special Conditions, if any, before the date of the commencement of the Work or before the permits, licenses, registrations, approvals and certificates are legally required to continue the Work without interruption. The Contractor shall obtain and pay, only when legally required, for all licenses, registrations, approvals, permits, inspections, and inspection certificates required to be obtained from or issued by any authority having jurisdiction over any part of the Work included in the Contract. All final permits, licenses, registrations, approvals and certificates shall be delivered to District before demand is made for final payment.

6.12 Royalties and Patents

6.12.1 Contractor shall obtain and pay, only when legally required, all royalties and license fees necessary for prosecution of Work before the earlier of the date of the commencement of the Work or the date that the license is legally required to continue the Work without interruption. Contractor shall defend suits or claims of infringement of patent, copyright, or other rights and shall hold the District, the Architect, and the Construction Manager harmless and indemnify them from loss on account thereof except when a particular design, process, or make or model of product is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process, or product is an infringement of a patent or copyright, the Contractor shall indemnify and defend the District, Architect and Construction Manager against any loss or damage unless the Contractor promptly informs the District of its information.

6.12.2 The review by the District or Architect of any method of construction, invention, appliance, process, article, device, or material of any kind shall be only its adequacy for the Work and shall not approve use by the Contractor in violation of any patent or other rights of any person or entity.

6.13 Work to Comply With Applicable Laws and Regulations

6.13.1 Contractor shall give all notices and comply with the following specific laws, ordinances, rules, and regulations and all other applicable laws, ordinances, rules, and regulations bearing on conduct of Work as indicated and specified, including but not limited to the appropriate statutes and administrative code sections. If Contractor observes that Drawings and Specifications are at variance therewith, or should Contractor become aware of the development of conditions not covered by Contract Documents that may result in finished Work being at variance therewith, Contractor shall promptly notify District in writing and any changes deemed necessary by District shall be made as provided in Contract for changes in Work.

6.13.1.1 National Electrical Safety Code, U. S. Department of Commerce

6.13.1.2 National Board of Fire Underwriters' Regulations

6.13.1.3 International Building Code, latest addition, and the California Code of Regulations, title 24, and other amendments

6.13.1.4 Manual of Accident Prevention in Construction, latest edition, published by A.G.C. of America

6.13.1.5 Industrial Accident Commission's Safety Orders, State of California

6.13.1.6 Regulations of the State Fire Marshall (title 19, California Code of Regulations) and Pertinent Local Fire Safety Codes

6.13.1.7 Americans with Disabilities Act

6.13.1.8 Education Code of the State of California

6.13.1.9 Government Code of the State of California

6.13.1.10 Labor Code of the State of California, division 2, part 7, Public Works and Public Agencies

6.13.1.11 Public Contract Code of the State of California

6.13.1.12 California Art Preservation Act

6.13.1.13 U. S. Copyright Act

6.13.1.14 U. S. Visual Artists Rights Act

6.13.2 Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act (Public Resources Code section 21000 et seq.).

6.13.3 If Contractor performs any Work that it knew, or through exercise of reasonable care should have known, to be contrary to any applicable laws,

ordinance, rules, or regulations, Contractor shall bear all costs arising therefrom and arising from the correction of said Work.

6.13.4 Where Specifications or Drawings state that materials, processes, or procedures must be approved by the DSA, State Fire Marshall, or other body or agency, Contractor shall be responsible for satisfying requirements of such bodies or agencies applicable at the time the Work is performed, and as determined by those bodies or agencies.

6.14 Safety/Protection of Persons and Property

6.14.1 The Contractor will be solely and completely responsible for conditions of the Work Site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours.

6.14.2 The wearing of hard hats will be mandatory at all times for all personnel on Site. Contractor shall supply sufficient hard hats to properly equip all employees and visitors.

6.14.3 Any construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the Work Site.

6.14.4 Implementation and maintenance of safety programs shall be the sole responsibility of the Contractor.

6.14.5 The Contractor shall furnish to the District a copy of the Contractor's safety plan within the time frame indicated in the Contract Documents and specifically adapted for the Project.

6.14.6 Contractor shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of this Contract and shall take all necessary measures and be responsible for the proper care and completion and final acceptance by District. All Work shall be solely at Contractor's risk with the exception of damage to the Work caused by "acts of God" as defined in Public Contract Code section 7105.

6.14.7 Contractor shall take, and require Subcontractors to take, all necessary precautions for safety of workers on the Project and shall comply with all applicable federal, state, local, and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where Work is being performed and to provide a safe and healthful place of employment. Contractor shall furnish, erect, and properly maintain at all times, all necessary safety devices, safeguards, construction canopies, signs, nets, barriers, lights, and watchmen for protection of workers and the public and shall post danger signs warning against hazards created by such features in the course of construction.

6.14.8 Hazards Control – Contractor shall store volatile wastes in covered metal containers and remove them from the Site daily. Contractor shall prevent accumulation of wastes that create hazardous conditions. Contractor shall provide adequate ventilation during use of volatile or noxious substances.

6.14.9 Contractor shall designate a responsible member of its organization on the Project, whose duty shall be to post information regarding protection and obligations of workers and other notices required under occupational safety and health laws, to comply with reporting and other occupational safety requirements, and to protect the life, safety, and health of workers. Name and position of person so designated shall be reported to District by Contractor.

6.14.10 Contractor shall correct any violations of safety laws, rules, orders, standards, or regulations. Upon the issuance of a citation or notice of violation by the Division of Occupational Safety and Health, Contractor shall correct such violation promptly.

6.14.11 Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

6.14.12 In an emergency affecting safety of life or of work or of adjoining property, Contractor, without special instruction or authorization, shall act, at its discretion, to prevent such threatened loss or injury. Any compensation claimed by Contractor on account of emergency work shall be determined by agreement.

6.14.13 All salvage materials will become the property of the Contractor and shall be removed from the Site unless otherwise called for in the Contract Documents. However, the District reserves the right to designate certain items of value that shall be turned over to the District unless otherwise directed by District.

6.14.14 All connections to public utilities and/or existing on-site services shall be made and maintained in such a manner as to not interfere with the continuing use of same by the District during the entire progress of the Work.

6.14.15 Contractor shall provide such heat, covering, and enclosures as are necessary to protect all Work, materials, equipment, appliances, and tools against damage by weather conditions, such as extreme heat, cold, rain, snow, dry winds, flooding, or dampness.

6.14.16 The Contractor shall protect and preserve the Work from all damage or accident, providing any temporary roofs, window and door coverings, boxings, or other construction as required by the Architect. The Contractor shall be responsible for existing structures, walks, roads, trees, landscaping, and/or improvements in working areas; and shall provide adequate protection therefore. If temporary removal is necessary of any of the above items, or damage occurs due to the Work, the Contractor shall replace same at his expense with same kind, quality, and size of Work or item damaged. This shall include any adjoining property of the District and others.

6.14.17 Contractor shall take adequate precautions to protect existing roads, sidewalks, curbs, pavements, utilities, adjoining property, and structures (including, without limitation, protection from settlement or loss of lateral support), and to avoid damage thereto, and repair any damage thereto caused by construction operations.

6.14.18 Contractor shall confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits, or directions of

Architect, and shall not interfere with the Work or unreasonably encumber Premises or overload any structure with materials. Contractor shall enforce all instructions of District and Architect regarding signs, advertising, fires, and smoking, and require that all workers comply with all regulations while on Project Site.

6.14.19 Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, or any person associated with the Work shall conduct themselves in a manner appropriate for a school site. No verbal or physical contact with neighbors, students, and faculty, profanity, or inappropriate attire or behavior will be permitted. District may require Contractor to permanently remove non-complying persons from Project Site.

6.14.20 Contractor shall take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed, Contractor shall have a civil engineer, registered as a professional engineer in California, replace them at no cost to District.

6.14.21 In the event that the Contractor enters into any agreement with owners of any adjacent property to enter upon the adjacent property for the purpose of performing the Work, Contractor shall fully indemnify, defend, and hold harmless each person, entity, firm, or agency that owns or has any interest in adjacent property. The form and content of the agreement of indemnification shall be approved by the District prior to the commencement of any Work on or about the adjacent property. The Contractor shall also indemnify the District as provided in the indemnification provision herein. These provisions shall be in addition to any other requirements of the owners of the adjacent property.

6.15 Working Evenings and Weekends

Contractor may be required to work increased hours, evenings, and/or weekends at no additional cost to the District. Contractor shall give the District seventy-two (72) hours' notice prior to performing any evening and/or weekend work. Contractor shall perform all evening and/or weekend work only upon District's approval and in compliance with all applicable rules, regulations, laws, and local ordinances including, without limitation, all noise and light limitations. Contractor shall reimburse the District for any increased or additional Inspector charges as a result of Contractor's increased hours, or evening and/or weekend work.

6.16 Cleaning Up

6.16.1 The Contractor shall provide all services, labor, materials, and equipment necessary for protecting and securing the Work, all school occupants, furnishings, equipment, and building structure from damage until its completion and final acceptance by District. Dust barriers shall be provided to isolate dust and dirt from construction operations. At completion of the Work and portions thereof, Contractor shall clean to the original state any areas beyond the Work area that become dust laden as a result of the Work. The Contractor must erect the necessary warning signs and barricades to ensure the safety of all school occupants. The Contractor at all times must maintain good housekeeping practices to reduce the risk of fire damage and must make a fire extinguisher, fire blanket, and/or fire watch, as applicable, available at each location where cutting, braising, soldering, and/or welding is being performed or where there is an increased risk of fire.

6.16.2 Contractor at all times shall keep Premises, including property immediately adjacent thereto, free from debris such as waste, rubbish (including personal rubbish of workers, e.g., food wrappers, etc.), and excess materials and equipment caused by the Work. Contractor shall not leave debris under, in, or about the Premises (or surrounding property or neighborhood), but shall promptly remove same from the Premises on a daily basis. If Contractor fails to clean up, District may do so and the cost thereof shall be charged to Contractor. If Contract is for work on an existing facility, Contractor shall also perform specific clean-up on or about the Premises upon request by the District as it deems necessary for the continuing education process. Contractor shall comply with all related provisions of the Specifications.

6.16.3 If the Construction Manager, Architect, or District observes the accumulation of trash and debris, the District will give the Contractor a 24-hour written notice to mitigate the condition.

6.16.4 Should the Contractor fail to perform the required clean-up, or should the clean-up be deemed unsatisfactory by the District, the District will then perform the clean-up. All cost associated with the clean-up work (including all travel, payroll burden, and costs for supervision) will be deducted from the Contract Price, or District may withhold those amounts from payment(s) to Contractor.

7. SUBCONTRACTORS

7.1 Contractor shall provide the District with information for all Subcontracts as indicated in the Contractor's Submittals and Schedules Section herein.

7.2 No contractual relationship exists between the District and any Subcontractor, supplier, or sub-subcontractor by reason of this Contract.

7.3 Contractor agrees to bind every Subcontractor by terms of this Contract as far as those terms that are applicable to Subcontractor's work including, without limitation, all labor, wage & hour, apprentice and related provisions and requirements. If Contractor shall subcontract any part of this Contract, Contractor shall be as fully responsible to District for acts and omissions of any Subcontractor and of persons either directly or indirectly employed by any Subcontractor, including Subcontractor caused Project delays, as it is for acts and omissions of persons directly employed by Contractor. The divisions or sections of the Specifications and/or the arrangement of the drawings are not intended to control the Contractor in dividing the Work among Subcontractors or limit the work performed by any trade.

7.4 District's consent to, or approval of, or failure to object to, any Subcontractor under this Contract shall not in any way relieve Contractor of any obligations under this Contract and no such consent shall be deemed to waive any provisions of this Contract.

7.5 Contractor is directed to familiarize itself with sections 4100 through 4114 of the Public Contract Code of the State of California, as regards subletting and subcontracting, and to comply with all applicable requirements therein. In addition, Contractor is directed to familiarize itself with sections 1720 through 1861 of the Labor Code of the State of California, as regards the payment of prevailing wages and related issues, and to comply with all applicable requirements therein including, without

limitation, section 1775 and the Contractor's and Subcontractors' obligations and liability for violations of prevailing wage law and other applicable laws.

7.6 No Contractor whose Bid is accepted shall, without consent of the awarding authority and in full compliance with section 4100 et seq. of the Public Contract Code, including, without limitation, sections 4107, 4107.5, and 4109 of the Public Contract Code, and section 1771.1 of the Labor Code, either:

7.6.1 Substitute any person as a Subcontractor in place of the Subcontractor designated in the original Bid; or

7.6.2 Permit any Subcontract to be assigned or transferred, or allow any portion of the Work to be performed by anyone other than the original Subcontractor listed in the Bid; or

7.6.3 Sublet or subcontract any portion of the Work in excess of one-half of one percent (0.5%) of the Contractor's total bid as to which his original bid did not designate a Subcontractor.

7.7 The Contractor shall be responsible for the coordination of the trades, Subcontractors, sub-subcontractors, and material or equipment suppliers working on the Project.

7.7.1 If the Contract is valued at $1 million or more and uses, or plans to use, state bond funds, then Contractor is responsible for ensuring that first tier Subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43, and/or C-46 licenses are prequalified by the District to work on the Project pursuant to Public Contract Code section 20111.6.

7.7.2 Contractor is responsible for ensuring that all Subcontractors are properly registered as public works contractors by the Department of Industrial Relations.

7.8 Contractor is solely responsible for settling any differences between the Contractor and its Subcontractor(s) or between Subcontractors.

7.9 Contractor must include in all of its subcontracts the assignment provisions as indicated in the Termination section of these General Conditions.

8. OTHER CONTRACTS/CONTRACTORS

8.1 District reserves the right to let other contracts, and/or to perform work with its own forces, in connection with the Project. Contractor shall afford other contractors reasonable opportunity for introduction and storage of their materials and execution of their work and shall properly coordinate and connect Contractor's Work with the work of other contractors.

8.2 In addition to Contractor's obligation to protect its own Work, Contractor shall protect the work of any other contractor that Contractor encounters while working on the Project.

8.3 If any part of Contractor's Work depends for proper execution or results upon work of District or any other contractor, the Contractor shall inspect and, before

proceeding with its Work, promptly report to the District in writing any defects in District's or any other contractor's work that render Contractor's Work unsuitable for proper execution and results. Contractor shall be held accountable for damages to District for District's or any other contractor's work that Contractor failed to inspect or should have inspected. Contractor's failure to inspect and report shall constitute Contractor's acceptance of all District's or any other contractor's work as fit and proper for reception of Contractor's Work, except as to defects that may develop in District's or any other contractor's work after execution of Contractor's Work and not caused by execution of Contractor's Work.

8.4 To ensure proper execution of its subsequent work, Contractor shall measure and inspect work already in place and shall at once report to the District in writing any discrepancy between that executed work and the Contract Documents.

8.5 Contractor shall ascertain to its own satisfaction the scope of the Project and nature of District's or any other contracts that have been or may be awarded by District in prosecution of the Project to the end that Contractor may perform this Contract in light of the other contracts, if any.

8.6 Nothing herein contained shall be interpreted as granting to Contractor exclusive occupancy of the Site, the Premises, or of the Project. Contractor shall not cause any unnecessary hindrance or delay to the use and/or school operation(s) of the Premises and/or to District or any other contractor working on the Project. If simultaneous execution of any contract or school operation is likely to cause interference with performance of Contractor's Contract, Contractor shall coordinate with those contractor(s), person(s), and/or entity(s) and shall notify the District of the resolution.

9. DRAWINGS AND SPECIFICATIONS

9.1 A complete list of all Drawings that form a part of the Contract is to be found as an index on the Drawings themselves, and/or may be provided to the Contractor and/or in the Table of Contents.

9.2 Materials or Work described in words that so applied have a well-known technical or trade meaning shall be deemed to refer to recognized standards, unless noted otherwise.

9.3 Trade Name or Trade Term. It is not the intention of this Contract to go into detailed descriptions of any materials and/or methods commonly known to the trade under "trade name" or "trade term." The mere mention or notation of "trade name" or "trade term" shall be considered a sufficient notice to Contractor that it will be required to complete the work so named, complete, finished, and operable, with all its appurtenances, according to the best practices of the trade.

9.4 The naming of any material and/or equipment shall mean furnishing and installing of same, including all incidental and accessory items thereto and/or labor therefor, as per best practices of the trade(s) involved, unless specifically noted otherwise.

9.5 Contract Documents are complementary, and what is called for by one shall be binding as if called for by all. As such, Drawings and Specifications are intended to be fully cooperative and to agree. However, if Contractor observes that Drawings and

Specifications are in conflict with the Contract Documents, Contractor shall promptly notify District and Architect in writing, and any necessary changes shall be made as provided in the Contract Documents.

9.6 In the case of discrepancy or ambiguity in the Contract Documents, the order of precedence in the Agreement shall prevail. However, in the case of discrepancy or ambiguity solely between and among the Drawings and Specifications, the discrepancy or ambiguity shall be resolved in favor of the interpretation that will provide District with the functionally complete and operable Project described in the Drawings and Specifications. In case of ambiguity, conflict, or lack of information, District will furnish clarifications with reasonable promptness.

9.7 Drawings and Specifications are intended to comply with all laws, ordinances, rules, and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, the laws, ordinances, rules, and regulations shall be considered as a part of the Contract within the limits specified. Contractor shall bear all expense of correcting work done contrary to said laws, ordinances, rules, and regulations.

9.8 As required by Section 4-317(c), Part 1, Title 24, CCR: "Should any existing conditions such as deterioration or non-complying construction be discovered which is not covered by the DSA-approved documents wherein the finished work will not comply with Title 24, California Code of Regulations, a construction change document, or a separate set of plans and specifications, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work."

9.9 Ownership of Drawings

All copies of Plans, Drawings, Designs, Specifications, and copies of other incidental architectural and engineering work, or copies of other Contract Documents furnished by District, are the property of District. They are not to be used by Contractor in other work and, with the exception of signed sets of Contract Documents, are to be returned to District on request at completion of Work, or may be used by District as it may require without any additional costs to District. Neither the Contractor nor any Subcontractor, or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by the Architect. District hereby grants the Contractor, Subcontractors, sub-subcontractors, and material or equipment suppliers a limited license to use applicable portions of the Drawings prepared for the Project in the execution of their Work under the Contract Documents.

10. CONTRACTOR'S SUBMITTALS AND SCHEDULES

Contractor's submittals shall comply with the provisions and requirements of the Specifications including, without limitation Submittals.

10.1 Schedule of Work, Schedule of Submittals, and Schedule of Values

10.1.1 Within **TEN (10)** calendar days after the date of the Notice to Proceed (unless otherwise specified in the Specifications), the Contractor shall prepare and submit to the District for review, in a form supported by sufficient data to substantiate its accuracy as the District may require:

10.1.1.1 Preliminary Schedule. A preliminary schedule of construction indicating the starting and completion dates of the various stages of the Work, including any information and following any form as may be specified in the Specifications. Once approved by District, this shall become the Construction Schedule. This schedule shall include and identify all tasks that are on the Project's critical path with a specific determination of the start and completion of each critical path task as well as all Contract milestones and each milestone's completion date(s) as may be required by the District.

10.1.1.2 Preliminary Schedule of Values. A preliminary schedule of values for all of the Work, which must include quantities and prices of items aggregating the Contract Price and must subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Unless the Special Conditions contain different limits, this preliminary schedule of values shall include, at a minimum, the following information and the following structure:

10.1.1.2.1 Divided into at least the following categories:

10.1.1.2.1.1 Overhead and profit;
10.1.1.2.1.2 Supervision;
10.1.1.2.1.3 General conditions;
10.1.1.2.1.4 Layout;
10.1.1.2.1.5 Mobilization;
10.1.1.2.1.6 Submittals;
10.1.1.2.1.7 Bonds and insurance;
10.1.1.2.1.8 Close-out/Certification documentation;
10.1.1.2.1.9 Demolition;
10.1.1.2.1.10 Installation;
10.1.1.2.1.11 Rough-in;
10.1.1.2.1.12 Finishes;
10.1.1.2.1.13 Testing;
10.1.1.2.1.14 Punchlist and acceptance.

10.1.1.2.2 And also divided by each of the following areas:

10.1.1.2.2.1 Site work;
10.1.1.2.2.2 By each building;
10.1.1.2.2.3 By each floor.

10.1.1.2.3 The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

10.1.1.2.3.1 Mobilization and layout combined to equal not more than 1%;
10.1.1.2.3.2 Submittals, samples and shop drawings combined to equal not more than 3%;
10.1.1.2.3.3 Bonds and insurance combined to equal not more than 2%.

10.1.1.2.4 Closeout documentation shall have a value in the preliminary schedule of not less than 5%.

10.1.1.2.5 Notwithstanding any provision of the Contract Documents to the contrary, payment of the Contractor's overhead, supervision, general conditions costs, and profit, as reflected in the Cost Breakdown, shall be paid based on percentage complete, with the disbursement of Progress Payments and the Final Payment.

10.1.1.2.6 Contractor shall certify that the preliminary schedule of values as submitted to the District is accurate and reflects the costs as developed in preparing Contractor's bid. The preliminary schedule of values shall be subject to the District's review and approval of the form and content thereof. In the event that the District objects to any portion of the preliminary schedule of values, the District shall notify the Contractor, in writing, of the District's objection(s) to the preliminary schedule of values. Within five (5) calendar days of the date of the District's written objection(s), Contractor shall submit a revised preliminary schedule of values to the District for review and approval. The foregoing procedure for the preparation, review and approval of the preliminary schedule of values shall continue until the District has approved the entirety of the preliminary schedule of values.

10.1.1.2.7 Once the preliminary schedule of values is approved by the District, this shall become the Schedule of Values. The Schedule of Values shall not be thereafter modified or amended by the Contractor without the prior consent and approval of the District, which may be granted or withheld in the sole discretion of the District.

10.1.1.3 Preliminary Schedule of Submittals. A preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals. Once approved by District, this shall become the Submittal Schedule. All submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those submittals shall be forwarded to the District so as not to delay the Construction Schedule. Upon request by the District, Contractor shall provide an electronic copy of all submittals to the District. All submittals shall be submitted no later than 90 days after the Notice to Proceed.

10.1.1.4 Safety Plan. Contractor's Safety Plan specifically adapted for the Project. Contractor's Safety Plan shall comply with the following requirements:

10.1.1.4.1 All applicable requirements of California Division of Occupational Safety and Health ("CalOSHA") and/or of the United States Occupational Safety and Health Administration ("OSHA").

10.1.1.4.2 All provisions regarding Project safety, including all applicable provisions in these General Conditions.

10.1.1.4.3 Contractor's Safety Plan shall be in English and in the language(s) of the Contractor's and its Subcontractors' employees.

10.1.1.5 Complete Registered Subcontractors List. The name, address, telephone number, facsimile number, California State Contractors License number, classification, DIR registration number and monetary value of all

Subcontracts of any tier for parties furnishing labor, material, or equipment for completion of the Project.

10.1.2 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the District.

10.1.3 The District will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the District and resubmit the schedules until approved by the District.

10.1.4 The District shall have the right at any time to revise the schedule of values if, in the District's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.1.5 All submittals and schedules must be approved by the District before Contractor can rely on them as a basis for payment.

10.2 Monthly Progress Schedule(s)

10.2.1 Contractor shall provide Monthly Progress Schedule(s) to the District. A Monthly Progress Schedule shall update the approved Construction Schedule or the last Monthly Progress Schedule, showing all work completed and to be completed as well as updating the Registered Subcontractors List. The monthly Progress Schedule shall be sent within the timeframe requested by the District and shall be in a format acceptable to the District and contain a written narrative of the progress of work that month and any changes, delays, or events that may affect the work. The process for District approval of the Monthly Progress Schedule shall be the same as the process for approval of the Construction Schedule.

10.2.2 Contractor shall submit Monthly Progress Schedule(s) with all payment applications.

10.2.3 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the District.

10.2.4 The District will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the District and resubmit the schedules until approved by the District.

10.2.5 The District shall have the right at any time to revise the schedule of values if, in the District's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.2.6 All submittals and schedules must be approved by the District before Contractor can rely on them as a basis for payment.

10.3 Material Safety Data Sheets (MSDS)

Contractor is required to ensure Material Safety Data Sheets are available in a readily accessible place at the Work Site for any material requiring a Material Safety Data Sheet

per the federal "Hazard Communication" standard, or employees' "right to know" law. The Contractor is also required to ensure proper labeling on substances brought onto the job site and that any person working with the material or within the general area of the material is informed of the hazards of the substance and follows proper handling and protection procedures. Two additional copies of the Material Safety Data Sheets shall also be submitted directly to the District.

11. SITE ACCESS, CONDITIONS, AND REQUIREMENTS

11.1 Site Investigation

Before bidding on this Work, Contractor shall make a careful investigation of the Site and thoroughly familiarize itself with the requirements of the Contract. By the act of submitting a bid for the Work included in this Contract, Contractor shall be deemed to have made a complete study and investigation, and to be familiar with and accepted the existing conditions of the Site.

Prior to commencing the Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey. This electronic record shall serve as a basis for determining any damages caused by the Contractor during the Project. The Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.

11.2 Soils Investigation Report

11.2.1 When a soils investigation report obtained from test holes at Site or for the Project is available, that report may be available to the Contractor but shall not be a part of this Contract and shall not alleviate or excuse the Contractor's obligation to perform its own investigation. Any information obtained from that report or any information given on Drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only, is not guaranteed, does not form a part of this Contract, and Contractor may not rely thereon. By submitting its bid, Contractor acknowledges that it has made visual examination of Site and has made whatever tests Contractor deems appropriate to determine underground condition of soil.

11.2.2 Contractor agrees that no claim against District will be made by Contractor for damages and hereby waives any rights to damages if, during progress of Work, Contractor encounters subsurface or latent conditions at Site materially differing from those shown on Drawings or indicated in Specifications, or for unknown conditions of an unusual nature that differ materially from those ordinarily encountered in the work of the character provided for in Plans and Specifications, except as indicated in the provisions of these General Conditions regarding trenches, trenching, and/or existing utility lines.

11.3 Access to Work

District and its representatives shall at all times have access to Work wherever it is in preparation or progress, including storage and fabrication. Contractor shall provide safe

and proper facilities for such access so that District's representatives may perform their functions.

11.4 Layout and Field Engineering

11.4.1 All field engineering required for layout of this Work and establishing grades for earthwork operations shall be furnished by Contractor at its expense. This Work shall be done by a qualified, California-registered civil engineer approved in writing by District and Architect. Any required Record and/or As-Built Drawings of Site development shall be prepared by the approved civil engineer.

11.4.2 The Contractor shall be responsible for having ascertained pertinent local conditions such as location, accessibility, and general character of the Site and for having satisfied itself as to the conditions under which the Work is to be performed. Contractor shall follow best practices, including but not limited to potholing to avoid utilities. District shall not be liable for any claim for allowances because of Contractor's error, failure to follow best practices, or negligence in acquainting itself with the conditions at the Site.

11.4.3 Contractor shall protect and preserve established benchmarks and monuments and shall make no changes in locations without the prior written approval of District. Contractor shall replace any benchmarks or monuments that are lost or destroyed subsequent to proper notification of District and with District's approval.

11.5 Utilities

Utilities shall be provided as indicated in the Specifications.

11.6 Sanitary Facilities

Sanitary facilities shall be provided as indicated in the Specifications.

11.7 Surveys

Contractor shall provide surveys done by a California-licensed civil engineer surveyor to determine locations of construction, grading, and site work as required to perform the Work.

11.8 Regional Notification Center

The Contractor, except in an emergency, shall contact the appropriate regional notification center at least two (2) days prior to commencing any excavation if the excavation will be conducted in an area or in a private easement that is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the District, and obtain an inquiry identification number from that notification center. No excavation shall be commenced and/or carried out by the Contractor unless an inquiry identification number has been assigned to the Contractor or any Subcontractor and the Contractor has given the District the identification number. Any damages arising from Contractor's failure to make appropriate notification shall be at the sole risk and expense of the Contractor.

Any delays caused by failure to make appropriate notification shall be at the sole risk of the Contractor and shall not be considered for an extension of the Contract Time.

11.9 Existing Utility Lines

11.9.1 Pursuant to Government Code section 4215, District assumes the responsibility for removal, relocation, and protection of main or trunk utility lines and facilities located on the construction Site at the time of commencement of construction under this Contract with respect to any such utility facilities that are not identified in the Plans and Specifications. Contractor shall not be assessed for liquidated damages for delay in completion of the Project caused by failure of District or the owner of a utility to provide for removal or relocation of such utility facilities.

11.9.2 Locations of existing utilities provided by District shall not be considered exact, but approximate within a reasonable margin and shall not relieve Contractor of responsibilities to exercise reasonable care or costs of repair due to Contractor's failure to do so. District shall compensate Contractor for the costs of locating, repairing damage not due to the failure of Contractor to exercise reasonable care, and removing or relocating such utility facilities not indicated in the Plans and Specifications with reasonable accuracy, and for equipment necessarily idle during such work.

11.9.3 No provision herein shall be construed to preclude assessment against Contractor for any other delays in completion of the Work. Nothing in this Article shall be deemed to require District to indicate the presence of existing service laterals, appurtenances, or other utility lines, within the exception of main or trunk utility lines or whenever the presence of these utilities on the Site of the construction Project can be inferred from the presence of other visible facilities, such as buildings, meter junction boxes, on or adjacent to the Site of the construction.

11.9.4 If Contractor, while performing Work under this Contract, discovers utility facilities not identified by District in Contract Plans and Specifications, Contractor shall immediately notify the District and the utility in writing. The cost of repair for damage to above-mentioned visible facilities without prior written notification to the District shall be borne by the Contractor.

11.10 Notification

Contractor understands, acknowledges and agrees that the purpose for prompt notification to the District pursuant to these provisions is to allow the District to investigate the condition(s) so that the District shall have the opportunity to decide how the District desires to proceed as a result of the condition(s). Accordingly, failure of Contractor to promptly notify the District in writing, pursuant to these provisions, shall constitute Contractor's waiver of any claim for damages or delay incurred as a result of the condition(s).

11.11 Hazardous Materials

Contractor shall comply with all provisions and requirements of the Contract Documents related to hazardous materials including, without limitation, Hazardous Materials Procedures and Requirements.

11.12 No Signs

Neither the Contractor nor any other person or entity shall display any signs not required by law or the Contract Documents at the Site, fences trailers, offices, or elsewhere on the Site without specific prior written approval of the District.

12. TRENCHES

12.1 Trenches Greater Than Five Feet

Pursuant to Labor Code section 6705, if the Contract Price exceeds $25,000 and involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall, in advance of excavation, promptly submit to the District and/or a registered civil or structural engineer employed by the District or Architect, a detailed plan, stamped by a licensed engineer retained by the Contractor, showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches.

12.2 Excavation Safety

If such plan varies from the Shoring System Standards established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer, but in no case shall such plan be less effective than that required by the Construction Safety Orders. No excavation of such trench or trenches shall be commenced until said plan has been accepted by the District or by the person to whom authority to accept has been delegated by the District.

12.3 No Tort Liability of District

Pursuant to Labor Code section 6705, nothing in this Article shall impose tort liability upon the District or any of its employees.

12.4 No Excavation without Permits

The Contractor shall not commence any excavation Work until it has secured all necessary permits including the required CalOSHA excavation/shoring permit. Any permits shall be prominently displayed on the Site prior to the commencement of any excavation.

12.5 Discovery of Hazardous Waste and/or Unusual Conditions

12.5.1 Pursuant to Public Contract Code section 7104, if the Work involves digging trenches or other excavations that extend deeper than four feet below the Surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the District, in writing, of any:

12.5.1.1 Material that the Contractor believes may be material that is hazardous waste, as defined in section 25117 of the Health and Safety Code, is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

12.5.1.2 Subsurface or latent physical conditions at the Site differing from those indicated.

12.5.1.3 Unknown physical conditions at the Site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

12.5.2 The District shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work, shall issue a Change Order under the procedures described herein.

12.5.3 In the event that a dispute arises between District and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law that pertain to the resolution of disputes and protests.

13. INSURANCE AND BONDS

13.1 Insurance

Unless different provisions and/or limits are indicated in the Special Conditions, all insurance required of Contractor and/or its Subcontractor(s) shall be in the amounts and include the provisions set forth herein.

13.1.1 Commercial General Liability and Automobile Liability Insurance

13.1.1.1 Contractor shall procure and maintain, during the life of this Contract, Commercial General Liability Insurance and Automobile Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, personal injury, death, advertising injury, and medical payments arising from operations under this Contract. This coverage shall be provided in a form at least as broad as Insurance Services (ISO) Form CG 0001 11188. Contractor shall ensure that Products Liability and Completed Operations coverage, Fire Damage Liability, and Any Auto including owned, non-owned, and hired, are included within the above policies and at the required limits, or Contractor shall procure and maintain these coverages separately.

13.1.1.2 Contractor's deductible or self-insured retention for its Commercial General Liability Insurance policy shall not exceed $25,000 unless approved in writing by District.

13.1.1.3 All such policies shall be written on an occurrence form.

13.1.2 Excess Liability Insurance

13.1.2.1 Contractor may procure and maintain, during the life of this Contract, an Excess Liability Insurance Policy to meet the policy limit requirements of the required policies if Contractor's underlying policy limits are less than required.

13.1.2.2 There shall be no gap between the per occurrence amount of any underlying policy and the start of the coverage under the Excess Liability Insurance Policy. Any Excess Liability Insurance Policy shall be written on a following form and shall protect Contractor, District, State, Construction Manager(s), Project Manager(s), and Architect(s) in amounts and including the provisions as set forth in the Supplementary Conditions (if any) and/or Special Conditions, and that complies with all requirements for Commercial General Liability and Automobile Liability and Employers' Liability Insurance.

13.1.2.3 The District, in its sole discretion, may accept the Excess Liability Insurance Policy that bring Contractor's primary limits to the minimum requirements herein.

13.1.3 Subcontractor(s): Contractor shall require its Subcontractor(s), if any, to procure and maintain Commercial General Liability Insurance, Automobile Liability Insurance, and Excess Liability Insurance (if Subcontractor elects to satisfy, in part the insurance required herein by procuring and maintaining an Excess Liability Insurance Policy) with forms of coverage and limits equal to the amounts required of the Contractor.

13.1.4 Workers' Compensation and Employers' Liability Insurance

13.1.4.1 In accordance with provisions of section 3700 of the California Labor Code, the Contractor and every Subcontractor shall be required to secure the payment of compensation to its employees.

13.1.4.2 Contractor shall procure and maintain, during the life of this Contract, Workers' Compensation Insurance and Employers' Liability Insurance for all of its employees engaged in work under this Contract, on/or at the Site of the Project. This coverage shall cover, at a minimum, medical and surgical treatment, disability benefits, rehabilitation therapy, and survivors' death benefits. Contractor shall require its Subcontractor(s), if any, to procure and maintain Workers' Compensation Insurance and Employers' Liability Insurance for all employees of Subcontractor(s). Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by Contractor's insurance. If any class of employee or employee engaged in Work under this Contract, on or at the Site of the Project, is not protected under the Workers' Compensation Insurance, Contractor shall provide, or shall cause a Subcontractor to provide, adequate insurance coverage for the protection of any employee(s) not otherwise protected before any of those employee(s) commence work.

13.1.5 Builder's Risk Insurance: Builder's Risk "All Risk" Insurance

The District shall obtain and maintain in force during the term of this Agreement, a Builders' Risk Insurance policy or policies separate from the OCIP, which shall insure against all risks of physical loss and/ or damage, including flood but excluding earth movement, subject to normal policy exclusions, to all buildings, structures, materials, and real property on site, which are intended to be, or have

already been incorporated into and forming part of the Project, whether or not such buildings, structures, materials, or real property will have been supplied or made available to Contractors by District.

The Builders' Risk policy shall be endorsed to add Contractors of any tier as additional named insureds' and to waive the carrier's right of recovery under subrogation against the District and all other Contractors of any tier whose interests are insured under such policy.

Unless required otherwise by District, claims under Builders' Risk insurance provided are subject to a Contractor Claims Obligation of fifteen thousand dollars ($15,000) per occurrence. If a claim results from any construction activity, the responsible Contractor, Subcontractor, or Sub-Subcontractor shall pay the Contractor Claims Obligation up to $15,000. All Builders' Risk losses will be adjusted with and payable to the District or its designee for the benefit of all parties as their interest may appear.

The District shall not be responsible for loss or damage to, or obtaining and/or maintaining in force insurance on temporary structures, construction equipment, tool or personal effects, owned or rented to or in the care, custody, and control of a Contractor of any tier.

In the event of loss or damage to the Project not covered by the Builders' Risk policy, the cost of the repair and/or replacement of such loss or damage shall be the responsibility of the District.

13.1.6 Pollution Liability Insurance

13.1.6.1 Contractor shall procure and maintain Pollution Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, including natural resource damage, cleanup costs, removal, storage, disposal, and/or use of the pollutant arising from operations under this Contract, and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims. Coverage shall apply to sudden and/or gradual pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants, including asbestos. This coverage shall be provided in a form at least as broad as Insurance Services Offices, Inc. (ISO) Form CG 2415, or Contractor shall procure and maintain these coverages separately.

13.1.6.2 Contractor shall warrant that any retroactive date applicable to coverage under the policy predates the effective date of the Contract and that continuous coverage will be maintained or an extended reporting or discovery period will be exercised for a period of three (3) years, beginning from the time that the Work under the Contract is completed.

13.1.6.3 If Contractor is responsible for removing any pollutants from a site, then Contractor shall ensure that Any Auto, including owned, non-owned, and hired, is included within the above policies and at the required limits, to cover its automobile exposure from transporting the pollutants from the site to an

approved disposal site. This coverage shall include the Motor Carrier Act Endorsement, MCS 90.

13.1.7 Proof of Insurance and Other Requirements: Endorsements and Certificates

13.1.7.1 Contractor shall not commence Work nor shall it allow any Subcontractor to commence Work under this Contract, until Contractor and its Subcontractor(s) have procured all required insurance and Contractor has delivered in duplicate to the District complete endorsements (or entire insurance policies) and certificates indicating the required coverages have been obtained, and the District has approved these documents.

13.1.7.2 Endorsements, certificates, and insurance policies shall include the following:

13.1.7.2.1 A clause stating:

"This policy shall not be canceled and the coverage amounts shall not be reduced until written notice to District, Architect, and Construction Manager stating date of the cancellation by the insurance carrier. Date of cancellation may not be less than thirty (30) days after date of mailing notice."

13.1.7.2.2 Language stating in particular those insured, extent of insurance, location and operation to which insurance applies, expiration date, to whom cancellation and reduction notice will be sent, and length of notice period.

13.1.7.2.3 All endorsements, certificates and insurance policies shall state that District, its trustees, employees and agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s) and Architect(s) are named additional insureds under all policies except Workers' Compensation Insurance and Employers' Liability Insurance.

13.1.7.3 No policy shall be amended, canceled or modified, and the coverage amounts shall not be reduced, until Contractor or Contractor's broker has provided written notice to District, Architect, and Construction Manager stating date of the amendment, modification, cancellation or reduction, and a description of the change. Date of amendment, modification, cancellation or reduction may not be less than thirty (30) days after date of mailing notice.

13.1.7.4 Insurance written on a "claims made" basis shall be retroactive to a date that coincides with or precedes Contractor's commencement of Work, including subsequent policies purchased as renewals or replacements. Said policy is to be renewed by the Contractor and all Subcontractors for a period of five (5) years following completion of the Work or termination of this Agreement. Such insurance must have the same coverage and limits as the policy that was in effect during the term of this Agreement, and will cover the Contractor and all Subcontractors for all claims made.

13.1.7.5 Contractor's and Subcontractors' insurance policy(s) shall be primary and non-contributory to any insurance or self-insurance maintained by District,

its trustees, employees and/or agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s), and/or Architect(s).

13.1.7.6 All endorsements shall waive any right to subrogation against any of the named additional insureds.

13.1.7.7 Unless otherwise stated in the Special Conditions, all of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than **A: VII**.

13.1.7.8 The insurance requirements set forth herein shall in no way limit the Contractor's liability arising out of or relating to the performance of the Work or related activities.

13.1.7.9 Failure of Contractor and/or its Subcontractor(s) to comply with the insurance requirements herein shall be deemed a material breach of the Agreement.

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13.1.8 Insurance Policy Limits

Unless different limits are indicated in the Special Conditions, the limits of insurance shall not be less than the following amounts:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	$5,000,000 per occurrence; $10,000,000 aggregate
Automobile Liability – Any Auto	Combined Single Limit	Personal vehicles $100,000 per person/ $300,000 per accident
Workers' Compensation		Statutory limits pursuant to State law
Employers' Liability		$1,000,000
Builder's Risk (Course of Construction)		Issued for $15,000.
Pollution Liability		$1,000,000 per claim; $2,000,000 aggregate

13.2 Contract Security - Bonds

13.2.1 Contractor shall furnish two surety bonds issued by a California admitted surety insurer as follows:

13.2.1.1 Performance Bond: A bond in an amount at least equal to one hundred percent (100%) of Contract Price as security for faithful performance of this Contract.

13.2.1.2 Payment Bond: A bond in an amount at least equal to one hundred percent (100%) of the Contract Price as security for payment of persons performing labor and/or furnishing materials in connection with this Contract.

13.2.2 Cost of bonds shall be included in the Bid and Contract Price.

13.2.3 All bonds related to this Project shall be in the forms set forth in these Contract Documents and shall comply with all requirements of the Contract Documents, including, without limitation, the bond forms.

14. WARRANTY/GUARANTEE/INDEMNITY

14.1 Warranty/Guarantee

14.1.1 The Contractor shall obtain and preserve for the benefit of the District, manufacturer's warranties on materials, fixtures, and equipment incorporated into the Work.

14.1.2 In addition to guarantees required elsewhere, Contractor shall, and hereby does guarantee and warrant all Work furnished on the job against all defects for a period of **ONE (1)** year after the later of the following dates, unless a longer period is provided for in the Contract Documents:

14.1.2.1 The acceptance by the District, or its agent, of the Work, subject to these General Conditions, or

14.1.2.2 The date that commissioning for the Project, if any, was completed.

At the District's sole option, Contractor shall repair or replace any and all of that Work, together with any other Work that may be displaced in so doing, that may prove defective in workmanship and/or materials within a **ONE (1)** year period from date of completion as defined above, unless a longer period is provided for in the Contract Documents, without expense whatsoever to District. In the event of failure of Contractor and/or Surety to commence and pursue with diligence said replacements or repairs within ten (10) days after being notified in writing, Contractor and Surety hereby acknowledge and agree that District is authorized to proceed to have defects repaired and made good at expense of Contractor and/or Surety who hereby agree to pay costs and charges therefore immediately on demand.

14.1.3 If, in the opinion of District, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to District or to prevent interruption of operations of District, District will attempt to give the notice

required above. If Contractor or Surety cannot be contacted or neither complies with District's request for correction within a reasonable time as determined by District, District may, notwithstanding the above provision, proceed to make any and all corrections and/or provide attentions the District believes are necessary. The costs of correction or attention shall be charged against Contractor and Surety of the guarantees provided in this Article or elsewhere in this Contract.

14.1.4 The above provisions do not in any way limit the guarantees on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period. Contractor shall furnish to District all appropriate guarantee or warranty certificates as indicated in the Specifications or upon request by District.

14.1.5 Nothing herein shall limit any other rights or remedies available to District.

14.2 Indemnity and Defense

14.2.1 To the furthest extent permitted by California law, the Contractor shall indemnify, keep and hold harmless the District, the Architect, and the Construction Manager, their consultants and separate contractors, and their respective board members, officers, representatives, contractors, agents, and employees, in both individual and official capacities ("Indemnitees"), against all suits, claims, damages, losses, and expenses, including but not limited to attorney's fees, caused by, arising out of, resulting from, or incidental to, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers, except to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction, in which case the Contractor's indemnification and hold harmless obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability, and/or to any extent that would render these provisions void or unenforceable. This agreement and obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of indemnity that would otherwise exist as to any party or person described herein. This indemnification, and hold harmless obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the California Department of Industrial Relations.

14.2.2 Contractor shall also defend, at its own expense, Indemnitees against all suits, claims, allegations, damages, losses, and expenses, including but not limited to attorneys' fees, caused by, arising out of, resulting from, or incidental to, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers, except to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction, in which case the Contractor's defense obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability, and/or to any extent that would render these provisions void or unenforceable. The District shall have the right to accept or reject any legal representation that Contractor proposes to defend

the Indemnitees. This obligation of defense is inclusive of fees and costs. If the Indemnitees provide their own defense due to failure to timely respond to tender of defense, rejection of tender of defense, or conflict of interest of proposed counsel, Contractor shall reimburse Indemnitees for any expenditures, including reasonable attorney's fees and costs. This agreement and obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of defense that would otherwise exist as to any party or person described herein. This defense obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the California Department of Industrial Relations. The Contractor shall give prompt notice to the District in the event of any injury (including death), loss, or damage included herein.

14.2.3 Without limitation of the provisions herein, if the Contractor's agreement to indemnify and hold harmless the Indemnitees or its agreement to defend Indemnitees as provided herein shall be determined to be void or unenforceable, in whole or in part, it is the intention of the parties that these circumstances shall not otherwise affect the validity or enforceability of the Contractor's agreement to indemnify, defend, and hold harmless the rest of the Indemnitees, as provided herein. Further, the Contractor shall be and remain fully liable on its agreements and obligations herein to the fullest extent permitted by law.

14.2.4 Pursuant to Public Contract Code section 9201, the District shall provide timely notification to Contractor of the receipt of any third-party claim relating to this Contract. The District shall be entitled to recover its reasonable costs incurred in providing said notification.

14.2.5 In any and all claims against any of the Indemnitees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the Contractor's indemnification obligation herein shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

14.2.6 The District may retain so much of the moneys due the Contractor as shall be considered necessary, until disposition of any such suit, claims or actions for damages or until the District, Architect and Construction Manager have received written agreement from the Contractor that they will unconditionally defend the District, Architect and Construction Manager, their officers, agents and employees, and pay any damages due by reason of settlement or judgment.

14.2.7 The defense and indemnification obligations hereunder shall survive the completion of Work, including the warranty/guarantee period, and/or the termination of the Agreement.

15. TIME

15.1 Notice to Proceed

15.1.1 District may issue a Notice to Proceed within ninety (90) days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.

15.1.2 In the event that the District desires to postpone issuing the Notice to Proceed beyond ninety (90) days from the date of the Notice of Award, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed.

15.1.3 If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to Contractor, Contractor may terminate the Contract. Contractor's termination due to a postponement shall be by written notice to District within ten (10) days after receipt by Contractor of District's notice of postponement. It is further understood by Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement. Should Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.

15.2 Computation of Time / Adverse Weather

15.2.1 The Contractor will only be allowed a time extension for Adverse Weather conditions if requested by Contractor in compliance with the time extension request procedures and only if all of the following conditions are met:

15.2.1.1 The weather conditions constitute Adverse Weather, as defined herein and further specified in the Special Conditions;

15.2.1.2 Contractor can verify that the Adverse Weather caused delays in excess of five (5) hours of the indicated labor required to complete the scheduled tasks of Work on the day affected by the Adverse Weather;

15.2.1.3 The Contractor's crew is dismissed as a result of the Adverse Weather;

15.2.1.4 Said delay adversely affects the critical path in the Construction Schedule; and

15.2.1.5 Exceeds twelve (12) days of delay per year.

15.2.2 If the aforementioned conditions are met, a non-compensable day-for-day extension will only be allowed for those days in excess of those indicated in the Special Conditions.

15.2.3 The Contractor shall work seven (7) days per week, if necessary, irrespective of inclement weather, to maintain access and the Construction Schedule, and to protect the Work under construction from the effects of Adverse Weather, all at no further cost to the District.

15.2.4 The Contract Time has been determined with consideration given to the average climate weather conditions prevailing in the County in which the Project is located.

15.3 Hours of Work

15.3.1 Sufficient Forces

Contractor and Subcontractors shall continuously furnish sufficient and competent work forces with the required levels of familiarity with the Project and skill, training and experience to ensure the prosecution of the Work in accordance with the Construction Schedule.

15.3.2 Performance During Working Hours

Work shall be performed during regular working hours as permitted by the appropriate governmental agency except that in the event of an emergency, or when required to complete the Work in accordance with job progress, Work may be performed outside of regular working hours with the advance written consent of the District and approval of any required governmental agencies.

15.3.3 No Work during State Testing

Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking State or Federally-required tests. The District or District's Representative will provide Contractor with a schedule of test dates concurrent with the District's issuance of the Notice to Proceed, or as soon as test dates are made available to the District.

15.4 Progress and Completion

15.4.1 Time of the Essence

Time limits stated in the Contract Documents are of the essence to the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

15.4.2 No Commencement Without Insurance or Bonds

The Contractor shall not commence operations on the Project or elsewhere prior to the effective date of insurance and bonds. The date of commencement of the Work shall not be changed by the effective date of such insurance or bonds. If Contractor commences Work without insurance and bonds, all Work is performed at Contractor's peril and shall not be compensable until and unless Contractor secures bonds and insurance pursuant to the terms of the Contract Documents and subject to District claim for damages.

15.5 Schedule

Contractor shall provide to District, Construction Manager, and Architect a schedule in conformance with the Contract Documents and as required in the Notice to Proceed and the Contractor's Submittals and Schedules section of these General Conditions.

15.6 Expeditious Completion

The Contractor shall proceed expeditiously with adequate forces and shall achieve Completion within the Contract Time.

16. EXTENSIONS OF TIME – LIQUIDATED DAMAGES

16.1 Liquidated Damages

Contractor and District hereby agree that the exact amount of damages for failure to complete the Work within the time specified is extremely difficult or impossible to determine. If the Work is not completed within the time specified in the Contract Documents, it is understood that the District will suffer damage. It being impractical and unfeasible to determine the amount of actual damage, it is agreed the Contractor shall pay to District as fixed and liquidated damages, and not as a penalty, the amount set forth in the Agreement for each calendar day of delay in completion. Contractor and its Surety shall be liable for the amount thereof pursuant to Government Code section 53069.85.

16.2 Excusable Delay

16.2.1 Contractor shall not be charged for liquidated damages because of any delays in completion of Work which are not the fault of Contractor or its Subcontractors, including acts of God as defined in Public Contract Code section 7105, acts of enemy, epidemics, and quarantine restrictions. Contractor shall, within five (5) calendar days of beginning of any delay, notify District in writing of causes of delay including documentation and facts explaining the delay and the direct correlation between the cause and effect. District shall review the facts and extent of any delay and shall grant extension(s) of time for completing Work when, in its judgment, the findings of fact justify an extension. Extension(s) of time shall apply only to that portion of Work affected by delay, and shall not apply to other portions of Work not so affected. An extension of time may only be granted if Contractor has timely submitted the Construction Schedule as required herein.

16.2.2 Contractor shall notify the District pursuant to the claims provisions in these General Conditions of any anticipated delay and its cause. Following submission of a claim, the District may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work might be delayed thereby.

16.2.3 In the event the Contractor requests an extension of Contract Time for unavoidable delay, such request shall be submitted in accordance with the provisions in the Contract Documents governing changes in Work. When requesting time, requests must be submitted with full justification and documentation. If the Contractor fails to submit justification, it waives its right to a time extension at a later date. Such justification must be based on the official Construction Schedule as

updated at the time of occurrence of the delay or execution of Work related to any changes to the Scope of Work. Any claim for delay must include the following information as support, without limitation:

16.2.3.1 The duration of the activity relating to the changes in the Work and the resources (manpower, equipment, material, etc.) required to perform the activities within the stated duration.

16.2.3.2 Specific logical ties to the Contract Schedule for the proposed changes and/or delay showing the activity/activities in the Construction Schedule that are affected by the change and/or delay. In particular, Contractor must show an actual impact to the schedule, after making a good faith effort to mitigate the delay by rescheduling the work, by providing an analysis of the schedule ("Schedule Analysis"). Such Schedule Analysis shall describe in detail the cause and effect of the delay and the impact on the critical dates in the Project schedule. (A portion of any delay of seven (7) days or more must be provided.)

16.2.3.3 A recovery schedule must be submitted within twenty (20) calendar days of written notification to the District of causes of delay.

16.3 No Additional Compensation for Delays Within Contractor's Control

16.3.1 Contractor is aware that governmental agencies, including, without limitation, the Division of the State Architect, the Department of General Services, gas companies, electrical utility companies, water districts, and other agencies may have to approve Contractor-prepared drawings or approve a proposed installation. Accordingly, Contractor shall include in its bid, time for possible review of its drawings and for reasonable delays and damages that may be caused by such agencies. Thus, Contractor is not entitled to make a claim for damages or delays arising from the review of Contractor's drawings.

16.3.2 Contractor shall only be entitled to compensation for delay when all of the following conditions are met:

16.3.2.1 The District is responsible for the delay;

16.3.2.2 The delay is unreasonable under the circumstances involved;

16.3.2.3 The delay was not within the contemplation of the District and Contractor; and

16.3.2.4 Contractor timely complies with the claims procedure of the Contract Documents.

16.4 Float or Slack in the Schedule

Float or slack is the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule. Float or slack is not for the exclusive use of or benefit of either the District or the Contractor, but its use shall be determined solely by the District.

17. CHANGES IN THE WORK

17.1 No Changes Without Authorization

17.1.1 There shall be no change whatsoever in the Drawings, Specifications, or in the Work without an executed Change Order or a written Construction Change Directive authorized by the District as herein provided. District shall not be liable for the cost of any extra work or any substitutions, changes, additions, omissions, or deviations from the Drawings and Specifications unless the District's governing board has authorized the same and the cost thereof has been approved in writing by Change Order or Construction Change Directive in advance of the changed Work being performed. No extension of time for performance of the Work shall be allowed hereunder unless claim for such extension is made at the time changes in the Work are ordered, and such time duly adjusted and approved in writing in the Change Order or Construction Change Directive. Contractor shall be responsible for any costs incurred by the District for professional services and DSA fees and/or delay to the Project Schedule, if any, for DSA to review any request for changes to the DSA approved plans and specifications for the convenience of the Contractor and/or to accommodate the Contractor's means and methods. The provisions of the Contract Documents shall apply to all such changes, additions, and omissions with the same effect as if originally embodied in the Drawings and Specifications.

17.1.2 Contractor shall perform immediately all work that has been authorized by a fully executed Change Order or Construction Change Directive. Contractor shall be fully responsible for any and all delays and/or expenses caused by Contractor's failure to expeditiously perform this Work.

17.1.3 Should any Change Order result in an increase in the Contract Price or extend the Contract Time, the cost of or length of extension in that Change Order shall be agreed to, in writing, by the District in advance of the Work by Contractor, and shall be subject to the monetary limitations set forth in Public Contract Code section 20118.4. In the event that Contractor proceeds with any change in Work without a Change Order executed by the District or Construction Change Directive, Contractor waives any claim of additional compensation or time for that additional work. Under no circumstances shall Contractor be entitled to any claim of additional compensation or time not expressly requested by Contractor in a Proposed Change Order or approved by District in an executed Change Order.

17.1.4 Contractor understands, acknowledges, and agrees that the reason for District authorization is so that District may have an opportunity to analyze the Work and decide whether the District shall proceed with the Change Order or alter the Project so that a change in Work becomes unnecessary.

17.2 Architect Authority

The Architect will have authority to order minor changes in the Work not involving any adjustment in the Contract Price, or an extension of the Contract Time, or a change that is inconsistent with the intent of the Contract Documents. These changes shall be effected by written Change Order, Construction Change Directive, by Architect's response(s) to RFI(s), or by Architect's Supplemental Instructions ("ASI").

17.3 Change Orders

17.3.1 A Change Order is a written instrument prepared and issued by the District and/or the Architect and signed by the District (as authorized by the District's Governing Board), the Contractor, the Architect, and approved by the Project Inspector (if necessary) and DSA (if necessary), stating their agreement regarding all of the following:

17.3.1.1 A description of a change in the Work;

17.3.1.2 The amount of the adjustment in the Contract Price, if any; and

17.3.1.3 The extent of the adjustment in the Contract Time, if any.

17.4 Construction Change Directives

17.4.1 A Construction Change Directive is a written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work. The District may, as provided by law, by Construction Change Directive and without invalidating the Contract, order changes in the Work consisting of additions, deletions, or other revisions. The adjustment to the Contract Price or Time, if any, is subject to the provisions of this section regarding Changes in the Work. If all or a portion of the Project is being funded by funds requiring approval by the State Allocation Board ("SAB"), these revisions may be subject to compensation once approval of same is received and funded by the SAB, and funds are released by the Office of Public School Construction ("OPSC"). Any dispute as to the adjustment in the Contract Price, if any, of the Construction Change Directive or timing of payment shall be resolved pursuant to the Payment and Claims and Disputes provisions herein.

17.4.2 The District may issue a Construction Change Directive in the absence of agreement on the terms of a Change Order.

17.5 Force Account Directives

17.5.1 When work, for which a definite price has not been agreed upon in advance, is to be paid for on a force account basis, all direct costs necessarily incurred and paid by the Contractor for labor, material, and equipment used in the performance of that Work, shall be subject to the approval of the District and compensation will be determined as set forth herein.

17.5.2 The District will issue a Force Account Directive to proceed with the Work on a force account basis, and a not-to-exceed budget will be established by the District.

17.5.3 All requirements regarding direct cost for labor, labor burden, material, equipment, and markups on direct costs for overhead and profit described in this section shall apply to Force Account Directives. However, the District will only pay for actual costs verified in the field by the District or its authorized representative(s) on a daily basis.

17.5.4 The Contractor shall be responsible for all cost related to the administration of Force Account Directive. The markup for overhead and profit for Contractor modifications shall be full compensation to the Contractor to administer Force Account Directive, and Contractor shall not be entitled to separately recover additional amounts for overhead and/or profit.

17.5.5 The Contractor shall notify the District or its authorized representative(s) at least twenty-four (24) hours prior to proceeding with any of the force account work. Furthermore, the Contractor shall notify the District when it has consumed eighty percent (80%) of the budget, and shall not exceed the budget unless specifically authorized in writing by the District. The Contractor will not be compensated for force account work in the event that the Contractor fails to timely notify the District regarding the commencement of force account work, or exceeding the force account budget.

17.5.6 The Contractor shall diligently proceed with the work, and on a daily basis, submit a daily force account report on a form supplied by the District no later than 5:00 p.m. each day. The report shall contain a detailed itemization of the daily labor, material, and equipment used on the force account work only. The names of the individuals performing the force account work shall be included on the daily force account reports. The type and model of equipment shall be identified and listed. The District will review the information contained in the reports, and sign the reports no later than the next work day, and return a copy of the report to the Contractor for their records. The District will not sign, nor will the Contractor receive compensation for work the District cannot verify. The Contractor will provide a weekly force account summary indicating the status of each Force Account Directive in terms of percent complete of the not-to-exceed budget and the estimated percent complete of the work.

17.5.7 In the event the Contractor and the District reach a written agreement on a set cost for the work while the work is proceeding based on a Force Account Directive, the Contractor's signed daily force account reports shall be discontinued and all previously signed reports shall be invalid.

17.6 Price Request

17.6.1 Definition of Price Request

A Price Request ("PR") is a written request prepared by the Architect requesting the Contractor to submit to the District and the Architect an estimate of the effect of a proposed change in the Work on the Contract Price and the Contract Time.

17.6.2 Scope of Price Request

A Price Request shall contain adequate information, including any necessary Drawings and Specifications, to enable Contractor to provide the cost breakdowns required herein. The Contractor shall not be entitled to any additional compensation for preparing a response to a Price Request, whether ultimately accepted or not.

17.7 Proposed Change Order

17.7.1 Definition of Proposed Change Order

A Proposed Change Order ("PCO") is a written request prepared by the Contractor requesting that the District and the Architect issue a Change Order based upon a proposed change to the Work.

17.7.2 Changes in Contract Price

A PCO shall include breakdowns and backup documentation pursuant to the revisions herein and sufficient, in the District's judgment, to validate any change in Contract Price. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional compensation for Change Order Work.

17.7.3 Changes in Time

A PCO shall also include any changes in time required to complete the Project. Any additional time requested shall not be the number of days to make the proposed change, but must be based upon the impact to the Construction Schedule as defined in the Contract Documents. If Contractor fails to request a time extension in a PCO, then the Contractor is thereafter precluded from requesting, and waives any right to request, additional time and/or claim a delay. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional time for Change Order Work. A PCO that leaves the amount of time requested blank, or states that such time requested is "to be determined", is not permitted and shall also constitute a waiver of any right to request additional time and/or claim a delay.

17.7.4 Unknown and/or Unforeseen Conditions

If there is an Allowance, then Contractor must submit a Request for Allowance Expenditure Directive, including supporting documentation as described below, to receive authorization for the release of funds from the Allowance. If cost of the unforeseen condition(s) exceed the Allowance, Contractor must submit a PCO requesting an increase in Contract Price and/or Contract Time that is based at least partially on Contractor's assertion that Contractor has encountered unknown and/or unforeseen condition(s) on the Project, then Contractor shall base the PCO on provable information that, beyond a reasonable doubt and to the District's satisfaction, demonstrates that the unknown and/or unforeseen condition(s) were actually unknown and/or unforeseen and that the condition(s) were reasonably unknown and/or unforeseen. If not, the District shall deny the PCO as unsubstantiated, and the Contractor shall complete the Project without any increase in Contract Price and/or Contract Time based on that PCO.

17.7.5 Proposed Change Order Certification

In submitting a PCO, Contractor certifies and affirms that the cost and/or time request is submitted in good faith, that the cost and/or time request is accurate and in accordance with the provisions of the Contract Documents, and the Contractor submits the cost and/or request for extension of time recognizing the significant civil penalties and treble damages which follow from making a false claim or presenting a false claim under Government Code section 12650 et seq.

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17.8 Format for Proposed Change Order

17.8.1 The following format shall be used as applicable by the District and the Contractor (e.g. Change Orders, PCO's) to communicate proposed additions and deductions to the Contract, supported by attached documentation. Any spaces left blank will be deemed no change to cost or time.

	WORK PERFORMED OTHER THAN BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach suppliers' invoice or itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add overhead and profit for any and all tiers of Subcontractor**, the total not to exceed ten percent (10%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Overhead and Profit for Contractor**, not to exceed five percent (5%) of Item (f)		
(h)	**Subtotal**		
(i)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (h)		
(j)	**TOTAL**		
(k)	**Time** (zero unless indicated; "TBD" not permitted)	**_____ Calendar Days**	

	WORK PERFORMED BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add Overhead and Profit for Contractor**, not to exceed fifteen percent (15%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (f)		
(h)	**TOTAL**		
(i)	**Time** (zero unless indicated; "TBD" not permitted)	**_____ Calendar Days**	

17.8.2 Labor. Contractor shall be compensated for the costs of labor actually and directly utilized in the performance of the Work. Such labor costs shall be limited to field labor for which there is a prevailing wage rate classification. Wage rates for labor shall not exceed the prevailing wage rates in the locality of the Site and shall be in the labor classification(s) necessary for the performance of the Work.

Labor costs shall exclude costs incurred by the Contractor in preparing estimate(s) of the costs of the change in the Work, in the maintenance of records relating to the costs of the change in the Work, coordination and assembly of materials and information relating to the change in the Work or performance thereof, or the supervision and other overhead and general conditions costs associated with the change in the Work or performance thereof, including but not limited to the cost for the job superintendent.

17.8.3 Materials. Contractor shall be compensated for the costs of materials necessarily and actually used or consumed in connection with the performance of the change in the Work. Costs of materials may include reasonable costs of transportation from a source closest to the Site of the Work and delivery to the Site. If discounts by material suppliers are available for materials necessarily used in the performance of the change in the Work, they shall be credited to the District. If materials necessarily used in the performance of the change in the Work are obtained from a supplier or source owned in whole or in part by the Contractor, compensation therefor shall not exceed the current wholesale price for such materials. If, in the reasonable opinion of the District, the costs asserted by the Contractor for materials in connection with any change in the Work are excessive, or if the Contractor fails to provide satisfactory evidence of the actual costs of such materials from its supplier or vendor of the same, the costs of such materials and the District's obligation to pay for the same shall be limited to the then lowest wholesale price at which similar materials are available in the quantities required to perform the change in the Work. The District may elect to furnish materials for the change in the Work, in which event the Contractor shall not be compensated for the costs of furnishing such materials or any mark-up thereon.

17.8.4 Equipment. As a precondition to the District's duty to pay for Equipment rental or loading and transportation, Contractor shall provide satisfactory evidence of the actual costs of Equipment from the supplier, vendor or rental agency of same. Contractor shall be compensated for the actual cost of the necessary and direct use of Equipment in the performance of the change in the Work. Use of such Equipment in the performance of the change in the Work shall be compensated in increments of fifteen (15) minutes. Rental time for Equipment moved by its own power shall include time required to move such Equipment to the site of the Work from the nearest available rental source of the same. If Equipment is not moved to the Site by its own power, Contractor will be compensated for the loading and transportation costs in lieu of rental time. The foregoing notwithstanding, neither moving time or loading and transportation time shall be allowed if the Equipment is used for performance of any portion of the Work other than the change in the Work. Unless prior approval in writing is obtained by the Contractor from the Architect, the Project Inspector and the District, no costs or compensation shall be allowed for time while Construction Equipment is inoperative, idle or on standby, for any reason. Contractor shall not be entitled to an allowance or any other compensation for Equipment or tools used in the performance of change in the Work where such Equipment or tools have a replacement value of $500.00 or less. Equipment costs claimed by the Contractor in connection with the performance of any Work shall not exceed rental rates established by distributors or construction equipment rental agencies in the locality of the Site; any costs asserted which exceed such rental rates shall not be allowed or paid. Unless otherwise specifically approved in writing by the Architect, the Project Inspector and the District, the allowable rate for the use of Equipment in connection with the Work shall constitute full compensation to the

Contractor for the cost of rental, fuel, power, oil, lubrication, supplies, necessary attachments, repairs or maintenance of any kind, depreciation, storage, insurance, labor (exclusive of labor costs of the Equipment operator), and any and all other costs incurred by the Contractor incidental to the use of such Equipment.

17.8.5 Overhead and Profit. The phrase "Overhead and Profit" shall include field and office supervisors and assistants, watchperson, use of small tools, consumable, insurance other than construction bonds and insurance required herein, and general field and home office expenses.

17.9 Change Order Certification

17.9.1 All Change Orders and PCOs must include the following certification by the Contractor:

17.9.1.1 The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the District.

17.9.1.2 It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

17.10 Determination of Change Order Cost

17.10.1 The amount of the increase or decrease in the Contract Price from a Change Order, if any, shall be determined in one or more of the following ways as applicable to a specific situation and at the District's discretion:

17.10.1.1 District acceptance of a PCO;

17.10.1.2 By unit prices contained in Contractor's original bid;

17.10.1.3 By agreement between District and Contractor.

17.11 Deductive Change Orders

All deductive Change Order(s) must be prepared pursuant to the provisions herein. Where a portion of the Work is deleted from the Contract, the reasonable value of the deducted work less the value of work performed shall be considered the appropriate deduction. The value submitted on the Schedule of Values shall be used to calculate the credit amount unless the bid documentation is being held in escrow as part of the

Contract Documents. Unit Prices, if any, may be used in District's discretion in calculating reasonable value. If Contractor offers a proposed amount for a deductive Change Order(s), Contractor shall include a minimum of five percent (5%) total profit and overhead to be deducted with the amount of the work of the Change Order(s). If Subcontractor work is involved, Subcontractors shall also include a minimum of five percent (5%) profit and overhead to be deducted with the amount of its deducted work. Any deviation from this provision shall not be allowed.

17.12 Addition or Deletion of Alternate Bid Item(s)

If the Bid Form and Proposal includes proposal(s) for Alternate Bid Item(s), during Contractor's performance of the Work, the District may elect to add or delete any such Alternate Bid Item(s) if not included in the Contract at the time of award. If the District elects to add or delete Alternate Bid Item(s) after Contract award, the cost or credit for such Alternate Bid Item(s) shall be as set forth in the Bid Form and Proposal unless the parties agree to a different price and the Contract Time shall be adjusted by the number of days allocated in the Contract Documents. If days are not allocated in the Contract Documents, the Contract Time shall be equitably adjusted.

17.13 Discounts, Rebates, and Refunds

For purposes of determining the cost, if any, of any change, addition, or omission to the Work hereunder, all trade discounts, rebates, refunds, and all returns from the sale of surplus materials and equipment shall accrue and be credited to the Contractor, and the Contractor shall make provisions so that such discounts, rebates, refunds, and returns may be secured, and the amount thereof shall be allowed as a reduction of the Contractor's cost in determining the actual cost of construction for purposes of any change, addition, or omission in the Work as provided herein.

17.14 Accounting Records

With respect to portions of the Work performed by Change Orders and Construction Change Directives, the Contractor shall keep and maintain cost-accounting records satisfactory to the District, including, without limitation, Job Cost Reports as provided in these General Conditions, which shall be available to the District on the same terms as any other books and records the Contractor is required to maintain under the Contract Documents. Such records shall include without limitation hourly records for Labor and Equipment and itemized records of materials and Equipment used that day in connection with the performance of any Work. All records maintained hereunder shall be subject to inspection, review and/or reproduction by the District, the Architect or the Project Inspector upon request. In the event that the Contractor fails or refuses, for any reason, to maintain or make available for inspection, review and/or reproduction such records, the District's reasonable good faith determination of the extent of adjustment to the Contract Price shall be final, conclusive, dispositive and binding upon Contractor.

17.15 Notice Required

If the Contractor desires to make a claim for an increase in the Contract Price, or any extension in the Contract Time for completion, it shall notify the District pursuant to the provisions herein, including the Article on Claims and Disputes. No claim shall be considered unless made in accordance with this subparagraph. Contractor shall proceed to execute the Work even though the adjustment may not have been agreed upon. Any

change in the Contract Price or extension of the Contract Time resulting from such claim shall be authorized by a Change Order.

17.16 Applicability to Subcontractors

Any requirements under this Article shall be equally applicable to Change Orders or Construction Change Directives issued to Subcontractors by the Contractor to the extent as required by the Contract Documents.

17.17 Alteration to Change Order Language

Contractor shall not alter Change Orders or reserve time in Change Orders. Change Orders altered in violation of this provision, if in conflict with the terms set forth herein, shall be construed in accordance with the terms set forth herein. Contractor shall execute finalized Change Orders and proceed under the provisions herein with proper notice.

17.18 Failure of Contractor to Execute Change Order

Contractor shall be in default of the Contract if Contractor fails to execute a Change Order when the Contractor agrees with the addition and/or deletion of the Work in that Change Order.

18. REQUEST FOR INFORMATION

18.1 Any Request for Information shall reference all applicable Contract Document(s), including Specification section(s), detail(s), page number(s), drawing number(s), and sheet number(s), etc. The Contractor shall make suggestions and interpretations of the issue raised by each Request for Information. A Request for Information cannot modify the Contract Price, Contract Time, or the Contract Documents. Upon request by the District, Contractor shall provide an electronic copy of the Request for Information in addition to the hard copy.

18.2 The Contractor shall be responsible for any costs incurred for professional services that District may deduct from any amounts owing to the Contractor, if a Request for Information requests an interpretation or decision of a matter where the information sought is equally available to the party making the request. District, at its sole discretion, shall deduct from and/or invoice Contractor for all the professional services arising herein.

19. PAYMENTS

19.1 Contract Price

The Contract Price is stated in the Agreement and, including authorized adjustments, is the total amount payable by the District to the Contractor for performance of the Work under the Contract Documents.

19.2 Applications for Progress Payments

19.2.1 Procedure for Applications for Progress Payments

19.2.1.1 Application for Progress Payment

19.2.1.1.1 Not before the fifth (5th) day of each calendar month during the progress of the Work, Contractor shall submit to the District and the Architect an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be notarized, if required, and supported by the following or each portion thereof unless waived by the District in writing:

19.2.1.1.1.1 The amount paid to the date of the Application to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;

19.2.1.1.1.2 The amount being requested under the Application for Payment by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;

19.2.1.1.1.3 The balance that will be due to each of such entities after said payment is made;

19.2.1.1.1.4 A certification that the As-Built Drawings and annotated Specifications are current;

19.2.1.1.1.5 Itemized breakdown of work done for the purpose of requesting partial payment;

19.2.1.1.1.6 An updated and acceptable construction schedule in conformance with the provisions herein;

19.2.1.1.1.7 The additions to and subtractions from the Contract Price and Contract Time;

19.2.1.1.1.8 A total of the retentions held;

19.2.1.1.1.9 Material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the District may require from time to time;

19.2.1.1.1.10 The percentage of completion of the Contractor's Work by line item;

19.2.1.1.1.11 Schedule of Values updated from the preceding Application for Payment;

19.2.1.1.1.12 A duly completed and executed conditional waiver and release upon progress payment compliant with Civil Code section 8132 from the Contractor and each subcontractor of any tier and supplier to be paid from the current progress payment;

19.2.1.1.1.13 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134

from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payment(s); and

19.2.1.1.1.14 A certification by the Contractor of the following:

The Contractor warrants title to all Work performed as of the date of this payment application has been completed in accordance with the Contract Documents for the Project. The Contractor further warrants that all amounts have been paid for work which previous Certificates for Payment were issued and payments received and all Work performed as of the date of this payment application is free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, workers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work, except those of which the District has been informed. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq.

19.2.1.1.1.15 The Contractor shall be subject to the False Claims Act set forth in Government Code section 12650 et seq. for information provided with any Application for Progress Payment.

19.2.1.1.1.16 All remaining certified payroll records ("CPR(s)") for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work for the period of the Application for Payment. As indicated herein, the District shall not make any payment to Contractor until:

19.2.1.1.1.16.1 Contractor and/or its Subcontractor(s) provide electronic CPRs weekly for all weeks any journeyman, apprentice, worker or other employee was employed in connection with the Work directly to the DIR, or within ten (10) days of any request by the District or the DIR, and

19.2.1.1.1.16.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs in a timely manner may directly delay the Contractor's payment.

19.2.1.1.2 Applications received after June 20th will not be paid until the second week of July and applications received after December 12th will not be paid until the first week of January.

19.2.2 <u>Prerequisites for Progress Payments</u>

19.2.2.1 <u>First Payment Request</u>: The following items, if applicable, must be completed before the District will accept and/or process the Contractor's first payment request:

19.2.2.1.1 Installation of the Project sign;

19.2.2.1.2 Installation of field office;

19.2.2.1.3 Installation of temporary facilities and fencing;

19.2.2.1.4 Schedule of Values;

19.2.2.1.5 Contractor's Construction Schedule;

19.2.2.1.6 Schedule of unit prices, if applicable;

19.2.2.1.7 Submittal Schedule;

19.2.2.1.8 Receipt by Architect of all submittals due as of the date of the payment application;

19.2.2.1.9 Copies of necessary permits;

19.2.2.1.10 Copies of authorizations and licenses from governing authorities;

19.2.2.1.11 Initial progress report;

19.2.2.1.12 Surveyor qualifications;

19.2.2.1.13 Written acceptance of District's survey of rough grading, if applicable;

19.2.2.1.14 List of all Subcontractors, with names, license numbers, telephone numbers, and Scope of Work;

19.2.2.1.15 All bonds and insurance endorsements; and

19.2.2.1.16 Resumes of Contractor's project manager, and if applicable, job site secretary, record documents recorder, and job site superintendent.

19.2.2.2 Second Payment Request: The District will not process the second payment request until and unless all submittals and Shop Drawings have been accepted for review by the Architect.

19.2.2.3 No Waiver of Criteria: Any payments made to Contractor where criteria set forth herein have not been met shall not constitute a waiver of said criteria by District. Instead, such payment shall be construed as a good faith effort by District to resolve differences so Contractor may pay its Subcontractors and suppliers. Contractor agrees that failure to submit such items may constitute a breach of contract by Contractor and may subject Contractor to termination.

19.3 Progress Payments

19.3.1 District's Approval of Application for Payment

19.3.1.1 Upon receipt of an Application for Payment, The District shall act in accordance with both of the following:

19.3.1.1.1 Each Application for Payment shall be reviewed by the District as soon as practicable after receipt for the purpose of determining that the Application for Payment is a proper Application for Payment.

19.3.1.1.2 Any Application for Payment determined not to be a proper Application for Payment suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) days, after receipt. An Application for Payment returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the Application for Payment is not proper. The number of days available to the District to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the District exceeds this seven-day return requirement.

19.3.1.1.3 An Application for Payment shall be considered properly executed if funds are available for payment of the Application for Payment, and payment is not delayed due to an audit inquiry by the financial officer of the District.

19.3.1.2 The District's review of the Contractor's Application for Payment will be based on the District's and the Architect's observations at the Site and the data comprising the Application for Payment that the Work has progressed to the point indicated and that, to the best of the District's and the Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to:

19.3.1.2.1 Observation of the Work for general conformance with the Contract Documents,

19.3.1.2.2 Results of subsequent tests and inspections,

19.3.1.2.3 Minor deviations from the Contract Documents correctable prior to completion, and

19.3.1.2.4 Specific qualifications expressed by the Architect.

19.3.1.3 District's approval of the certified Application for Payment shall be based on Contractor complying with all requirements for a fully complete and valid certified Application for Payment.

19.3.2 Payments to Contractor

19.3.2.1 Within thirty (30) days after approval of the Application for Payment, Contractor shall be paid a sum equal to ninety-five percent (95%) of the value of the Work performed (as verified by Architect and Inspector and certified by Contractor) up to the last day of the previous month, less the aggregate of previous payments and amount to be withheld. The value of the Work completed shall be Contractor's best estimate. No inaccuracy or error in said estimate shall operate to release the Contractor, or any Surety upon any bond, from damages arising from such Work, or from the District's right to enforce each and every provision of this Contract, and the District shall have the right subsequently to correct any error made in any estimate for payment.

19.3.2.2 The Contractor shall not be entitled to have any payment requests processed, or be entitled to have any payment made for Work performed, so long as any lawful or proper direction given by the District concerning the Work, or any portion thereof, remains incomplete.

19.3.2.3 If the District fails to make any progress payment within thirty (30) days after receipt of an undisputed and properly submitted Application for Payment from the Contractor, the District shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure.

19.3.3 No Waiver

No payment by District hereunder shall be interpreted so as to imply that District has inspected, approved, or accepted any part of the Work. Notwithstanding any payment, the District may enforce each and every provision of this Contract. The District may correct or require correction of any error subsequent to any payment.

19.4 Decisions to Withhold Payment

19.4.1 Reasons to Withhold Payment

The District may withhold payment in whole, or in part, to the extent reasonably necessary to protect the District if, in the District's opinion, the representations to the District required herein cannot be made. The District may withhold payment, in whole, or in part, to such extent as may be necessary to protect the District from loss because of, but not limited to any of the following:

19.4.1.1 Defective Work not remedied within **FORTY-EIGHT (48)** hours of written notice to Contractor.

19.4.1.2 Stop Payment Notices or other liens served upon the District as a result of the Contract. Contractor agrees that the District may withhold up to 125% of the amount claimed in the Stop Payment Notice to answer the claim and to provide for the District's reasonable cost of any litigation pursuant to the stop payment notice.

19.4.1.3 Liquidated damages assessed against the Contractor.

19.4.1.4 The cost of completion of the Contract if there exists a reasonable doubt that the Work can be completed for the unpaid balance of the Contract Price or by the completion date.

19.4.1.5 Damage to the District or other contractor(s).

19.4.1.6 Unsatisfactory prosecution of the Work by the Contractor.

19.4.1.7 Failure to store and properly secure materials.

19.4.1.8 Failure of the Contractor to submit, on a timely basis, proper, sufficient, and acceptable documentation required by the Contract Documents, including, without limitation, a Construction Schedule, Schedule of Submittals,

Schedule of Values, Monthly Progress Schedules, Shop Drawings, Product Data and samples, Proposed product lists, executed Change Orders, and/or verified reports.

19.4.1.9 Failure of the Contractor to maintain As-Built Drawings.

19.4.1.10 Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment.

19.4.1.11 Unauthorized deviations from the Contract Documents.

19.4.1.12 Failure of the Contractor to prosecute the Work in a timely manner in compliance with the Construction Schedule, established progress schedules, and/or completion dates.

19.4.1.13 Failure to provide acceptable electronic certified payroll records, as required by the Labor Code, by these Contract Documents, or by written request; for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or by each Subcontractor in connection with the Work for the period of the Application for Payment or if payroll records are delinquent or inadequate.

19.4.1.14 Failure to properly pay prevailing wages as required in Labor Code section 1720 et seq., failure to comply with any other Labor Code requirements, and/or failure to comply with labor compliance monitoring and enforcement by the DIR.

19.4.1.15 Allowing an unregistered subcontractor, as described in Labor Code section 1725.5, to engage in the performance of any work under this Contract.

19.4.1.16 Failure to comply with any applicable federal statutes and regulations regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon Act and related requirements, Contract Work Hours and Safety Standards Act requirements, if applicable.

19.4.1.17 Failure to properly maintain or clean up the Site.

19.4.1.18 Failure to timely indemnify, defend, or hold harmless the District.

19.4.1.19 Any payments due to the District, including but not limited to payments for failed tests, utilities changes, or permits.

19.4.1.20 Failure to pay Subcontractor(s) or supplier(s) as required by law and by the Contract Documents.

19.4.1.21 Failure to pay any royalty, license or similar fees.

19.4.1.22 Contractor is otherwise in breach, default, or in substantial violation of any provision of this Contract.

19.4.1.23 Failure to perform any implementation and/or monitoring required by any SWPPP for the Project and/or the imposition of any penalties or fines therefore whether imposed on the District or Contractor.

19.4.2 Reallocation of Withheld Amounts

19.4.2.1 District may, in its discretion, apply any withheld amount to pay outstanding claims or obligations as defined herein. In so doing, District shall make such payments on behalf of Contractor. If any payment is so made by District, then that amount shall be considered a payment made under Contract by District to Contractor and District shall not be liable to Contractor for any payment made in good faith. These payments may be made without prior judicial determination of claim or obligation. District will render Contractor an accounting of funds disbursed on behalf of Contractor.

19.4.2.2 If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to perform any provision thereof, District may, after **FORTY-EIGHT (48)** hours' written notice to the Contractor and, without prejudice to any other remedy, make good such deficiencies. The District shall adjust the total Contract Price by reducing the amount thereof by the cost of making good such deficiencies. If District deems it inexpedient to correct Work that is damaged, defective, or not done in accordance with Contract provisions, an equitable reduction in the Contract Price (of at least one hundred fifty percent (150%) of the estimated reasonable value of the nonconforming Work) shall be made therefor.

19.4.3 Payment After Cure

When Contractor removes the grounds for declining approval, payment shall be made for amounts withheld because of them. No interest shall be paid on any retainage or amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

19.5 Subcontractor Payments

19.5.1 Payments to Subcontractors

No later than seven (7) days after receipt, or pursuant to Business and Professions Code section 7108.5 and Public Contract Code section 7107, the Contractor shall pay to each Subcontractor, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to its Sub-subcontractors in a similar manner.

19.5.2 No Obligation of District for Subcontractor Payment

The District shall have no obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.

19.5.3 Joint Checks

District shall have the right in its sole discretion, if necessary for the protection of the District, to issue joint checks made payable to the Contractor and Subcontractors and/or material or equipment suppliers. The joint check payees shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. In no event shall any joint check payment be construed to create any contract between the District and a Subcontractor of any tier, or a material or equipment supplier, any obligation from the District to such Subcontractor or a material or equipment supplier, or rights in such Subcontractor or a material or equipment supplier against the District.

20. COMPLETION OF THE WORK

20.1 Completion

20.1.1 District will accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District.

20.1.2 The Work may only be accepted as complete by action of the governing board of the District.

20.1.3 District, at its sole option, may accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District, except for minor corrective items, as distinguished from incomplete items. If Contractor fails to complete all minor corrective items within fifteen (15) days after the date of the District's acceptance of completion, District shall withhold from the final payment one hundred fifty percent (150%) of an estimate of the amount sufficient to complete the corrective items, as determined by District, until the item(s) are completed.

20.1.4 At the end of the 15-day period, if there are any items remaining to be corrected, District may elect to proceed as provided herein related to adjustments to Contract Price, and/or District's right to perform the Work of the Contractor.

20.2 Close-Out/Certification Procedures

20.2.1 Punch List

The Contractor shall notify the Architect when Contractor considers the Work complete. Upon notification, Architect will prepare a list of minor items to be completed or corrected ("Punch List"). The Contractor and/or its Subcontractors shall proceed promptly to complete and correct items on the Punch List. Failure to include an item on Punch List does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

20.2.2 Close-Out/Certification Requirements

20.2.2.1 Utility Connections

Buildings shall be connected to water, gas, sewer, and electric services, complete and ready for use. Service connections shall be made and existing services reconnected.

20.2.2.2 Record Drawings and Record Specifications

20.2.2.2.1 Contractor shall provide exact Record Drawings of the Work ("As-Builts") and Record Specifications upon completion of the Project and as a condition precedent to approval of final payment.

20.2.2.2.2 Contractor shall obtain the Inspector's approval of the corrected prints and employ a competent draftsman to transfer the Record Drawings information to the most current version of AutoCAD that is, at that time, currently utilized for plan check submission by either the District, the Architect, OPSC, and/or DSA, and print a complete set of transparent sepias. When completed, Contractor shall deliver corrected sepias and diskette/CD/other data storage device acceptable to District with AutoCAD file to the District.

20.2.2.2.3 Contractor is liable and responsible for any and all inaccuracies in the Record Drawings and Record Specifications, even if inaccuracies become evident at a future date.

20.2.2.3 Maintenance Manuals: Contractor shall prepare all operation and maintenance manuals and date as indicated in the Specifications.

20.2.2.4 Source Programming: Contractor shall provide all source programming for all items in the Project.

20.2.2.5 Verified Reports: Contractor shall completely and accurately fill out and file forms DSA 6-C or DSA 152 (or current form), as appropriate. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

20.3 Final Inspection

20.3.1 Contractor shall comply with Punch List procedures as provided herein, and maintain the presence of a Project Superintendent and Project Manager until the Punch List is complete to ensure proper and timely completion of the Punch List. Under no circumstances shall Contractor demobilize its forces prior to completion of the Punch List without District's prior written approval. Upon receipt of Contractor's written notice that all of the Punch List items have been fully completed and the Work is ready for final inspection and acceptance, Architect and Project Inspector will inspect the Work and shall submit to Contractor and District a final inspection report noting the Work, if any, required in order to complete in accordance with the Contract Documents. Absent unusual circumstances, this report shall consist of the Punch List items not yet satisfactorily completed.

20.3.2 Upon Contractor's completion of all items on the Punch List and any other uncompleted portions of the Work, the Contractor shall notify the District and Architect, who shall again inspect such Work. If the Architect finds the Work complete and acceptable under the Contract Documents, the Architect will notify Contractor, who shall then jointly submit to the Architect and the District its final Application for Payment.

20.3.3 Final Inspection Requirements

20.3.3.1 Before calling for final inspection, Contractor shall determine that the following have been performed:

20.3.3.1.1 The Work has been completed.

20.3.3.1.2 All life safety items are completed and in working order.

20.3.3.1.3 Mechanical and electrical Work are complete and tested, fixtures are in place, connected, and ready for tryout.

20.3.3.1.4 Electrical circuits scheduled in panels and disconnect switches labeled.

20.3.3.1.5 Painting and special finishes complete.

20.3.3.1.6 Doors complete with hardware, cleaned of protective film, relieved of sticking or binding, and in working order.

20.3.3.1.7 Tops and bottoms of doors sealed.

20.3.3.1.8 Floors waxed and polished as specified.

20.3.3.1.9 Broken glass replaced and glass cleaned.

20.3.3.1.10 Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site.

20.3.3.1.11 Work cleaned, free of stains, scratches, and other foreign matter, and damaged and broken material replaced.

20.3.3.1.12 Finished and decorative work shall have marks, dirt, and superfluous labels removed.

20.3.3.1.13 Final cleanup, as provided herein.

20.4 Costs of Multiple Inspections

More than two (2) requests of the District to make a final inspection shall be considered an additional service of District, Architect, Construction Manager, and/or Project Inspector, and all subsequent costs will be invoiced to Contractor and if funds are available, withheld from remaining payments.

20.5 Partial Occupancy or Use Prior to Completion

20.5.1 District's Rights to Occupancy

The District may occupy or use any completed or partially completed portion of the Work at any stage, and such occupancy shall not constitute the District's Final Acceptance of any part of the Work. Neither the District's Final Acceptance, the making of Final Payment, any provision in Contract Documents, nor the use or occupancy of the Work, in whole or in part, by District shall constitute acceptance of Work not in accordance with the Contract Documents nor relieve the Contractor or

the Contractor's Performance Bond Surety from liability with respect to any warranties or responsibility for faulty or defective Work or materials, equipment and workmanship incorporated therein. In the event that the District occupies or uses any completed or partially completed portion of the Work, the Contractor shall remain responsible for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents unless the Contractor requests in writing, and the District agrees, to otherwise divide those responsibilities. Any dispute as to responsibilities shall be resolved pursuant to the Claims and Disputes provisions herein, with the added provision that during the dispute process, the District shall have the right to occupy or use any portion of the Work that it needs or desires to use.

20.5.2 Inspection Prior to Occupancy or Use

Immediately prior to partial occupancy or use, the District, the Contractor, and the Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

20.5.3 No Waiver

Unless otherwise agreed upon, partial or entire occupancy or use of a portion or portions of the Work shall not constitute beneficial occupancy or acceptance of the Work not complying with the requirements of the Contract Documents.

21. FINAL PAYMENT AND RETENTION

21.1 Final Payment

Upon receipt and approval of a valid and final Application for Payment, the Architect will issue a final Certificate of Payment. The District shall thereupon jointly inspect the Work and either accept the Work as complete or notify the Architect and the Contractor in writing of reasons why the Work is not complete. Upon acceptance of the Work of the Contractor as fully complete by the Governing Board of the District (that, absent unusual circumstances, will occur when the Punch List items have been satisfactorily completed), the District shall record a Notice of Completion with the County Recorder, and the Contractor shall, upon receipt of final payment from the District, pay the amount due Subcontractors.

21.2 Prerequisites for Final Payment

The following conditions must be fulfilled prior to Final Payment:

21.2.1 A full release of all Stop Payment Notices served in connection with the Work shall be submitted by Contractor.

21.2.2 A duly completed and executed conditional waiver and release upon final payment compliant with Civil Code section 8136, from the Contractor and each subcontractor of any tier and supplier to be paid from the final payment.

21.2.3 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134, from the Contractor and

each subcontractor of any tier and supplier that was paid from the previous progress payments.

21.2.4 A duly completed and executed Document 00 65 19.26, "AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS" from the Contractor.

21.2.5 The Contractor shall have made all corrections to the Work that are required to remedy any defects therein, to obtain compliance with the Contract Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of District required under the Contract Documents.

21.2.6 Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, and bonds required by the Contract Documents for its portion of the Work.

21.2.7 Contractor must have completed all requirements set forth under "Close-Out/Certification Procedures," including, without limitation, submission of an approved set of complete Record Drawings.

21.2.8 Architect shall have issued its written approval that final payment can be made.

21.2.9 The Contractor shall have delivered to the District all manuals and materials required by the Contract Documents, which must be approved by the District.

21.2.10 The Contractor shall have completed final clean-up as provided herein.

21.3 Retention

21.3.1 The retention, less any amounts disputed by the District or that the District has the right to withhold pursuant to provisions herein, shall be paid:

21.3.1.1 After approval by the Architect of the Application and Certificate of Payment,

21.3.1.2 After the satisfaction of the conditions set forth herein, and

21.3.1.3 After forty-five (45) days after the recording of the Notice of Completion by District.

21.3.2 No interest shall be paid on any retention, or on any amounts withheld due to a failure of the Contractor to perform, in accordance with the terms and conditions of the Contract Documents, except as provided to the contrary in any Escrow Agreement between the District and the Contractor pursuant to Public Contract Code section 22300.

21.4 Substitution of Securities

The District will permit the substitution of securities in accordance with the provisions of Public Contract Code section 22300.

22. UNCOVERING OF WORK

If a portion of the Work is covered without Inspector or Architect approval or not in compliance with the Contract Documents, it must, if required in writing by the District, the Project Inspector, or the Architect, be uncovered for the Project Inspector's or the Architect's observation and be corrected, replaced, and/or recovered at the Contractor's expense without change in the Contract Price or Contract Time.

23. NONCONFORMING WORK AND CORRECTION OF WORK

23.1 Nonconforming Work

23.1.1 Contractor shall promptly remove from Premises all Work identified by District as failing to conform to the Contract Documents whether incorporated or not. Contractor shall promptly replace and re-execute its own Work to comply with the Contract Documents without additional expense to the District and shall bear the expense of making good all work of other contractors destroyed or damaged by any removal or replacement pursuant hereto and/or any delays to the District or other Contractors caused thereby.

23.1.2 If Contractor does not remove Work that District has identified as failing to conform to the Contract Documents within a reasonable time, not to exceed **FORTY-EIGHT (48)** hours, District may remove it and may store any material at Contractor's expense. If Contractor does not pay expense(s) of that removal within ten (10) days' time thereafter, District may, upon ten (10) days' written notice, sell any material at auction or at private sale and shall deduct all costs and expenses incurred by the District and/or District may withhold those amounts from payment(s) to Contractor.

23.2 Correction of Work

23.2.1 Correction of Rejected Work

Pursuant to the notice provisions herein, the Contractor shall immediately correct the Work rejected by the District, the Architect, or the Project Inspector as failing to conform to the requirements of the Contract Documents, whether observed before or after Completion and whether or not fabricated, installed, or completed. The Contractor shall bear costs of correcting the rejected Work, including additional testing, inspections, and compensation for the Inspector's or the Architect's services and expenses made necessary thereby.

23.2.2 One-Year Warranty Corrections

If, within one (1) year after the date of Completion of the Work or a designated portion thereof, or after the date for commencement of warranties established hereunder, or by the terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the District to do so. This period of one (1) year shall be extended with respect to portions of the Work first performed after Completion by the period of time between Completion and the actual performance of the Work. This obligation hereunder shall survive acceptance of the Work under the

Contract and termination of the Contract. The District shall give such notice promptly after discovery of the condition.

23.3 District's Right to Perform Work

23.3.1 If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this contract, the District, after **FORTY-EIGHT (48)** hours written notice to the Contractor, may, without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

23.3.2 If it is found at any time, before or after completion of the Work, that Contractor has varied from the Drawings and/or Specifications, including, but not limited to, variation in material, quality, form, or finish, or in the amount or value of the materials and labor used, District may require at its option:

23.3.2.1 That all such improper Work be removed, remade or replaced, and all work disturbed by these changes be made good by Contractor at no additional cost to the District;

23.3.2.2 That the District deduct from any amount due Contractor the sum of money equivalent to the difference in value between the work performed and that called for by the Drawings and Specifications; or

23.3.2.3 That the District exercise any other remedy it may have at law or under the Contract Documents, including but not limited to the District hiring its own forces or another contractor to replace the Contractor's nonconforming Work, in which case the District shall either issue a deductive Change Order, a Construction Change Directive, or invoice the Contractor for the cost of that work. Contractor shall pay any invoices within thirty (30) days of receipt of same or District may withhold those amounts from payment(s) to Contractor.

24. TERMINATION AND SUSPENSION

24.1 District's Right to Terminate Contractor for Cause

24.1.1 Grounds for Termination: The District, in its sole discretion, may terminate the Contract and/or terminate the Contractor's right to perform the work of the Contract based upon any of the following:

24.1.1.1 Contractor refuses or fails to execute the Work or any separable part thereof with sufficient diligence as will ensure its completion within the time specified or any extension thereof, or

24.1.1.2 Contractor fails to complete said Work within the time specified or any extension thereof, or

24.1.1.3 Contractor persistently fails or refused to perform Work or provide material of sufficient quality as to be in compliance with Contract Documents; or

24.1.1.4 Contractor persistently or repeatedly refuses fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials to complete the Work in the time specified; or

24.1.1.5 Contractor fails to make prompt payment to Subcontractors, or for material, or for labor; or

24.1.1.6 Contractor persistently disregards laws, or ordinances, or instructions of District; or

24.1.1.7 Contractor fails to supply labor, including that of Subcontractors, that is sufficient to prosecute the Work or that can work in harmony with all other elements of labor employed or to be employed on the Work; or

24.1.1.8 Contractor or its Subcontractor(s) is/are otherwise in breach, default, or in substantial violation of any provision of this Contract, including but not limited to a lapse in licensing or registration.

24.1.2 Notification of Termination

24.1.2.1 Upon the occurrence at District's sole determination of any of the above conditions, District may, without prejudice to any other right or remedy, serve written notice upon Contractor and its Surety of District's termination of this Contract and/or the Contractor's right to perform the work of the Contract. This notice will contain the reasons for termination. Unless, within three (3) days after the service of the notice, any and all condition(s) shall cease, and any and all violation(s) shall cease, or arrangement satisfactory to District for the correction of the condition(s) and/or violation(s) be made, this Contract shall cease and terminate. Upon Termination, Contractor shall not be entitled to receive any further payment until the entire Work is finished.

24.1.2.2 Upon Termination, District may immediately serve written notice of tender upon Surety whereby Surety shall have the right to take over and perform this Contract only if Surety:

24.1.2.2.1 Within three (3) days after service upon it of the notice of tender, gives District written notice of Surety's intention to take over and perform this Contract; and

24.1.2.2.2 Commences performance of this Contract within three (3) days from date of serving of its notice to District.

24.1.2.3 Surety shall not utilize Contractor in completing the Project if the District notifies Surety of the District's objection to Contractor's further participation in the completion of the Project. Surety expressly agrees that any contractor which Surety proposes to fulfill Surety's obligations is subject to District's approval. District's approval shall not be unreasonably withheld, conditioned or delayed.

24.1.2.4 If Surety fails to notify District or begin performance as indicated herein, District may take over the Work and execute the Work to completion by any method it may deem advisable at the expense of Contractor and/or its

Surety. Contractor and/or its Surety shall be liable to District for any excess cost or other damages the District incurs thereby. Time is of the essence in this Contract. If the District takes over the Work as herein provided, District may, without liability for so doing, take possession of and utilize in completing the Work such materials, appliances, plan, and other property belonging to Contractor as may be on the Site of the Work, in bonded storage, or previously paid for.

24.1.3 Effect of Termination

24.1.3.1 Contractor shall, only if ordered to do so by the District, immediately remove from the Site all or any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The District retains the right, but not the obligation, to keep and use any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The Contractor and its Surety shall be liable upon the performance bond for all damages caused to the District by reason of the Contractor's failure to complete the Contract.

24.1.3.2 In the event that the District shall perform any portion of, or the whole of the Work, pursuant to the provisions of the General Conditions, the District shall not be liable nor account to the Contractor in any way for the time within which, or the manner in which, the Work is performed by the District or for any changes the District may make in the Work or for the money expended by the District in satisfying claims and/or suits and/or other obligations in connection with the Work.

24.1.3.3 In the event that the Contract is terminated for any reason, no allowances or compensation will be granted for the loss of any anticipated profit by the Contractor or any impact or impairment of Contractor's bonding capacity.

24.1.3.4 If the expense to the District to finish the Work exceeds the unpaid Contract Price, Contractor and Surety shall pay difference to District within twenty-one (21) days of District's request.

24.1.3.5 The District shall have the right (but shall have no obligation) to assume and/or assign to a general contractor or construction manager or other third party who is qualified and has sufficient resources to complete the Work, the rights of the Contractor under its subcontracts with any or all Subcontractors. In the event of an assumption or assignment by the District, no Subcontractor shall have any claim against the District or third party for Work performed by Subcontractor or other matters arising prior to termination of the Contract. The District or any third party, as the case may be, shall be liable only for obligations to the Subcontractor arising after assumption or assignment. Should the District so elect, the Contractor shall execute and deliver all documents and take all steps, including the legal assignment of its contractual rights, as the District may require, for the purpose of fully vesting in the District the rights and benefits of

its Subcontractor under Subcontracts or other obligations or commitments. All payments due the Contractor hereunder shall be subject to a right of offset by the District for expenses and damages suffered by the District as a result of any default, acts, or omissions of the Contractor. Contractor must include this assignment provision in all of its contracts with its Subcontractors.

24.1.3.6 The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to District.

24.1.4 Emergency Termination of Public Contracts Act of 1949

24.1.4.1 This Contract is subject to termination as provided by sections 4410 and 4411 of the Government Code of the State of California, being a portion of the Emergency Termination of Public Contracts Act of 1949.

24.1.4.1.1 Section 4410 of the Government Code states:

In the event a national emergency occurs, and public work, being performed by contract, is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the work, then the public agency and the contractor may, by written agreement, terminate said contract.

24.1.4.1.2 Section 4411 of the Government Code states:

Such an agreement shall include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party shall pay to the other or any other person, under the facts and circumstances in the case.

24.1.4.2 Compensation to the Contractor shall be determined at the sole discretion of District on the basis of the reasonable value of the Work done, including preparatory work. As an exception to the foregoing and at the District's discretion, in the case of any fully completed separate item or portion of the Work for which there is a separate previously submitted unit price or item on the accepted schedule of values, that price shall control. The District, at its sole discretion, may adopt the Contract Price as the reasonable value of the work done or any portion thereof.

24.2 Termination of Contractor for Convenience

24.2.1 District in its sole discretion may terminate the Contract upon three (3) days' written notice to the Contractor. Under a termination for convenience, the District retains the right to all the options available to the District if there is a termination for cause. In case of a termination for convenience, the Contractor shall have no claims against the District except:

24.2.1.1 The actual cost for labor, materials, and services performed that is unpaid and adequately documented through timesheets, invoices, receipts, or otherwise, and

24.2.1.2 Five percent (5%) of the total cost of work performed as of the date of termination, or five percent (5%) of the value of the Work yet to be performed, whichever is less. This five percent (5%) amount shall be full compensation for all Contractor's and Subcontractor(s)' mobilization and/or demobilization costs and any anticipated loss profits resulting from termination of the Contractor for convenience.

24.3 Suspension of Work

24.3.1 District in its sole discretion may suspend, delay or interrupt the Work in whole or in part for such period of time as the District may determine upon three (3) days written notice to the Contractor.

24.3.1.1 An adjustment may be made for changes in the cost of performance of the Work caused by any such suspension, delay or interruption. No adjustment shall be made to the extent:

24.3.1.1.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible; or

24.3.1.1.2 That an equitable adjustment is made or denied under another provision of the Contract; or

24.3.1.1.3 That the suspension of Work was the direct or indirect result of Contractor's failure to perform any of its obligations hereunder.

24.3.1.2 Any adjustments in cost of performance may have a fixed or percentage fee as provided in the section on Format for Proposed Change Order herein. This amount shall be full compensation for all Contractor's and its Subcontractor(s)' changes in the cost of performance of the Contract caused by any such suspension, delay or interruption.

25. CLAIMS PROCESS

25.1 Performance during Claim Process

Contractor and its subcontractors shall continue to perform its Work under the Contract and shall not cause a delay of the Work during any dispute, claim, negotiation, mediation, or arbitration proceeding, except by written agreement by the District.

25.2 Definition of Claim

25.2.1 Pursuant to Public Contract Code section 9204, the term "Claim" means a separate demand by the Contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

25.2.1.1 A time extension, including without limitation, for relief of damages or penalties for delay assessed by the District under the Contract;

25.2.1.2 Payment by the District of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or to which Contractor is not otherwise entitled to; or

25.2.1.3 An amount of payment disputed by the District.

25.3 Claims Presentation

25.3.1 If Contractor intends to apply for an increase in the Contract Price or Contract Time for any reason including, without limitation, the acts of District or its agents, Contractor shall, within thirty (30) days after the event giving rise to the Claim, give notice of the Claim in writing, including an itemized statement of the details and amounts of its Claim for any increase in the Contract Price of Contract Time, including a Schedule Analysis and any and all other documentation substantiating Contractor's claimed damages. Otherwise, Contractor shall have waived and relinquished its dispute against the District and Contractor's claims for compensation or an extension of time shall be forfeited and invalidated. Likewise, failure to timely submit a claim and the requisite supporting documentation shall constitute a waiver of such claim.

25.3.2 The Claim shall identify:

25.3.2.1 The issues, events, conditions, circumstances and/or causes giving rise to the dispute, and shall show, in detail, the cause and effect of same;

25.3.2.2 The pertinent dates and/or durations and actual and/or anticipated effects on the Contract Price, Contract Schedule milestones and/or Contract Time adjustments;

25.3.2.3 The line-item costs for labor, material, and/or equipment, if applicable; or

25.3.2.4 A request by Contractor, if any, to waive the claims procedure under Public Contract Code section 9204 and proceed directly to the commencement of a civil action or binding arbitration.

25.3.3 The Claim shall include the following certification by the Contractor:

25.3.3.1 The undersigned Contractor certifies under penalty of perjury that the attached dispute is made in good faith; that the supporting data is accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the adjustment for which Contractor believes the District is liable; and that I am duly authorized to certify the dispute on behalf of the Contractor.

25.3.3.2 Furthermore, Contractor understands that the value of the attached dispute expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from the Work performed on the Project, additional

time required on the Project and/or resulting from delay to the Project. Contractor may not separately recover for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

25.4 Claim Resolution pursuant to Public Contract Code section 9204

25.4.1 STEP 1:

25.4.1.1 Upon receipt of a Claim by registered or certified mail, return receipt requested, including the documents necessary to substantiate it, the District shall conduct a reasonable review of the Claim and, within a period **not to exceed 45 days**, shall provide the Contractor a written statement identifying what portion of the Claim is disputed and what portion is undisputed. Upon receipt of a Claim, the District and Contractor may, **by mutual agreement, extend the time period** to provide a written statement. If the District needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the Claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of Claim sent by registered mail or certified mail, return receipt requested, the District shall have **up to three (3) days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension**, expires to provide Contractor a written statement identifying the disputed portion and the undisputed portion.

25.4.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the District issues its written statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.4.1.2 Upon receipt of a Claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable. In this instance, District and Contractor must comply with the sections below regarding Public Contract Code section 20104 et seq. and Government Code Claim Act Claims.

25.4.1.3 If the District fails to issue a written statement, or to otherwise meet the time requirements of this section, this shall result in the Claim being deemed rejected in its entirety. A Claim that is denied by reason of the District's failure to have responded to a Claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the Claim or the responsibility or qualifications of Contractor.

25.4.2 STEP 2:

25.4.2.1 If Contractor disputes the District's written response, or if the District fails to respond to a Claim within the time prescribed, Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the District shall schedule a meet and confer conference within 30 days for settlement of the dispute. Within 10 business days following the conclusion of the meet and confer conference, if the Claim or any portion of the Claim remains in dispute, the District shall provide the Contractor a

written statement identifying the portion of the Claim that remains in dispute and the portion that is undisputed.

25.4.2.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the District issues its written statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.4.3 STEP 3:

25.4.3.1 Any disputed portion of the Claim, as identified by Contractor in writing, shall be submitted to nonbinding mediation, with the District and Contractor sharing the associated costs equally. The District and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the Claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the Claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the Claim remaining in dispute shall be subject to applicable procedures outside this section.

25.4.3.1.1 For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

25.4.3.2 Unless otherwise agreed to by the District and Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Public Contract Code section 20104.4 to mediate after litigation has been commenced.

25.4.4 STEP 4:

25.4.4.1 If mediation under this section does not resolve the parties' dispute, the District may, but does not require arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program.

25.5 <u>Subcontractor Pass-Through Claims</u>

25.5.1 If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a District because privity of contract does not exist, the contractor may present to the District a Claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that Contractor present a Claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the Claim be presented to the District shall furnish reasonable documentation to support the Claim.

25.5.2 Within 45 days of receipt of this written request from a subcontractor, Contractor shall notify the subcontractor in writing as to whether the Contractor presented the Claim to the District and, if Contractor did not present the Claim, provide the subcontractor with a statement of the reasons for not having done so.

25.5.3 The Contractor shall bind all its Subcontractors to the provisions of this section and will hold the District harmless against Claims by Subcontractors.

25.6 Government Code Claim Act Claim

25.6.1 If a claim, or any portion thereof, remains in dispute upon satisfaction of all applicable Claim Resolution requirements, including those pursuant to Public Contract Code section 9204, the Contractor shall comply with all claims presentation requirements as provided in Chapter 1 (commencing with section 900) and Chapter 2 (commencing with section 910) of Part 3 of Division 3.6 of Title 1 of Government Code as a condition precedent to the Contractor's right to bring a civil action against the District. For purposes of those provisions, the running of the time within which a claim must be presented to the District shall be tolled from the time Contractor submits its written Claim until the time the Claim is denied, including any time utilized by any applicable meet and confer process.

25.7 Claim Resolution pursuant to Public Contract Code section 20104 et seq.

25.7.1 In the event of a disagreement between the parties as to performance of the Work, the interpretation of this Contract, or payment or nonpayment for Work performed or not performed, the parties shall attempt to resolve all claims of three hundred seventy-five thousand dollars ($375,000) or less which arise between Contractor and District by those procedures set forth in Public Contract Code section 20104, et seq., to the extent applicable.

25.7.1.1 Contractor shall file with the District any written Claim, including the documents necessary to substantiate it, upon the application for final payment.

25.7.1.2 For claims of less than fifty thousand dollars ($50,000), the District shall respond in writing within forty-five (45) days of receipt of the Claim or may request in writing within thirty (30) days of receipt of the Claim any additional documentation supporting the Claim or relating to defenses or claims the District may have against the Contractor.

25.7.1.2.1 If additional information is required, it shall be requested and provided by mutual agreement of the parties.

25.7.1.2.2 District's written response to the documented Claim shall be submitted to the Contractor within fifteen (15) days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor to produce the additional information, whichever is greater.

25.7.1.3 For claims of over fifty thousand dollars ($50,000) and less than or equal to three hundred seventy-five thousand dollars ($375,000), the District shall respond in writing to all written Claims within sixty (60) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the

Claim any additional documentation supporting the Claim or relating to defenses or claims the District may have against the Contractor.

25.7.1.3.1 If additional information is required, it shall be requested and provided upon mutual agreement of the District and the Contractor.

25.7.1.3.2 The District's written response to the Claim, as further documented, shall be submitted to the Contractor within thirty (30) days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor to produce the additional information or requested documentation, whichever is greater.

25.7.1.4 If Contractor disputes the District's written response, or the District fails to respond within the time prescribed, Contractor may so notify the District, in writing, either within fifteen (15) days of receipt of the District's response or within fifteen (15) days of the District's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the District shall schedule a meet and confer conference within thirty (30) days for settlement of the dispute.

25.7.1.5 Following the meet and confer conference, if the Claim or any portion of it remains in dispute, the Contractor may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions the running of the time within which a claim must be filed shall be tolled from the time the Contractor submits its written Claim until the time the Claim is denied, including any period of time utilized by the meet and confer process.

25.7.1.6 For any civil action filed to resolve claims filed pursuant to this section, within sixty (60) days, but no earlier than thirty (30) days, following the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within fifteen (15) days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) days of the submittal, and shall be concluded within fifteen (15) days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

25.7.1.7 If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of the Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986, (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

25.7.1.8 The District shall not fail to pay money as to any portion of a Claim which is undisputed except as otherwise provided in the Contract Documents. In

any suit filed pursuant to this section, the District shall pay interest due at the legal rate on any arbitration award or judgment. Interest shall begin to accrue on the date the suit is filed in a court of law.

25.7.2 Contractor shall bind its Subcontractors to the provisions of this Section and will hold the District harmless against disputes by Subcontractors.

25.8 Claim Resolution Non-Applicability

25.8.1 The procedures for dispute and claim resolutions set forth in this Article shall not apply to the following:

25.8.1.1 Personal injury, wrongful death or property damage claims;

25.8.1.2 Latent defect or breach of warranty or guarantee to repair;

25.8.1.3 Stop payment notices;

25.8.1.4 District's rights set forth in the Article on Suspension and Termination;

25.8.1.5 Disputes arising out of labor compliance enforcement by the Department of Industrial Relations; or

25.8.1.6 District rights and obligations as a public entity set forth in applicable statutes; provided, however, that penalties imposed against a public entity by statutes, including, but not limited to, Public Contract Code sections 20104.50 and 7107, shall be subject to the Claim Resolution requirements provided in this Article.

25.9 Attorney's Fees

25.9.1 Should litigation be necessary to enforce any terms or provisions of this Agreement, then each party shall bear its own litigation and collection expenses, witness fees, court costs and attorney's fees.

26. STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS

26.1 Labor Compliance and Enforcement

Since this Project is subject to labor compliance and enforcement by the Department of Industrial Relations ("DIR"), Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code and Title 8 of the California Code of Regulations, including, without limitation, the requirement that the Contractor and all Subcontractors shall timely furnish complete and accurate electronic certified payroll records directly to the DIR. The District may not issue payment if this requirement is not met.

26.2 Wage Rates, Travel, and Subsistence

26.2.1 Pursuant to the provisions of Article 2 (commencing at section 1770), Chapter 1, Part 7, Division 2, of the Labor Code, the general prevailing rate of per

diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public work is to be performed for each craft, classification, or type of worker needed to execute this Contract are on file at the District's principal office and copies will be made available to any interested party on request. Contractor shall obtain and post a copy of these wage rates at the job site.

26.2.2 Holiday and overtime work, when permitted by law, shall be paid for at the general prevailing rate of per diem wages for holiday and overtime work on file with the Director of the Department of Industrial Relations, unless otherwise specified. The holidays upon which those rates shall be paid need not be specified by the District, but shall be all holidays recognized in the applicable collective bargaining agreement. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code.

26.2.3 Contractor shall pay and shall cause to be paid each worker engaged in Work on the Project the general prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations, regardless of any contractual relationship which may be alleged to exist between Contractor or any Subcontractor and such workers.

26.2.4 If during the period this bid is required to remain open, the Director of the Department of Industrial Relations determines that there has been a change in any prevailing rate of per diem wages in the locality in which the Work under the Contract is to be performed, such change shall not alter the wage rates in the Notice to Bidders or the Contract subsequently awarded.

26.2.5 Pursuant to Labor Code section 1775, Contractor shall, as a penalty to District, forfeit the statutory amount (believed by the District to be currently up to two hundred dollars ($200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates, determined by the District and/or the Director, for the work or craft in which that worker is employed for any public work done under Contract by Contractor or by any Subcontractor under it. The difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by Contractor.

26.2.6 Any worker employed to perform Work on the Project, which Work is not covered by any classification listed in the general prevailing wage rate of per diem wages determined by the Director, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to Work to be performed by him, and such minimum wage rate shall be retroactive to time of initial employment of such person in such classification.

26.2.7 Pursuant to Labor Code section 1773.1, per diem wages are deemed to include employer payments for health and welfare, pension, vacation, travel time, subsistence pay, and apprenticeship or other training programs authorized by Labor Code section 3093, and similar purposes.

26.2.8 Contractor shall post at appropriate conspicuous points on the Site of Project, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned. In addition, Contractor shall

post a sign-in log for all workers and visitors to the Site, a list of all subcontractors of any tier on the Site, and the required Equal Employment Opportunity poster(s).

26.3 Hours of Work

26.3.1 As provided in article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by Contractor or by any Subcontractor on any subcontract under this Contract upon the Work or upon any part of the Work contemplated by this Contract shall be limited and restricted by Contractor to eight (8) hours per day, and forty (40) hours during any one week, except as hereinafter provided. Notwithstanding the provisions hereinabove set forth, Work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week, shall be permitted upon this public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

26.3.2 Contractor shall keep and shall cause each Subcontractor to keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by Contractor in connection with the Work or any part of the Work contemplated by this Contract. The record shall be kept open at all reasonable hours to the inspection of District and to the Division of Labor Standards Enforcement of the DIR.

26.3.3 Pursuant to Labor Code section 1813, Contractor shall as a penalty to the District forfeit the statutory amount (believed by the District to be currently twenty-five dollars ($25)) for each worker employed in the execution of this Contract by Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code.

26.3.4 Any Work necessary to be performed after regular working hours, or on Sundays or other holidays shall be performed without additional expense to the District.

26.4 Payroll Records

26.4.1 Contractor shall upload, and shall cause each Subcontractor performing any portion of the Work under this Contract to upload, an accurate and complete certified payroll record ("CPR") electronically using DIR's eCPR System by uploading the CPRs by electronic XML file or entering each record manually using the DIR's iform (or current form) online on a weekly basis and within ten (10 days of any request by the District or Labor Commissioner at http://www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html or current application and URL, showing the name, address, social security number, work classification, straight-time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work.

26.4.1.1 The CPRs enumerated hereunder shall be filed directly with the DIR on a weekly basis or to the requesting party, whether the District or DIR, within ten

(10) days after receipt of each written request. The CPRs from the Contractor and each Subcontractor for each week shall be provided on or before Wednesday of the week following the week covered by the CPRs. District may not make any payment to Contractor until:

26.4.1.1.1 Contractor and/or its Subcontractor(s) provide CPRs acceptable to the DIR; and

26.4.1.1.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs to the DIR in a timely manner may directly delay Contractor's payment.

26.4.2 All CPRs shall be available for inspection at all reasonable hours at the principal office of Contractor on the following basis:

26.4.2.1 A certified copy of an employee's CPR shall be made available for inspection or furnished to the employee or his/her authorized representative on request.

26.4.2.2 CPRs shall be made available for inspection or furnished upon request to a representative of District, Division of Labor Standards Enforcement, Division of Apprenticeship Standards, and/or the DIR.

26.4.2.3 CPRs shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through the District, Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested CPRs have not been provided pursuant to the provisions herein, the requesting party shall, prior to being provided the records, reimburse the costs of preparation by Contractor, Subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of Contractor.

26.4.3 Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by District, Division of Apprenticeship Standards, or Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of Contractor awarded Contract or performing Contract shall not be marked or obliterated.

26.4.4 Contractor shall inform District of the location of the records enumerated hereunder, including the street address, city, and county, and shall, within five (5) working days, provide a notice of change of location and address.

26.4.5 In the event of noncompliance with the requirements of this section, Contractor shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects Contractor must comply with this section. Should noncompliance still be evident after the ten (10) day period, Contractor shall, as a penalty to District, forfeit up to one hundred dollars ($100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Labor Commissioner, these penalties shall be withheld from progress payments then due.

26.4.6 [RESERVED]

26.5 [RESERVED]

26.6 Apprentices

26.6.1 Contractor acknowledges and agrees that, if this Contract involves a dollar amount greater than or a number of working days greater than that specified in Labor Code section 1777.5, then this Contract is governed by the provisions of Labor Code Section 1777.5. It shall be the responsibility of Contractor to ensure compliance with this Article and with Labor Code section 1777.5 for all apprenticeship occupations.

26.6.2 Apprentices of any crafts or trades may be employed and, when required by Labor Code section 1777.5, shall be employed provided they are properly registered in full compliance with the provisions of the Labor Code.

26.6.3 Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he/she is employed, and shall be employed only at the work of the craft or trade to which she/he is registered.

26.6.4 Only apprentices, as defined in section 3077 of the Labor Code, who are in training under apprenticeship standards and written apprentice agreements under chapter 4 (commencing at section 3070), division 3, of the Labor Code, are eligible to be employed. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he/she is training.

26.6.5 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractors employing workers in any apprenticeable craft or trade in performing any Work under this Contract shall apply to the applicable joint apprenticeship committee for a certificate approving the Contractor or Subcontractor under the applicable apprenticeship standards and fixing the ratio of apprentices to journeymen employed in performing the Work.

26.6.6 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractor may be required to make contributions to the apprenticeship program.

26.6.7 If Contractor or Subcontractor willfully fails to comply with Labor Code section 1777.5, then, upon a determination of noncompliance by the Administrator of Apprenticeship, it shall:

26.6.7.1 Be denied the right to bid on any subsequent project for one (1) year from the date of such determination;

26.6.7.2 Forfeit as a penalty to District the full amount as stated in Labor Code section 1777.7. Interpretation and enforcement of these provisions shall be in accordance with the rules and procedures of the California Apprenticeship Council and under the authority of the Chief of the Division of Apprenticeship Standards.

26.6.8 Contractor and all Subcontractors shall comply with Labor Code section 1777.6, which section forbids certain discriminatory practices in the employment of apprentices.

26.6.9 Contractor shall become fully acquainted with the law regarding apprentices prior to commencement of the Work. Special attention is directed to sections 1777.5, 1777.6, and 1777.7 of the Labor Code, and title 8, California Code of Regulations, section 200 et seq. Questions may be directed to the State Division of Apprenticeship Standards, 455 Golden Gate Avenue, 9th floor, San Francisco, California 94102.

26.7 Non-Discrimination

26.7.1 Contractor herein agrees not to discriminate in its recruiting, hiring, promotion, demotion, or termination practices on the basis of race, religious creed, national origin, ancestry, sex, age, or physical handicap in the performance of this Contract and to comply with the provisions of the California Fair Employment and Housing Act as set forth in part 2.8 of division 3 of the California Government Code, commencing at section 12900; the Federal Civil Rights Act of 1964, as set forth in Public Law 88-352, and all amendments thereto; Executive Order 11246; and all administrative rules and regulations found to be applicable to Contractor and Subcontractor.

26.7.2 Special requirements for Federally Assisted Construction Contracts: During the performance of this Contract, Contractor agrees to incorporate in all subcontracts the provisions set forth in Chapter 60-1.4(b) of Title 41 published in Volume 33 No. 104 of the Federal Register dated May 28, 1968.

26.8 Labor First Aid

Contractor shall maintain emergency first aid treatment for Contractor's workers on the Project which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 et seq.) and the California Occupational Safety and Health Act of 1973 (Lab. Code, § 6300 et seq.; 8 Cal. Code of Regs., § 330 et seq.).

27. [RESERVED]

28. MISCELLANEOUS

28.1 Assignment of Antitrust Actions

28.1.1 Section 7103.5(b) of the Public Contract Code states:

In entering into a public works contract or subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commending with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, which assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

28.1.2 Section 4552 of the Government Code states:

In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder.

28.1.3 Section 4553 of the Government Code states:

If an awarding body or public purchasing body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

28.1.4 Section 4554 of the Government Code states:

Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action.

28.1.5 Under this Article, "public purchasing body" is District and "bidder" is Contractor.

28.2 Excise Taxes

If, under Federal Excise Tax Law, any transaction hereunder constitutes a sale on which a Federal Excise Tax is imposed and the sale is exempt from such Federal Excise Tax because it is a sale to a State or Local Government for its exclusive use, District, upon request, will execute documents necessary to show (1) that District is a political subdivision of the State for the purposes of such exemption, and (2) that the sale is for the exclusive use of District. No Federal Excise Tax for such materials shall be included in any Contract Price.

28.3 Taxes

Contract Price is to include any and all applicable sales taxes or other taxes that may be due in accordance with section 7051 et seq. of the Revenue and Taxation Code, Regulation 1521 of the State Board of Equalization or any other tax code that may be applicable.

28.4 Shipments

All shipments must be F.O.B. destination to Site or sites, as indicated in the Contract Documents. There must be no charge for containers, packing, unpacking, drayage, or

insurance. The total Contract Price shall be all inclusive (including sales tax) and no additional costs of any type will be considered.

28.5 Compliance with Government Reporting Requirements

If this Contract is subject to federal or other governmental reporting requirements because of federal or other governmental financing in whole or in part for the Project of which it is part, or for any other reason, Contactor shall comply with those reporting requirements at the request of the District at no additional cost.

END OF DOCUMENT

DOCUMENT 00 73 13

SPECIAL CONDITIONS

1. Modernization Projects

1.1 Access. Access to the school buildings and entry to buildings, classrooms, restrooms, mechanical rooms, electrical rooms, or other rooms, for construction purposes, must be coordinated with District and onsite District personnel before Work is to start. Unless agreed to otherwise in writing, only a school custodian will be allowed to unlock and lock doors in existing building(s). The custodian will be available only while school is in session. If a custodian is required to arrive before 7:00 a.m. or leave after 3:30 p.m. to accommodate Contractor's Work, the overtime wages for the custodian will be paid by the Contractor, unless at the discretion of the District, other arrangements are made in advance.

1.2 Keys. Upon request, the District may, at its own discretion, provide keys to the school site for the convenience of the Contractor. The Contractor agrees to pay all expenses to re-key the entire school site and all other affected District buildings if the keys are lost or stolen, or if any unauthorized party obtains a copy of the key or access to the school.

1.3 Maintaining Services. The Contractor is advised that Work is to be performed in spaces regularly scheduled for instruction. Interruption and/or periods of shutdown of public access, electrical service, water service, lighting, or other utilities shall be only as arranged in advance with the District. Contractor shall provide temporary services to all facilities interrupted by Contractor's Work.

1.4 Maintaining Utilities. The Contractor shall maintain in operation during duration of Contract, drainage lines, storm drains, sewers, water, gas, electrical, steam, and other utility service lines within working area.

1.5 Confidentiality. Contractor shall maintain the confidentiality of all information, documents, programs, procedures and all other items that Contractor encounters while performing the Work. This requirement shall be ongoing and shall survive the expiration or termination of this Contract and specifically includes, without limitation, all student, parent, and employee disciplinary information and health information.

1.6 Work during Instructional Time. By submitting its bid, Contractor affirms that Work may be performed during ongoing instruction in existing facilities. If so, Contractor agrees to cooperate to the best of its ability to minimize any disruption to school operations and any use of school facilities by the public up to, and including, rescheduling specific work activities, at no additional cost to District.

1.7 No Work during Student Testing. Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking State or Federally-required tests.

2. Badge Policy for Contractors

All Contractors doing work for the District will provide their workers with identification badges. These badges will be worn by all members of the Contractor's staff who are working in a District facility.

2.1 Badges must be filled out in full and contain the following information:

2.1.1 Name of Contractor

2.1.2 Name of Employee

2.1.3 Contractor's address and phone number

2.2 Badges are to be worn when the Contractor or his/her employees are on site and must be visible at all times. Contractors must inform their employees that they are required to allow District employees, the Architect, the Construction Manager, the Program Manager, or the Project Inspector to review the information on the badges upon request.

2.3 Continued failure to display identification badges as required by this policy may result in the individual being removed from the Project or assessment of fines against the Contractor.

3. Substitution for Specified Items

3.1 Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words “or equal.” Contractor may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified.

3.1.1 If the material, process, or article offered by Contractor is not, in the opinion of the District, substantially equal or better in every respect to that specified, then Contractor shall furnish the material, process, or article specified in the Specifications without any additional compensation or change order.

3.1.2 This provision shall not be applicable with respect to any material, product, thing or service for which District made findings and gave notice in accordance with Public Contract Code section 3400(c); therefore, Contractor shall not be entitled to request a substitution with respect to those materials, products or services.

3.2 A request for a substitution shall be submitted as follows:

3.2.1 Contractor shall notify the District in writing of any request for a substitution at least ten (10) days prior to bid opening as indicated in the Instructions to Bidders.

3.2.2 Requests for Substitutions after award of the Contract shall be submitted within thirty-five (35) days of the date of the Notice of Award.

3.3 Within 35 days after the date of the Notice of Award, Contractor shall provide data substantiating a request for substitution of "an equal" item, including but not limited to the following:

3.3.1 All variations of the proposed substitute from the material specified including, but not limited to, principles of operation, materials, or construction finish, thickness or gauge of materials, dimensions, weight, and tolerances;

3.3.2 Available maintenance, repair or replacement services;

3.3.3 Increases or decreases in operating, maintenance, repair, replacement, and spare parts costs;

3.3.4 Whether or not acceptance of the substitute will require other changes in the Work (or in work performed by the District or others under Contract with the District); and

3.3.5 The time impact on any part of the Work resulting directly or indirectly from acceptance of the proposed substitute.

3.4 No substitutions shall be made until approved, in writing, by the District. The burden of proof as to equality of any material, process, or article shall rest with Contractor. The Contractor warrants that if substitutes are approved:

3.4.1 The proposed substitute is equal or superior in all respects to that specified, and that such proposed substitute is suitable and fit for the intended purpose and will perform adequately the function and achieve the results called for by the general design and the Contract Documents;

3.4.2 The Contractor provides the same warranties and guarantees for the substitute that would be provided for that specified;

3.4.3 The Contractor shall be fully responsible for the installation of the substitute and any changes in the Work required, either directly or indirectly, because of the acceptance of such substitute, with no increase in Contract Price or Contract Time. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time;

3.4.4 The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute; and

3.4.5 The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit.

3.5 In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.

3.6 In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

3.7 Contractor shall be responsible for any costs the District incurs for professional services, DSA fees, or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods. District may deduct those costs from any amounts owing to the Contractor for the review of the request for substitution, even if the request for substitution is not approved. District, at its sole discretion, shall deduct from the payments due to and/or invoice Contractor for all the professional services and/or DSA fees or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods arising herein.

4. Weather Days

Delays due to Adverse Weather conditions will only be permitted in compliance with the provisions in the General Conditions and only if the number of days of Adverse Weather exceeds the following parameters and Contractor can verify that the excess days of Adverse Weather caused delays: 50 days per year.

5. Insurance Policy Limits

All of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than _____. The limits of insurance shall not be less than:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	$5,000,000 per occurrence; $10,000,000 aggregate
Automobile Liability – Any Auto	Combined Single Limit	Personal vehicles:$500,000 Commercial vehicles: $1,000,000
		Personal vehicles: $100,000 per person/ $300,000 per accident
Workers' Compensation		Statutory limits pursuant to State law
Employers' Liability		$1,000,000.
Builder's Risk (Course of Construction)		Issued for $15,000..
Pollution Liability		$1,000,000 per claim; $2,000,000 aggregate

6. Permits, Certificates, Licenses, Fees, Approvals

6.1 Payment for Permits, Certificates, Licenses, Fees, and Approvals. As required in the General Conditions, the Contractor shall secure and pay for all permits, licenses, approvals, and certificates necessary for the prosecution of the Work with the exception of the following:

6.1.1 Utility Connection Fees

With respect to the above-listed items, Contractor shall be responsible for securing such items; however, District will be responsible for payment of these charges or fees. Contractor shall notify the District of the amount due with respect to such items and to whom the amount is payable. Contractor shall provide the District with an invoice and receipt with respect to such charges or fees.

6.2 General Permit For Storm Water Discharges Associated With Construction and Land Disturbance Activities

6.2.1 Contractor acknowledges that all California school districts are obligated to develop and implement the following requirements for the discharge of storm water to surface waters from its construction and land disturbance activities (storm water requirements), without limitation:

6.2.1.1 Municipal Separate Storm Sewer System (MS4) is a system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

6.2.1.2 Storm Water Pollution Prevention Plan ("SWPPP") contains specific best management practices ("BMPs") and establishes numeric effluent limitations at:

6.2.1.2.1 Sites where the District engages in maintenance (e.g., fueling, cleaning, repairing) for transportation activities.

6.2.1.2.2 Construction sites where:

6.2.1.2.2.1 One (1) or more acres of soil will be disturbed, or

6.2.1.2.2.2 The project is part of a larger common plan of development that disturbs more than one (1) acre of soil.

6.2.2 Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

6.2.3 At no additional cost to the District, Contractor shall provide a Qualified Storm Water Practitioner who shall be onsite and implement and monitor any and all SWPPP requirements applicable to the Project, including but not limited to:

6.2.3.1 At least forty eight (48) hours prior to a forecasted rain event, implementing the Rain Event Action Plan (REAP) for any rain event requiring

implementation of the REAP, including any erosion and sediment control measures needed to protect all exposed portions of the site; and

6.2.3.2 Monitoring any Numeric Action Levels (NALs), if applicable.

7. Project Labor Agreement/Payroll Records

The District has entered into a Project Labor Agreement ("PLA"), which covers this Project. Accordingly, the following provision is added as Section 26.4.6:

26.4.6 As Contractor and its subcontractors have agreed to be bound by the terms of the PLA entered into by the District [on or about / dated] _____, Contractor and its subcontractors may be excused from uploading CPRs electronically using DIR's eCPR System by uploading the CPRs by electronic XML file or entering each record manually using the DIR's iform (or current form) online at http://www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html , or by using a more current application and URL. However, within ten (10) days of any request by the District or Labor Commissioner, Contractor and its subcontractors shall provide CPRs showing the name, address, social security number, work classification, straight time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each subcontractor in connection with the Work.

8. As-Builts and Record Drawings

Contractor shall submit Record Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and drafting ("CADD") files in AutoCAD by Autodesk format., plus one set of Record Drawings on mylar.

9. Fingerprinting

Contractor shall comply with the provisions of Education Code section 45125.2 regarding the submission of employee fingerprints to the California Department of Justice and the completion of criminal background investigations of its employees, its subcontractor(s), and its subcontractors' employees. Contractor shall not permit any employee to have any contact with District pupils until such time as Contractor has verified in writing to the governing board of the District, that such employee has not been convicted of a violent or serious felony, as defined in Education Code section 45122.1. Contractor shall fully complete and perform all tasks required pursuant to the Criminal Background Investigation/ Fingerprinting Certification.

10. Disabled Veteran Business Enterprises

This Project uses or may plan to use funds allocated pursuant to the State of California School Facility Program ("Program") for the construction and/or modernization of school buildings. Therefore, Section 17076.11 of the Education Code requires the District to have a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%), per year, of the overall dollar amount expended each year by the District on projects that receive state funding and the Contractor must submit the Disabled Veteran Business Enterprise Participation Certification to the District with its executed Agreement, identifying the steps Contractor took to solicit DVBE participation in conjunction with this Contract.

11. Construction Manager

The District will use a Construction Manager on the Project that is the subject of this Contract, Victoria Vargas, (650)246-5974 is the Construction Manager for this Project.

12. Program Manager

Bill Savidge, (650)246-5977 is the Program Manager designated for the Project that is the subject of this Contract.

16. Preliminary Schedule of Values

The preliminary schedule of values shall include, at a minimum, the following information and the following structure:

Replace provision in the General Conditions with the following provisions:

16.1.1.2.3. The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

16.1.2.3.1 Mobilization and layout combined to equal not more than **1**%;

16.1.1.2.3.2 Submittals, samples and shop drawings combined to equal not more than **3**%;

16.1.1.2.3.3 Bonds and insurance combined to equal not more than **2**%.

END OF DOCUMENT

DOCUMENT 00 73 56

HAZARDOUS MATERIALS PROCEDURES & REQUIREMENTS

1. Summary

This document includes information applicable to hazardous materials and hazardous waste abatement.

2. Notice of Hazardous Waste or Materials

a. Contractor shall give notice in writing to the District, the Construction Manager, and the Architect promptly, before any of the following materials are disturbed, and in no event later than twenty-four (24) hours after first observance, of any:

(1) Material that Contractor believes may be a material that is hazardous waste or hazardous material, as defined in section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law;

(2) Other material that may present a substantial danger to persons or property exposed thereto in connection with Work at the site.

b. Contractor's written notice shall indicate whether the hazardous waste or material was shown or indicated in the Contract Documents to be within the scope of Work, and whether the materials were brought to the site by Contractor, its Subcontractors, suppliers, or anyone else for whom Contractor is responsible. As used in this section the term "hazardous materials" shall include, without limitation, asbestos, lead, Polychlorinated biphenyl (PCB), petroleum and related hydrocarbons, and radioactive material.

c. In response to Contractor's written notice, the District shall investigate the identified conditions.

d. If the District determines that conditions do not involve hazardous materials or that no change in terms of Contract is justified, the District shall so notify Contractor in writing, stating reasons. If the District and Contractor cannot agree on whether conditions justify an adjustment in Contract Price or Contract Time, or on the extent of any adjustment, Contractor shall proceed with the Work as directed by the District.

e. If after receipt of notice from the District, Contractor does not agree to resume Work based on a reasonable belief it is unsafe, or does not agree to resume Work under special conditions, then District may order such portion of Work that is in connection with such hazardous condition or such affected area to be deleted from the Work, or performed by others, or District may invoke its rights to terminate the Contract in whole or in part. District will determine entitlement to or the amount or extent of an adjustment, if any, in

Contract Price or Contract Time as a result of deleting such portion of Work, or performing the Work by others.

f. If Contractor stops Work in connection with any hazardous condition and in any area affected thereby, Contractor shall immediately redeploy its workers, equipment, and materials, as necessary, to other portions of the Work to minimize delay and disruption.

3. Additional Warranties and Representations

a. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have the required levels of familiarity with the Site and the Work, training, and ability to comply fully with all applicable laws and contractual requirements for safe and expeditious performance of the Work, including whatever training is or may be required regarding the activities to be performed (including, but not limited to, all training required to address adequately the actual or potential dangers of Contract performance).

b. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have and maintain in good standing any and all certifications and licenses required by applicable federal, state, and other governmental and quasi-governmental requirements applicable to the Work.

c. Contractor represents and warrants that it has studied carefully all requirements of the Specifications regarding procedures for demolition, hazardous waste abatement, or safety practices, specified in the Contract, and prior to submitting its bid, has either (a) verified to its satisfaction that the specified procedures are adequate and sufficient to achieve the results intended by the Contract Documents, or (b) by way of approved "or equal" request or request for clarification and written Addenda, secured changes to the specified procedures sufficient to achieve the results intended by the Contract Documents. Contractor accepts the risk that any specified procedure will result in a completed Project in full compliance with the Contract Documents.

4. Monitoring and Testing

a. District reserves the right, in its sole discretion, to conduct air monitoring, earth monitoring, Work monitoring, and any other tests (in addition to testing required under the agreement or applicable law), to monitor Contract requirements of safe and statutorily compliant work methods and (where applicable) safe re-entry level air standards under state and federal law upon completion of the job, and compliance of the work with periodic and final inspection by public and quasi-public entities having jurisdiction.

b. Contractor acknowledges that District has the right to perform, or cause to be performed, various activities and tests including, but not limited to, pre-abatement, during abatement, and post-abatement air monitoring, that District shall have no obligation to perform said activities and tests, and that a portion of said activities and tests may take place prior to the completion of

the Work by Contractor. In the event District elects to perform these activities and tests, Contractor shall afford District ample access to the Site and all areas of the Work as may be necessary for the performance of these activities and tests. Contractor will include the potential impact of these activities or tests by District in the Contract Price and the Scheduled Completion Date.

c. Notwithstanding District's rights granted by this paragraph, Contractor may retain its own industrial hygiene consultant at Contractor's own expense and may collect samples and may perform tests including, but not limited to, pre-abatement, during abatement, and post-abatement personal air monitoring, and District reserves the right to request documentation of all such activities and tests performed by Contractor relating to the Work and Contractor shall immediately provide that documentation upon request.

5. Compliance with Laws

a. Contractor shall perform safe, expeditious, and orderly work in accordance with the best practices and the highest standards in the hazardous waste abatement, removal, and disposal industry, the applicable law, and the Contract Documents, including, but not limited to, all responsibilities relating to the preparation and return of waste shipment records, all requirements of the law, delivering of all requisite notices, and obtaining all necessary governmental and quasi-governmental approvals.

b. Contractor represents that it is familiar with and shall comply with all laws applicable to the Work or completed Work including, but not limited to, all federal, state, and local laws, statutes, standards, rules, regulations, and ordinances applicable to the Work relating to:

(1) The protection of the public health, welfare and environment;

(2) Storage, handling, or use of asbestos, PCB, lead, petroleum based products, radioactive material, or other hazardous materials;

(3) The generation, processing, treatment, storage, transport, disposal, destruction, or other management of asbestos, PCB, lead, petroleum, radioactive material, or hazardous waste materials or other waste materials of any kind; and

(4) The protection of environmentally sensitive areas such as wetlands and coastal areas.

6. Disposal

a. Contractor has the sole responsibility for determining current waste storage, handling, transportation, and disposal regulations for the job Site and for each waste disposal facility. Contractor must comply fully at its sole cost and expense with these regulations and any applicable law. District may, but is not obligated to, require submittals with this information for it to review consistent with the Contract Documents.

b. Contractor shall develop and implement a system acceptable to District to track hazardous waste from the Site to disposal, including appropriate "Hazardous Waste Manifests" on the EPA form, so that District may track the volume of waste it put in each landfill and receive from each landfill a certificate of receipt.

c. Contractor shall provide District with the name and address of each waste disposal facility prior to any disposal, and District shall have the express right to reject any proposed disposal facility. Contractor shall not use any disposal facility to which District has objected. Contractor shall document actual disposal or destruction of waste at a designated facility by completing a disposal certificate or certificate of destruction forwarding the original to the District.

7. Permits

a. Before performing any of the Work, and at such other times as may be required by applicable law, Contractor shall deliver all requisite notices and obtain the approval of all governmental and quasi-governmental authorities having jurisdiction over the Work. Contractor shall submit evidence satisfactory to District that it and any disposal facility:

(1) have obtained all required permits, approvals, and the like in a timely manner both prior to commencement of the Work and thereafter as and when required by applicable law; and

(2) are in compliance with all such permits, approvals and the regulations.

For example, before commencing any work in connection with the Work involving asbestos-containing materials, or PCBs, or other hazardous materials subject to regulation, Contractor agrees to provide the required notice of intent to renovate or demolish to the appropriate state or federal agency having jurisdiction, by certified mail, return receipt requested, or by some other method of transmittal for which a return receipt is obtained, and to send a copy of that notice to District. Contractor shall not conduct any Work involving asbestos-containing materials or PCBs unless Contractor has first confirmed that the appropriate agency having jurisdiction is in receipt of the required notification. All permits, licenses, and bonds that are required by governmental or quasi-governmental authorities, and all fees, deposits, tap fees, offsite easements, and asbestos and PCB disposal facilities expenses necessary for the prosecution of the Work, shall be procured and paid for by Contractor. Contractor shall give all notices and comply with the all applicable laws bearing on the conduct of the Work as drawn and specified. If Contractor observes or reasonably should have observed that Plans and Specifications and other Contract Documents are at variance therewith, it shall be responsible for promptly notifying District in writing of such fact. If Contractor performs any Work contrary to applicable laws, it shall bear all costs arising therefrom.

b. In the case of any permits or notices held in District's name or of necessity to be made in District's name, District shall cooperate with Contractor in securing the permit or giving the notice, but the Contractor shall prepare for District review and execution upon approval, all necessary applications, notices, and other materials.

8. Indemnification

To the fullest extent permitted by law, the indemnities and limitations of liability expressed throughout the Contract Documents apply with equal force and effect to any claims or liabilities imposed or existing by virtue of the removal, abatement, and disposal of hazardous waste. This includes, but is not limited to, liabilities connected to the selection and use of a waste disposal facility, a waste transporter, personal injury, property damage, loss of use of property, damage to the environment or natural resources, or "disposal" and "release" of materials associated with the Work (as defined in 42 U.S.C. § 960l *et seq*.).

9. Termination

District shall have an absolute right to terminate for default immediately without notice and without an opportunity to cure should Contractor knowingly or recklessly commit a material breach of the terms of the Contract Documents, or any applicable law, on any matter involving the exposure of persons or property to hazardous waste. However, if the breach of contract exposing persons or property to hazardous waste is due solely to an ordinary, unintentional, and non-reckless failure to exercise reasonable care, then the procedures for termination for cause shall apply without modification.

END OF DOCUMENT

DOCUMENT 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Access Conditions and Requirements;

B. Special Conditions.

1.02 SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of this Contract consists of the following:

Selective demolition and construction necessary for the Modernization to existing school buildings, including associated civil, architectural, structural, plumbing, mechanical and/or electrical work as indicated in the Drawings and Specifications. Generally, these categories of work involve new finishes, adaptive re-use and modification of certain selected areas, new cabinetry, handicap accessibility retrofits, changing and expanding selected infrastructure utilities, and extensive modifications. The Project will involve the "phasing" and barricading of work areas as indicated on the Plans and enumerated in these Specifications.

1.03 CONTRACTS

A. Perform the Work under a single, fixed-price Contract.

1.04 WORK BY OTHERS

A. Work on the Project that will be performed and completed prior to the start of the Work of this Contract:

1.05 CODES, REGULATIONS, AND STANDARDS

A. The codes, regulations, and standards adopted by the state and federal agencies having jurisdiction shall govern minimum requirements for this Project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.

B. Codes, regulations, and standards shall be as published effective as of date of bid opening, unless otherwise specified or indicated.

1.06 PROJECT RECORD DOCUMENTS

A. Contractor shall maintain on Site one set of the following record documents; Contractor shall record actual revisions to the Work:

(1) Contract Drawings.

(2) Specifications.

(3) Addenda.

(4) Change Orders and other modifications to the Contract.

(5) Reviewed shop drawings, product data, and samples.

(6) Field test records.

(7) Inspection certificates.

(8) Manufacturer's certificates.

B. Contractor shall store Record Documents separate from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.

C. Contractor shall record information concurrent with construction progress.

D. Specifications: Contractor shall legibly mark and record at each product section of the Specifications the description of the actual product(s) installed, including the following:

(1) Manufacturer's name and product model and number.

(2) Product substitutions or alternates utilized.

(3) Changes made by Addenda and Change Orders and written directives.

1.07 EXAMINATION OF EXISTING CONDITIONS

A. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site and of the streets or roads approaching the Site.

B. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.

C. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

1.08 CONTRACTOR'S USE OF PREMISES

A. If unoccupied and only with District's prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.

B. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor.

C. Contractor shall not interfere with use of or access to occupied portions of the building(s) or adjacent property.

D. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.

E. No one other than those directly involved in the demolition and construction, or specifically designated by the District or the Architect shall be permitted in the areas of work during demolition and construction activities.

F. The Contractor shall install the construction fence and maintain that it will be locked when not in use. Keys to this fencing will be provided to the District.

1.09 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.

B. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

1.10 UTILITY SHUTDOWNS AND INTERRUPTIONS

A. Contractor shall give the District a minimum of three (3) days written notice in advance of any need to shut off existing utility services or to effect equipment interruptions. The District will set exact time and duration for shutdown, and will assist Contractor with shutdown. Work required to re-establish utility services shall be performed by the Contractor.

B. Contractor shall obtain District's written approval as indicated in the General Conditions in advance of deliveries of material or equipment or other activities that may conflict with District's use of the building(s) or adjacent facilities.

1.11 STRUCTURAL INTEGRITY

A. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.

B. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 22 00

ALTERNATES AND UNIT PRICING

PART 1 – ALTERNATES

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Bid Form and Proposal;

D. Instruction to Bidders.

1.02 DESCRIPTION

The items of work indicated below propose modifications to, substitutions for, additions to and/or deletions from the various parts of the Work specified in other Sections of the Specifications. The acceptance or rejection of any of the alternates is strictly at the option of the District subject to District's acceptance of Contractor's stated prices contained in this Proposal.

1.03 GENERAL

Where an item is omitted, or scope of Work is decreased, all Work pertaining to the item whether specifically stated or not, shall be omitted and where an item is added or modified or where scope of Work is increased, all Work pertaining to that required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

1.04 BASE BID

The Base Bid includes all work required to construct the Project completely and in accordance with the Contract Documents.

1.05 ALTERNATES

Additive alternate: Site work at quad as delineated in the drawings.

PART 2 - UNIT PRICING

2.01 GENERAL

Contractor shall completely state all required figures based on Unit Prices listed below. Where scope of Work is decreased, all Work pertaining to the item, whether specifically stated or not, shall be omitted and where scope of Work is increased, all

work pertaining to that item required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

2.02 UNIT PRICES

Furnish unit prices for each of the named items on a square foot, lineal foot, or per each basis, as applies. Unit prices shall include all labor, materials, services, profit, overhead, insurance, bonds, taxes, and all other incidental costs of Contractor, subcontractors, and supplier(s).

A. None

END OF DOCUMENT

DOCUMENT 01 25 13

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. Instructions to Bidders;

B. General Conditions, including, without limitation, Substitutions For Specified Items; and

C. Special Conditions.

1.02 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT

A. Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified may be reviewed subject to the provisions of the General Conditions.

B. Wherever more than one manufacturer's product is specified, the first-named product is the basis for the design used in the work and the use of alternative-named manufacturers' products or substitutes may require modifications in that design. If such alternatives are proposed by Contractor and are approved by the District and/or the Architect, Contractor shall assume all costs required to make necessary revisions and modifications of the design resulting from the substitutions requested by the Contractor.

C. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or approved equal," supporting data for the second product, if proposed by Contractor, shall be submitted in accordance with the requirements for substitutions. The District's Board has found and determined that certain item(s) shall be used on this Project based on the purpose(s) indicated pursuant to Public Contract Code section 3400(c). These findings, as well as the products and brand or trade names, have been identified in the Notice to Bidders.

D. The Contractor will not be allowed to substitute specified items unless the request for substitution is submitted as follows:

(1) District must receive any notice of request for substitution of a specified item a minimum of ten (10) calendar days prior to bid opening.

(2) Within 35 days after the date of the Notice of Award, the Contractor shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the technical Specifications. Insufficient information shall be grounds for rejection of substitution.

E. If the District and/or Architect, in reviewing proposed substitute materials and equipment, require revisions or corrections to be made to previously accepted Shop Drawings and supplemental supporting data to be resubmitted, Contractor shall promptly do so. If any proposed substitution is judged by the District and/or Architect to be unacceptable, the specified material or equipment shall be provided.

F. Samples may be required. Tests required by the District and/or Architect for the determination of quality and utility shall be made at the expense of Contractor, with acceptance of the test procedure first given by the District.

G. In reviewing the supporting data submitted for substitutions, the District and/or Architect will use for purposes of comparison all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Contract Documents. If more than two (2) submissions of supporting data are required, the cost of reviewing the additional supporting data shall be borne by Contractor, and the District will deduct the costs from the Contract Price. The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute.

H. The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit. In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.

I. In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 26 00

CHANGES IN THE WORK

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE PROVISIONS IN THE AGREEMENT, GENERAL CONDITIONS, AND SPECIAL CONDITIONS, IF USED, RELATED TO CHANGES AND/OR REQUESTS FOR CHANGES.

END OF DOCUMENT

DOCUMENT 01 29 00

APPLICATION FOR PAYMENT AND CONDITIONAL AND UNCONDITIONAL WAIVER AND RELEASE FORMS

CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS IN THE GENERAL CONDITIONS RELATED TO APPLICATIONS FOR PAYMENT AND/OR PAYMENTS.

CONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8132)

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: $_____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

(1) Retentions.

(2) Extras for which the claimant has not received payment.

(3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:

Date(s) of waiver and release: _____

Amount(s) of unpaid progress payment(s): $_____

(4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

UNCONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8134)

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment: $_____

Exceptions

This document does not affect any of the following:

(1) Retentions.

(2) Extras for which the claimant has not received payment.

(3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

CONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8136)

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check:

Amount of Check: $_____

Check Payable to: _____

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: $_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

UNCONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8138)

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: $_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

DOCUMENT 01 31 19

PROJECT MEETINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions; and

B. Special Conditions.

1.02 PROGRESS MEETINGS:

A. Contractor shall schedule and hold regular weekly progress meetings after a minimum of one week's prior written notice of the meeting date and time to all Invitees as indicated below.

B. Location: Contractor's field office.

C. The Contractor shall notify and invite the following entities ("Invitees"):

(1) District Representative

(2) Contractor

(3) Contractor's Project Manager

(4) Contractor's Superintendent

(5) Subcontractors, as appropriate to the agenda of the meeting.

(6) Suppliers, as appropriate to the agenda of the meeting.

(7) District Construction Manager

(8) Architect

(9) Engineer(s), if any and as appropriate to the agenda of the meeting.

(10) Others, as appropriate to the agenda of the meeting.

D. The District's and/or the Architect's Consultants will attend at their discretion, in response to the agenda.

E. The Distric Construction Manager, and/or another District Agent shall take and distribute meeting notes to attendees and other concerned parties. If exceptions are taken to anything in the meeting notes, those exceptions shall

be stated in writing to the District within five (5) working days following District's distribution of the meeting notes.

1.03 PRE-INSTALLATION/PERFORMANCE MEETING:

A. Contractor shall schedule a meeting prior to the start of each of the following portions of the Work: removal of temporary power pole. Contractor shall invite all Invitees to this meeting, and others whose work may affect or be affected by the quality of the cutting and patching work.

B. Contractor shall review in detail prior to this meeting, the manufacturer's requirements and specifications, applicable portions of the Contract Documents, Shop Drawings, and other submittals, and other related work. At this meeting, invitees shall review and resolve conflicts, incompatibilities, or inadequacies discovered or anticipated.

C. Contractor shall review in detail Project conditions, schedule, requirements for performance, application, installation, and quality of completed Work, and protection of adjacent Work and property.

D. Contractor shall review in detail means of protecting the completed Work during the remainder of the construction period.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 32 13

SCHEDULING OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Summary of Work; and

D. Submittals.

1.02 SECTION INCLUDES

A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.

(1) Development of schedule, cost and resource loading of the schedule, monthly payment requests, and project status reporting requirements of the Contract shall employ computerized Critical Path Method ("CPM") scheduling ("CPM Schedule").

(2) CPM Schedule shall be cost loaded based on Schedule of Values as approved by District.

(3) Submit schedules and reports as specified in the General Conditions.

B. Upon Award of Contract, Contractor shall immediately commence development of Initial and Original CPM Schedules to ensure compliance with CPM Schedule submittal requirements.

1.03 CONSTRUCTION SCHEDULE

A. Within ten (10) days of being awarded the Contract and before request for first progress payment, the Contractor shall prepare and submit to the Project Manager a construction progress schedule conforming to the Milestone Schedule below.

B. The Construction Schedule shall be continuously updated, and an updated schedule shall be submitted with each application for progress payment. Each revised schedule shall indicate the work actually accomplished during the previous period and the schedule for completion of the remaining work.

C. Milestone Schedule:

ACTIVITY DESCRIPTION	REQUIRED COMPLETION
FINAL PROJECT COMPLETION	**July 31, 2018**

1.04 QUALIFICATIONS

A. Contractor shall employ experienced scheduling personnel qualified to use the latest version of [i.e., Primavera Project Planner]. Experience level required is set forth below. Contractor may employ such personnel directly or may employ a consultant for this purpose.

(1) The written statement shall identify the individual who will perform CPM scheduling.

(2) Capability and experience shall be verified by description of construction projects on which individual has successfully applied computerized CPM.

(3) Required level of experience shall include at least two (2) projects of similar nature and scope with value not less than three fourths (¾) of the Total Bid Price of this Project. The written statement shall provide contact persons for referenced projects with current telephone and address information.

B. District reserves the right to approve or reject Contractor's scheduler or consultant at any time. District reserves the right to refuse replacing of Contractor's scheduler or consultant, if District believes replacement will negatively affect the scheduling of Work under this Contract.

1.05 GENERAL

A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.

B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in the Contract, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.

(1) District is not required to accept an early completion schedule, i.e., one that shows an earlier completion date than the Contract Time.

(2) Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier completion schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in its early completion schedule but within the Contract Time.

(3) A schedule showing the work completed in less than the Contract Time, and that has been accepted by District, shall be considered to have Project Float. The Project Float is the time between the scheduled

completion of the work and the Completion Date. Project Float is a resource available to both District and the Contractor.

C. Ownership Project Float: Neither the District nor Contractor owns Project Float. The Project owns the Project Float. As such, liability for delay of the Completion Date rests with the party whose actions, last in time, actually cause delay to the Completion Date.

(1) For example, if Party A uses some, but not all of the Project Float and Party B later uses remainder of the Project Float as well as additional time beyond the Project Float, Party B shall be liable for the time that represents a delay to the Completion Date.

(2) Party A would not be responsible for the time since it did not consume the entire Project Float and additional Project Float remained; therefore, the Completion Date was unaffected by Party A.

D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract CPM Schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.

E. Failure of Progress Schedule to include any element of the Work, or any inaccuracy in Progress Schedule, will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.

F. Software: Use Microsoft Project. Such software shall be compatible with Windows operating system. Contractor shall transmit contract file to District on compact disk at times requested by District.

G. Transmit each item under the form approved by District.

(1) Identify Project with District Contract number and name of Contractor.

(2) Provide space for Contractor's approval stamp and District's review stamps.

(3) Submittals received from sources other than Contractor will be returned to the Contractor without District's review.

1.06 INITIAL CPM SCHEDULE

A. Initial CPM Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to ninety (90) calendar days after the Notice to Proceed.

B. Indicate detailed plan for the Work to be completed in first ninety (90) days of the Contract; details of planned mobilization of plant and equipment;

sequence of early operations; procurement of materials and equipment. Show Work beyond ninety (90) calendar days in summary form.

C. Initial CPM Schedule shall be time scaled.

D. Initial CPM Schedule shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments until acceptance of the Original CPM Schedule. Use of Initial CPM Schedule for progress payments shall not exceed ninety (90) calendar days.

E. District and Contractor shall meet to review and discuss the Initial CPM Schedule within seven (7) calendar days after it has been submitted to District.

(1) District's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).

(2) Contractor shall make corrections to schedule necessary to comply with Contract requirements and shall adjust schedule to incorporate any missing information requested by District. Contractor shall resubmit Initial CPM Schedule if requested by District.

F. If, during the first ninety (90) days after Notice to Proceed, the Contractor is of the opinion that any of the Work included on its Initial CPM Schedule has been impacted, the Contractor shall submit to District a written Time Impact Evaluation ("TIE") in accordance with Article 1.12 of this Section. The TIE shall be based on the most current update of the Initial CPM Schedule.

1.07 ORIGINAL CPM SCHEDULE

A. Submit a detailed proposed Original CPM Schedule presenting an orderly and realistic plan for completion of the Work in conformance with requirements as specified herein.

B. Progress Schedule shall include or comply with following requirements:

(1) Time scaled, cost and resource (labor and major equipment) loaded CPM schedule.

(2) No activity on schedule shall have duration longer than fifteen (15) work days, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District.

(a) Activity durations shall be total number of actual work days required to perform that activity.

(3) The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.

(4) District furnished materials and equipment, if any, identified as separate activities.

(5) Activities for maintaining Project Record Documents.

(6) Dependencies (or relationships) between activities.

(7) Processing/approval of submittals and shop drawings for all material and equipment required per the Contract. Activities that are dependent on submittal acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates.

(a) Include time for submittals, re-submittals and reviews by District. Coordinate with accepted schedule for submission of Shop Drawings, samples, and other submittals.

(b) Contractor shall be responsible for all impacts resulting from re-submittal of Shop Drawings and submittals.

(8) Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity.

(a) Include time for fabrication and delivery of manufactured products for the Work.

(b) Show dependencies between procurement and construction.

(9) Activity description; what Work is to be accomplished and where.

(10) The total cost of performing each activity shall be total of labor, material, and equipment, excluding overhead and profit of Contractor. Overhead and profit of the General Contractor shall be shown as a separate activity in the schedule. Sum of cost for all activities shall equal total Contract value.

(11) Resources required (labor and major equipment) to perform each activity.

(12) Responsibility code for each activity corresponding to Contractor or Subcontractor responsible for performing the Work.

(13) Identify the activities which constitute the controlling operations or critical path. No more than twenty-five (25%) of the activities shall be critical or near critical. Near critical is defined as float in the range of one (1) to (10) days.

(14) Twenty (20) workdays for developing punch list(s), completion of punch-list items, and final clean up for the Work or any designated portion thereof. No other activities shall be scheduled during this period.

(15) Interface with the work of other contractors, District, and agencies such as, but not limited to, utility companies.

(16) Show detailed Subcontractor Work activities. In addition, furnish copies of Subcontractor schedules upon which CPM was built.

(a) Also furnish for each Subcontractor, as determined by District, submitted on Subcontractor letterhead, a statement certifying that Subcontractor concurs with Contractor's Original CPM Schedule and that Subcontractor's related schedules have been incorporated, including activity duration, cost and resource loading.

(b) Subcontractor schedules shall be independently derived and not a copy of Contractor's schedule.

(c) In addition to Contractor's schedule and resource loading, obtain from electrical, mechanical, and plumbing Subcontractors, and other Subcontractors as required by District, productivity calculations common to their trades, such as units per person day, feet of pipe per day per person, feet of wiring per day per person, and similar information.

(d) Furnish schedule for Contractor/Subcontractor CPM schedule meetings which shall be held prior to submission of Original CPM schedule to District. District shall be permitted to attend scheduled meetings as an observer.

(17) Activity durations shall be in Work days.

(18) Submit with the schedule a list of anticipated non-Work days, such as weekends and holidays. The Progress Schedule shall exclude in its Work day calendar all non-Work days on which Contractor anticipates critical Work will not be performed.

C. Original CPM Schedule Review Meeting: Contractor shall, within sixty (60) days from the Notice to Proceed date, meet with District to review the Original CPM Schedule submittal.

(1) Contractor shall have its Project Manager, Project Superintendent, Project Scheduler, and key Subcontractor representatives, as required by District, in attendance. The meeting will take place over a continuous one (1) day period.

(2) District's review will be limited to submittal's conformance to Contract requirements including, but not limited to, coordination requirements. However, review may also include:

(a) Clarifications of Contract Requirements.

(b) Directions to include activities and information missing from submittal.

(c) Requests to Contractor to clarify its schedule.

(3) Within five (5) days of the Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by District at the Meeting.

1.08 ADJUSTMENTS TO CPM SCHEDULE

A. Adjustments to Original CPM Schedule: Contractor shall have adjusted the Original CPM Schedule submittal to address all review comments from original CPM Schedule review meeting and resubmit network diagrams and reports for District's review.

(1) District, within ten (10) days from date that Contractor submitted the revised schedule, will either:

(a) Accept schedule and cost and resource loaded activities as submitted, or

(b) Advise Contractor in writing to review any part or parts of schedule which either do not meet Contract requirements or are unsatisfactory for District to monitor Project's progress, resources, and status or evaluate monthly payment request by Contractor.

(2) District may accept schedule with conditions that the first monthly CPM Schedule update be revised to correct deficiencies identified.

(3) When schedule is accepted, it shall be considered the "Original CPM Schedule" which will then be immediately updated to reflect the current status of the work.

(4) District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may later be discovered to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.

B. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.

(1) By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.

(2) Upon submittal of schedule update, updated schedule shall be considered "current" CPM Schedule.

(3) Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including adverse effects such as delays resulting from ill-timed Work.

C. Submittal of Original CPM Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the Schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.

D. Contractor shall distribute Original CPM Schedule to Subcontractors for review and written acceptance, which shall be noted on Subcontractors' letterheads to Contractor and transmitted to District for the record.

1.09 MONTHLY CPM SCHEDULE UPDATE SUBMITTALS

A. Following acceptance of Contractor's Original CPM Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.

(1) Each schedule update submitted shall be complete, including all information requested for the Original CPM Schedule submittal.

(2) Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.

B. A meeting will be held on approximately the twenty-fifth (25th) of each month to review the schedule update submittal and progress payment application.

(1) At this meeting, at a minimum, the following items will be reviewed: Percent (%) complete of each activity; Time Impact Evaluations for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Contractor delays.

(2) These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.

(3) Contractor shall plan on the meeting taking no less than four (4) hours.

C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated CPM Schedule update.

D. Within five (5) work days of receipt of above noted revised submittals, District will either accept or reject monthly schedule update submittal.

(1) If accepted, percent (%) complete shown in monthly update will be basis for Application for Payment by the Contractor. The schedule update shall be submitted as part of the Contractor's Application for Payment.

(2) If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.

E. Neither updating, changing or revising of any report, curve, schedule, or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall

have the effect of amending or modifying in any way the Completion Date or milestone dates or of modifying or limiting in any way Contractor's obligations under this Contract.

1.10 SCHEDULE REVISIONS

A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.

B. To reflect revisions to the Schedule, the Contractor shall provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. The Contractor shall provide the written narrative and schedule diagram for revisions two (2) working days in advance of the monthly schedule update meeting.

C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District. District may request further information and justification for schedule revisions and Contractor shall, within three (3) days, provide District with a complete written narrative response to District's request.

D. If the Contractor's revision is still not accepted by District, and the Contractor disagrees with District's position, the Contractor has seven (7) calendar days from receipt of District's letter rejecting the revision to provide a written narrative providing full justification and explanation for the revision. The Contractor's failure to respond in writing within seven (7) calendar days of District's written rejection of a schedule revision shall be contractually interpreted as acceptance of District's position, and the Contractor waives its rights to subsequently dispute or file a claim regarding District's position.

E. At District's discretion, the Contractor can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

1.11 RECOVERY SCHEDULE

A. If the Schedule Update shows a completion date twenty-one (21) calendar days beyond the Contract Completion Date, or individual milestone completion dates, the Contractor shall submit to District the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, the Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, the Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.

B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District.

C. If the Contractor's revisions are not accepted by District, District and the Contractor shall follow the procedures in paragraph 1.09.C, 1.09.D and 1.09.E above.

D. At District's discretion, the Contractor can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

1.12 TIME IMPACT EVALUATION ("TIE") FOR CHANGE ORDERS, AND OTHER DELAYS

A. When Contractor is directed to proceed with changed Work, the Contractor shall prepare and submit within fourteen (14) calendar days from the Notice to Proceed a TIE which includes both a written narrative and a schedule diagram depicting how the changed Work affects other schedule activities. The schedule diagram shall show how the Contractor proposes to incorporate the changed Work in the schedule and how it impacts the current schedule-update critical path. The Contractor is also responsible for requesting time extensions based on the TIE's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed Work to the scheduled critical path.

B. Contractor shall be required to comply with the requirements of Paragraph 1.09.A for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.

C. Contractor shall be responsible for all costs associated with the preparation of TIEs, and the process of incorporating them into the current schedule update. The Contractor shall provide District with four (4) copies of each TIE.

D. Once agreement has been reached on a TIE, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Time may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

1.13 TIME EXTENSIONS

A. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with the General Conditions.

B. Where an event for which District is responsible impacts the projected Completion Date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment, and material the Contractor would expend to mitigate District-caused time impact. The Contractor shall submit its mitigation plan to District within fourteen (14) calendar days from the date of discovery of the impact. The Contractor is responsible for the cost to prepare the mitigation plan.

C. Failure to request time, provide TIE, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.

D. No time will be granted under this Contract for cumulative effect of changes.

E. District will not be obligated to consider any time extension request unless the Contractor complies with the requirements of Contract Documents.

F. Failure of the Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.

G. If the Contractor does not submit a TIE within the required fourteen (14) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

1.14 SCHEDULE REPORTS

A. Submit four (4) copies of the following reports with the Initial CPM Schedule, the Original CPM Schedule, and each monthly update.

B. Required Reports:

(1) Two activity listing reports: one sorted by activity number and one by total Project Float. These reports shall also include each activity's early/late and actual start and finish dates, original and remaining duration, Project Float, responsibility code, and the logic relationship of activities.

(2) Cost report sorted by activity number including each activity's associated cost, percentage of Work accomplished, earned value- to date, previous payments, and amount earned for current update period.

(3) Schedule plots presenting time-scaled network diagram showing activities and their relationships with the controlling operations or critical path clearly highlighted.

(4) Cash flow report calculated by early start, late start, and indicating actual progress. Provide an exhibit depicting this information in graphic form.

(5) Planned versus actual resource (i.e., labor) histogram calculated by early start and late start.

C. Other Reports:

In addition to above reports, District may request, from month to month, any two of the following reports. Submit four (4) copies of all reports.

(1) Activities by early start.

(2) Activities by late start.

(3) Activities grouped by Subcontractors or selected trades.

(4) Activities with scheduled early start dates in a given time frame, such as fifteen (15) or thirty (30) day outlook.

D. Furnish District with report files on compact disks containing all schedule files for each report generated.

1.15 PROJECT STATUS REPORTING

A. In addition to submittal requirements for CPM scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each CPM Schedule as specified herein. Status reporting shall be in form specified below.

B. Contractor shall prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:

(1) Status of major Project components (percent (%) complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.

(2) Progress made on critical activities indicated on CPM Schedule.

(3) Explanations for any lack of work on critical path activities planned to be performed during last month.

(4) Explanations for any schedule changes, including changes to logic or to activity durations.

(5) List of critical activities scheduled to be performed next month.

(6) Status of major material and equipment procurement.

(7) Any delays encountered during reporting period.

(8) Contractor shall provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.

(a) Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in computer-generated monthly and weekly printed reports.

(b) Contractor shall explain all variances and mitigation measures.

(9) Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by District at no additional cost.

(10) Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

1.16 WEEKLY SCHEDULE REPORT

At the Weekly Progress Meeting, the Contractor shall provide and present a time-scaled three (3) week look-ahead schedule that is based and correlated by activity number to the current schedule (i.e., Initial, Original CPM, or Schedule Update).

1.17 DAILY CONSTRUCTION REPORTS

On a daily basis, Contractor shall submit a daily activity report to District for each workday, including weekends and holidays when worked. Contractor shall develop the daily construction reports on a computer-generated database capable of sorting daily Work, manpower, and man-hours by Contractor, Subcontractor, area, sub-area, and Change Order Work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of daily construction report data base format prior to implementation. Include in report:

A. Project name and Project number.

B. Contractor's name and address.

C. Weather, temperature, and any unusual site conditions.

D. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.

E. Worker quantities for its own Work force and for Subcontractors of any tier.

F. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

1.18 PERIODIC VERIFIED REPORTS

Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports on the first day of February, May, August, and November during the preceding quarter year; at the completion of the Contract; at the completion of the Work; at the suspension of Work for a period of more than one (1) month; whenever the services of Contractor or any of Contractor's Subcontractors are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;

B. Special Conditions.

1.02 SECTION INCLUDES:

A. Definitions:

(1) Shop Drawings and Product Data are as indicated in the General Conditions and include, but are not limited to, fabrication, erection, layout and setting drawings, formwork and falsework drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams. In addition, there are other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and all positions conform to the requirement of the Contract Documents, including, without limitation, the Drawings.

(2) "Manufactured" applies to standard units usually mass-produced; "fabricated" means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicated proper relation to adjoining work and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.

(3) Manufacturer's Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed, at a minimum, in accordance with a specified product manufacturer's instructions, the Contractor shall procure and distribute copies of these to the District, the Architect, and all other concerned parties and shall furnish, install, or perform the work, at a minimum, in accordance with those instructions.

B. Samples, Shop Drawings, Product Data, and other items as specified, in accordance with the following requirements:

(1) Contractor shall submit all Shop Drawings, Product Data, and Samples to the District, the Architect, the Project Inspector, and the Construction Manager.

(2) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such Shop Drawings, Product Data, and/or Samples.

(3) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall allow sufficient time so that no delay occurs due to required lead time in ordering or delivery of any item to the Site. Contractor shall be responsible for any delay in progress of Work due to its failure to observe these requirements.

(4) Time for completion of Work shall not be extended on account of Contractor's failure to promptly submit Shop Drawings, Product Data, and/or Samples.

(5) Reference numbers on Shop Drawings shall have Architectural and/or Engineering Contract Drawings reference numbers for details, sections, and “cuts” shown on Shop Drawings. These reference numbers shall be in addition to any numbering system that Contractor chooses to use or has adopted as standard.

(6) When the magnitude or complexity of submittal material prevents a complete review within the stated time frame, Contractor shall make this submittal in increments to avoid extended delays.

(7) Contractor shall certify on submittals for review that submittals conform to Contract requirements. In event of any variance, Contractor shall specifically state in transmittal and on Shop Drawings, portions vary and require approval of a substitute. Also certify that Contractor-furnished equipment can be installed in allocated space.

(8) Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standard of the American Society for Testing and Materials.

(9) Upon demand by Architect or District, Contractor shall submit samples of materials and/or articles for tests or examinations and consideration before Contractor incorporates same in Work. Contractor shall be solely responsible for delays due to sample(s) not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples that are of value after testing will remain the property of Contractor.

C. Submittal Schedule:

(1) Contractor shall prepare its proposed submittal schedule that is coordinated with the proposed construction schedule and submit both to the District within ten (10) days after the date of the Notice to Proceed. Contractor's proposed schedules shall become the Project Construction Schedule and the Project Submittal Schedule after each is approved by the District.

(2) Contractor is responsible for all lost time should the initial submittal be rejected, marked "revise and resubmit", etc.

(3) All Submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those Submittals shall be forwarded to the District so as not to delay the Construction Schedule.

1.03 SHOP DRAWINGS:

A. Contractor shall submit one reproducible transparency and six (6) opaque reproductions. The District will review and return the reproducible copy and one (1) opaque reproduction to Contractor.

B. Before commencing installation of any Work, the Contractor shall submit and receive approval of all drawings, descriptive data, and material list(s) as required to accomplish Work.

C. Review of Shop Drawings is regarded as a service to assist Contractor and in all cases original Contract Documents shall take precedence as outlined under General Conditions.

D. No claim for extra time or payment shall be based on work shown on Shop Drawings unless the claim is (1) noted on Contractor's transmittal letter accompanying Shop Drawings and (2) Contractor has complied with all applicable provisions of the General Conditions, including, without limitation, provisions regarding changes and payment, and all required written approvals.

E. District shall not review Shop Drawings for quantities of materials or number of items supplied.

F. District's and/or Architect's review of Shop Drawing will be general. District and/or Architect review does not relieve Contractor of responsibility for dimensions, accuracy, proper fitting, construction of Work, furnishing of materials, or Work required by Contract Documents and not indicated on Shop Drawings. The District's and/or Architect's review of Shop Drawings is not to be construed as approving departures from Contract Documents.

G. Review of Shop Drawings and Schedules does not relieve Contractor from responsibility for any aspect of those Drawings or Schedules that is a violation of local, County, State, or Federal laws, rules, ordinances, or rules and regulations of commissions, boards, or other authorities or utilities having jurisdiction.

H. Before submitting Shop Drawings for review, Contractor shall check Shop Drawings of its subcontractors for accuracy, and confirm that all Work contiguous with and having bearing on other work shown on Shop Drawings is accurately drawn and in conformance with Contract Documents.

I. Submitted drawings and details must bear stamp of approval of Contractor:

(1) Stamp and signature shall clearly certify that Contractor has checked Shop Drawings for compliance with Drawings.

(2) If Contractor submits a Shop Drawing without an executed stamp of approval, or whenever it is evident (despite stamp) that Drawings have not been checked, the District and/or Architect will not consider them and will return them to the Contractor for revision and resubmission. In that event, it will be deemed that Contractor has not complied with this provision and Contractor shall bear risk of all delays to same extent as if it had not submitted any Shop Drawings or details.

J. Submission of Shop Drawings (in either original submission or when resubmitted with correction) constitutes evidence that Contractor has checked all information thereon and that it accepts and is willing to perform Work as shown.

K. Contractor shall pay for cost of any changes in construction due to improper checking and coordination. Contractor shall be responsible for all additional costs, including coordination. Contractor shall be responsible for costs incurred by itself, the District, the Architect, the Project Inspector, the Construction Manager, any other Subcontractor or contractor, etc., due to improperly checked and/or coordination of submittals.

L. Shop Drawings must clearly delineate the following information:

(1) Project name and address.

(2) Specification number and description.

(3) Architect's name and project number.

(4) Shop Drawing title, number, date, and scale.

(5) Names of Contractor, Subcontractor(s) and fabricator.

(6) Working and erection dimensions.

(7) Arrangements and sectional views.

(8) Necessary details, including complete information for making connections with other Work.

(9) Kinds of materials and finishes.

(10) Descriptive names of materials and equipment, classified item numbers, and locations at which materials or equipment are to be installed in the Work. Contractor shall use same reference identification(s) as shown on Contract Drawings.

M. Contractor shall prepare composite drawings and installation layouts when required to solve tight field conditions.

(1) Shop Drawings shall consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences, etc.

(2) Contractor shall coordinate these composite Shop Drawings and installation layouts in the field between itself and its Subcontractor(s) for proper relationship to the Work, the work of other trades, and the field conditions. The Contractor shall check and approve all submittal(s) before submitting them for final review.

1.04 PRODUCT DATA OR NON REPRODUCIBLE SUBMITTALS:

A. Contractor shall submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Contract must submit a minimum of six (6) each, to the District. District shall return one (1) to the Contractor, who shall reproduce whatever additional copies it requires for distribution.

B. Contractor shall submit six (6) copies of a complete list of all major items of mechanical, plumbing, and electrical equipment and materials in accordance with the approved Submittal Schedule, except as required earlier to comply with the approved Construction Schedule. Other items specified are to be submitted prior to commencing Work. Contractor shall submit items of like kind at one time in a neat and orderly manner. Partial lists will not be acceptable.

C. Submittals shall include manufacturer's specifications, physical dimensions, and ratings of all equipment. Contractor shall furnish performance curves for all pumps and fans. Where printed literature describes items in addition to that item being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out. If highlighting is used, Contractor shall mark all copies.

D. Equipment submittals shall be complete and include space requirements, weight, electrical and mechanical requirements, performance data, and supplemental information that may be requested.

E. Imported Materials Certification must be submitted at least ten (10) days before material is delivered.

1.05 SAMPLES:

A. Contractor shall submit for approval Samples as required and within the time frame in the Contract Documents. Materials such as concrete, mortar, etc., which require on-site testing will be obtained from Project Site.

B. Contractor shall submit four (4) samples except where greater or lesser number is specifically required by Contract Documents including, without limitation, the Specifications.

(1) Samples must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.

(2) Samples must show full range of texture, color, and pattern.

C. Contractor shall make all Submittals, unless it has authorized Subcontractor(s) to submit and Contractor has notified the District in writing to this effect.

D. Samples to be shipped prepaid or hand-delivered to the District.

E. Contractor shall mark samples to show name of Project, name of Contractor submitting, Contract number and segment of Work where representative Sample will be used, all applicable Specifications Sections and documents, Contract Drawing Number and detail, and ASTM or FS reference, if applicable.

F. Contractor shall not deliver any material to Site prior to receipt of District's and/or Architect's completed written review and approval. Contractor shall furnish materials equal in every respect to approved Samples and execute Work in conformance therewith.

G. District's and/or Architect's review, acceptance, and/or approval of Sample(s) will not preclude rejections of any material upon discovery of defects in same prior to final acceptance of completed Work.

H. After a material has been approved, no change in brand or make will be permitted.

I. Contractor shall prepare its Submittal Schedule and submit Samples of materials requiring laboratory tests to specified laboratory for testing not less than ninety (90) days before such materials are required to be used in Work.

J. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other information required.

K. Field Samples and Mock-Ups are to be removed by Contractor at District's direction:

(1) Size: As Specified.

(2) Furnish catalog numbers and similar data, as requested.

1.06 REVIEW AND RESUBMISSION REQUIREMENTS:

A. The District will arrange for review of Sample(s), Shop Drawing(s), Product Data, and other submittal(s) by appropriate reviewer and return to Contractor as provided below within twenty-one (21) days after receipt or within twenty-one (21) days after receipt of all related information necessary for such review, whichever is later.

B. One (1) copy of product or materials data will be returned to Contractor with the review status.

C. Samples to be incorporated into the Work will be returned to Contractor, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review, if any. Other

Samples will not be returned, but the same notice will be given with respect thereto, and that notice shall be considered a return of the Sample.

D. Contractor shall revise and resubmit any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) as required by the reviewer. Such resubmittals will be reviewed and returned in the same manner as original Sample(s), Shop Drawing(s), Product Data, and other submittal(s), within fourteen (14) days after receipt thereof or within fourteen (14) days after receipt of all related information necessary for such review. Such resubmittal shall not delay the Work.

E. Contractor may proceed with any of the Work covered by Sample(s), Shop Drawing(s), Product Data, and other submittal(s) upon its return if designated as no exception taken, or revise as noted, provided the Contractor proceeds in accordance with the District and/or the Architect's notes and comments.

F. Contractor shall not begin any of the work covered by a Sample(s), Shop Drawing(s), Product Data, and other submittal(s), designated as revise and resubmit or rejected, until a revision or correction thereof has been reviewed and returned to Contractor.

G. Sample(s), Shop Drawing(s), Product Data, and other submittal(s) designated as revise and resubmit or rejected and requiring resubmittal, shall be revised or corrected and resubmitted to the District no later than fourteen (14) days or a shorter period as required to comply with the approved Construction Schedule, after its return to Contractor.

H. Neither the review nor the lack of review of any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) shall waive any of the requirements of the Contract Documents, or relieve Contractor of any obligation thereunder.

I. District's and/or Architect's review of Shop Drawings does not relieve the Contractor of responsibility for any errors that may exist. Contractor is responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all the Work.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 35 13.23

SITE STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;

B. Special Conditions;

C. Drug-Free Workplace Certification;

D. Tobacco-Free Environment Certification;

E. Criminal Background Investigation/Fingerprinting Certification;

F. Temporary Facilities and Controls.

1.02 REQUIREMENTS OF THE DISTRICT:

A. Drug-Free Schools and Safety Requirements:

(1) All school sites and other District Facilities have been declared “Drug-Free Zones.” No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or contractors are to use drugs on these sites.

(2) Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. Contractor shall post: "Non-Smoking Area" in a highly visible location in each work area, staging area, and parking area. Contractor may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.

(3) Contractor shall ensure that no alcohol, firearms, weapons, or controlled substances enter or are used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.

B. Language: Profanity or other unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students, staff, volunteers, parents or public will not be allowed.

C. Disturbing the Peace (Noise and Lighting):

(1) Contractor shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.

(2) The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use. District reserves the right to prohibit the use of radios at the Site, except for mobile phones or other handheld communication radios.

(3) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

D. Traffic:

(1) Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on-the Premises shall be five (5) miles per hour (maximum) or less if conditions require.

(2) All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Contractor.

(3) District shall designate a construction entry to the Site. If Contractor requests, District determines it is required, and to the extent possible, District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with District and at Contractor's expense.

(4) Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in softscape areas that could otherwise be damaged.

E. All of the above shall be observed and complied with by the Contractor and all workers on the Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District. The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Obtaining of Permits, Licenses and Registrations and Work to Comply with All Applicable Laws and Regulations;

B. Special Conditions; and

C. Quality Control.

1.02 DESCRIPTION:

This section covers the general requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.03 REQUIREMENTS OF REGULATORY AGENCIES:

A. All statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction over the Work, are hereby incorporated into these Contract Documents as if repeated in full herein and are intended to be included in any reference to Code or Building Code, unless otherwise specified, including, without limitation, the references in the list below. Contractor shall make available at the Site copies of all the listed documents applicable to the Work as the District and/or Architect may request, including, without limitation, applicable portions of the California Code of Regulations ("CCR").

(1) California Building Standards Administrative Code, Part 1, Title 24, CCR.

(2) California Building Code (CBC), Part 2, Title 24, CCR; (International Building Code volumes 1-2 and California Amendments).

(3) California Electrical Code (CEC), Part 3, Title 24, CCR; (National Electrical Code and California Amendments).

(4) California Mechanical Code (CMC), Part 4, Title 24, CCR; (Uniform Mechanical Code and California Amendments).

(5) California Plumbing Code (CPC), Part 5, Title 24, CCR; (Uniform Plumbing Code and California Amendments).

(6) California Fire Code (CFC), Part 9, Title 24, CCR; (International Fire Code and California Amendments).

(7) California Referenced Standards Code, Part 12, Title 24, CCR.

(8) State Fire Marshal Regulations, Public Safety, Title 19, CCR.

(9) Partial List of Applicable National Fire Protection Association (NFPA) Standards:

(a) NFPA 13 - Automatic Sprinkler System.

(b) NFPA 14 - Standpipes Systems.

(c) NFPA 17A - Wet Chemical System

(d) NFPA 24 - Private Fire Mains.

(e) (California Amended) NFPA 72 - National Fire Alarm Codes.

(f) NFPA 253 - Critical Radiant Flux of Floor Covering System.

(g) NFPA 2001 - Clean Agent Fire Extinguishing Systems.

(10) California Division of the State Architect interpretation of Regulations ("DSA IR"), including, without limitation:

(a) DSA IR A-6 — Construction Change Document Submittal and Approval Processes.

(b) DSA IR A-7 — Project Inspector Certification and Approval.

(c) DSA IR A-8 — Project Inspector and Assistant Inspector Duties and Performance.

(d) DSA IR A-12 — Assistant Inspector Approval.

(11) DSA Procedures ("DSA PR")

(a) DSA PR 13-01 – Construction Oversight Process

(b) DSA PR 13-02 – Project Certification Process

B. This Project shall be governed by applicable regulations, including, without limitation, the State of California's Administrative Regulations for the Division of the State Architect-Structural Safety (DSA/SS), Chapter 4, Part 1, Title 24, CCR, and the most current version on the date the bids are opened and as it pertains to school construction including, without limitation:

(1) Test and testing laboratory per Section 4-335. District shall pay for the testing laboratory.

(2) Special inspections per Section 4-333(c).

(3) Deferred Approvals per section 4-317(g).

(4) Verified reports per Sections 4-336 & 4-343(c).

(5) Duties of the Architect & Engineers shall be per Sections 4-333(a) and 4-341.

(6) Duties of the Contractor shall be per Section 4-343.

(7) Duties of Project Inspector shall be per Section 4-334.

(8) Addenda and Construction Change Documents per Section 4-338.

Contractor shall keep and make available all applicable parts of the most current version of Title 24 referred to in the plans and specifications at the Site during construction.

C. Items of deferred approval shall be clearly marked on the first sheet of the Architect's and/or Engineer's approved Drawings. All items later submitted for approval shall be per Title 24 requirements to the DSA.

(1) Contractor shall submit the following to Architect for review and endorsement:

(a) Product information on proposed material/system supplier.

(b) Drawings, specifications, and calculations prepared, signed, and stamped by an architect or engineer licensed in the State of California for that portion of the Work.

(c) All other requirements as may be required by DSA.

(2) Cost of preparing and submitting documentation per DSA Deferred Approval requirements including required modifications to Drawings and Specifications, whether or not indicated in the Contract Documents, shall be borne by Contractor.

(3) Contractor shall not begin fabrication and installation of deferred approval items without first obtaining DSA approval of Drawings and Specifications.

(4) Schedule of Work Subject to DSA Deferred Approval: Window wall systems exceeding 10 feet in span.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 42 13

ABBREVIATIONS AND ACRONYMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions including without limitation, Definitions;

B. Special Conditions.

1.02 DOCUMENT INCLUDES:

A. Abbreviations used throughout the Contract Documents.

B. Reference to a technical society, organization, or body is by abbreviation, as follows:

1.	AA	The Aluminum Association
2.	AAMA	American Architectural Manufacturers Association
3.	AASHTO	American Association of State Highway and Transportation Officials
4.	ABPA	Acoustical and Board Products Association
5.	ACI	American Concrete Institute
6.	AGA	American Gas Association
7.	AGC	Associated General Contractors of America
8.	AHC	Architectural Hardware Consultant
9.	AI	Asphalt Institute
10.	AIA	American Institute of Architects
11.	AIEE	American Institute of Electrical Engineers
12.	AISC	American Institute of Steel Construction
13.	AISI	American Iron and Steel Institute
14.	AMCA	Air Moving and Conditioning Association
15.	ANSI	American National Standards Institute
16.	APA	American Plywood Association
17.	ARI	Air Conditioning and Refrigeration Institute
18.	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
19.	ASME	American Society of Mechanical Engineers
20.	ASSE	American Society of Structural Engineers
21.	ASTM	American Society of Testing and Materials
22.	AWPB	American Wood Preservers Bureau
23.	AWPI	American Wood Preservers Institute
24.	AWS	American Welding Society
25.	AWSC	American Welding Society Code
26.	AWI	Architectural Woodwork Institute
27.	AWWA	American Water Works Association

28.	BIA	Brick Institute of America
29.	CCR	California Code of Regulations
30.	CLFMI	Chain Link Fence Manufacturers Institute
31.	CMG	California Masonry Guild
32.	CRA	California Redwood Association
33.	CRSI	Concrete Reinforcing Steel Institute
34.	CS	Commercial Standards
35.	CSI	Construction Specifications Institute
36.	CTI	Cooling Tower Institute
37.	FGMA	Flat Glass Manufacturer's Association
38.	FIA	Factory Insurance Association
39.	FM	Factory Mutual
40.	FS	Federal Specification
41.	FTI	Facing Title Institute
42.	GA	Gypsum Association
43.	ICC	International Code Council
44.	IEEE	Institute of Electrical and Electronic Engineers
45.	IES	Illumination Engineering Society
46.	LIA	Lead Industries Association
47.	MIA	Marble Institute of America
48.	MLMA	Metal Lath Manufacturers Association
49.	MS	Military Specifications
50.	NAAMM	National Association of Architectural Metal Manufacturers
51.	NBHA	National Builders Hardware Association
52.	NBFU	National Board of Fire Underwriters
53.	NBS	National Bureau of Standards
54.	NCMA	National Concrete Masonry Association
55.	NEC	National Electrical Code
56.	NEMA	National Electrical Manufacturers Association
57.	NFPA	National Fire Protection Association/National Forest Products Association
58.	NMWIA	National Mineral Wool Insulation Association
59.	NTMA	National Terrazzo and Mosaic Association
60.	NWMA	National Woodwork Manufacturer's Association
61.	ORS	Office of Regulatory Services (California)
62.	OSHA	Occupational Safety and Health Act
63.	PCI	Precast Concrete Institute
64.	PCA	Portland Cement Association
65.	PDCA	Painting and Decorating Contractors of America
66.	PDI	Plumbing Drainage Institute
67.	PEI	Porcelain Enamel Institute
68.	PG&E	Pacific Gas & Electric Company
69.	PS	Product Standards
70.	SDI	Steel Door Institute; Steel Deck Institute
71.	SJI	Steel Joist Institute
72.	SSPC	Steel Structures Painting Council
73.	TCA	Tile Council of America
74.	TPI	Truss Plate Institute
75.	UBC	Uniform Building Code
76.	UL	Underwriters Laboratories Code
77.	UMC	Uniform Mechanical Code

78.	USDA	United States Department of Agriculture
79.	VI	Vermiculite Institute
80.	WCLA	West Coast Lumberman's Association
81.	WCLB	West Coast Lumber Bureau
82.	WEUSER	Western Electric Utilities Service Engineering Requirements
83.	WIC	Woodwork Institute of California
84.	WPOA	Western Plumbing Officials Association

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 42 16

DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions including without limitation, Definitions;

B. Special Conditions.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or Federal Standards, Contractor shall comply with requirements of the standard, except when more rigid requirements are specified in the Contract Documents, or are required by applicable codes.

B. Contractor shall conform to current reference standard publication date in effect on the date of bid opening.

C. Contractor shall obtain copies of standards unless specifically required not to by the Contract Documents.

D. Contractor shall maintain a copy of all standards at jobsite during submittals, planning, and progress of the specific Work, until final completion, unless specifically required not to by the Contract Documents.

E. Should specified reference standards conflict with Contract Documents, Contractor shall request clarification from the District and/or the Architect before proceeding.

F. The contractual relationship of the parties to the Contract shall not be altered from the contractual relationship as indicated in the Contract Documents by mention or inference otherwise in any referenced document.

G. Governing Codes shall be as shown in the Contract Documents including, without limitation, the Specifications.

END OF DOCUMENT

DOCUMENT 01 42 19

REFERENCES

PART 1 - GENERAL

1.01 SCHEDULE OF REFERENCES:

The following information is intended only for the general assistance of the Contractor, and the District does not represent that all of the information is current. It is the Contractor's responsibility to verify the correct information for each of the entities listed.

AA	The Aluminum Association 1400 Crystal Drive, Suite 430 Arlington, VA 22202 www.aluminum.org	703/358-2960
AABC	Associated Air Balance Council 1518 K Street, NW, Suite 503 Washington, DC 20005 www.aabc.com	202/737-0202
AAMA	American Architectural Manufacturers Association 1827 Walden Office Sq., Suite 550 Schaumburg, IL 60173-4268 www.aamanet.org	847/303-5664
AASHTO	American Association of State Highway and Transportation Officials 444 N Capitol St. NW - Suite 249 Washington, DC 20001 www.transportation.org	202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 One Davis Drive Research Triangle Park, NC 27709 2215 www.aatcc.org	919/549-8141
ACA	American Coatings Association 1500 Rhode Island Ave., NW Washington DC, 20005 www.paint.org	202/462-6272

ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439 www.concrete.org	248/848-3700
ACPA	American Concrete Pipe Association 8445 Freeport Parkway, Suite 350 Irving, TX 75063-2595 www.concrete-pipe.org	972/506-7216
ADC	Air Duct Council 1901 N. Roselle Road, Suite 800 Schaumburg, Illinois 60195 www.flexibleduct.org	847/706-6750
AF&PA	American Forest and Paper Association 1101 K Street, NW, Suite 700 Washington, DC 20005 www.afandpa.org	202/463-2700
AGA	American Gas Association 400 North Capitol Street, NW Washington, DC 20001 www.aga.org	202/824-7000
AGC	Associate General Contractors of America 2300 Wilson Blvd., Suite 300 Arlington, VA 22201 www.agc.org	703/548-3118
AHA	American Hardboard Association 1210 West Northwest Highway Palatine, IL 60067 domensino.com/AHA/default.htm	847/934-8800
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480 www.asphaltinstitute.org	859/288-4960
AIA	The American Institute of Architects 1735 New York Ave., NW Washington, DC 20006-5292 www.aia.org	202/626-7300
AISC	American Institute of Steel Construction 130 East Randolph Street Suite 2000 Chicago, IL 60601 www.aisc.org	312.670.2400

AIA	American Insurance Association (formerly the National Board of Fire Underwriters) 555 12th St, NW, Suite 550 Washington DC 20004 www.aiadc.org	202/828-7100
AISI	American Iron and Steel Institute 25 Massachusetts Ave., NW, Suite 800 Washington, DC 20001 www.steel.org	202/452.7100
AITC	American Institute of Timber Construction 7012 S. Revere Parkway Suite 140 Centennial, CO 80112 www.aitc-glulam.org	503/639.0651
ALI	Associated Laboratories, Inc. P.O. Box 152837 Dallas, TX 75315 www.assoc-labs.com	214/565-0593
ALSC	American Lumber Standards Committee, Inc. 7470 New Technology Way, Suite F Frederick, MD 21703 www.alsc.org	301/972-1700
AMCA	Air Movement and Control Association International, Inc. 30 W. University Drive Arlington Heights, IL 60004 www.amca.org	847/394-0150
ANLA	American Nursery & Landscape Association (now AmericanHort) 525 9th St NW, Suite 80 Washington, DC 20004 www.americanhort.org	202/789-2900
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC, 20036 www.ansi.org	202/293.8020
APA	APA-The Engineered Wood Association 7011 S. 19th Street Tacoma, WA 98466-5333 www.apawood.org	253/565-6600

APA	Architectural Precast Association 325 John Know Rd, Ste L103 Tallahassee, FL 32303 www.archprecast.org	850/205.5637
ARI	Air Conditioning and Refrigeration Institute (now Air-Conditioning, Heating, & Refrigeration Institute) 2111 Wilson Blvd, Suite 500 Arlington, VA 22201 www.ahrinet.org	703/524-8800
ARMA	Asphalt Roofing Manufacturers Association Public Information Department 750 National Press Building 529 14th Street, NW Washington, DC 20045 www.asphaltroofing.org	202/591-2450
ASA	The Acoustical Society of America ASA Office Manager Suite 1NO1 2 Huntington Quadrangle Melville, NY 11747-4502 http://asa.aip.org	516/576-2360
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 www.asce.org	800/548-2723 703/295-6300
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329-2305 www.ashrae.org	800/527-4723 404/636-8400
ASLA	American Society of Landscape Architects 636 Eye Street, NW Washington, DC 20001-3736 www.asla.org	202/898-2444
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016-5990 www.asme.org	800/434-2763
ASPE	American Society of Plumbing Engineers 2980 S River Rd. Des Plaines, IL 60018 http://aspe.org	847/296-0002

ASQ	American Society for Quality P.O. Box 3005 Milwaukee, WI 53201-3005 or 600 North Plankinton Avenue Milwaukee, WI 53203 http://asq.org	800/248-1946 414/272-8575
ASSE	American Society of Sanitary Engineering 901 Canterbury, Suite A Westlake, Ohio 44145 www.asse-plumbing.org	440/835-3040
ASTM	ASTM International 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA, 19428-2959 www.astm.org	610/832-9500
AWCI	Association of the Wall and Ceiling Industry 513 West Broad Street, Suite 210 Falls Church, VA 22046 www.awci.org	703/538-1600
AWPA	American Wood Protection Association P.O. Box 361784 Birmingham, AL 35236-1784 www.awpa.com	205/733-4077
AWPI	American Wood Preservers Institute 2750 Prosperity Ave. Suite 550 Fairfax, VA 22031-4312 www.arcat.com	800/356-AWPI 703/204-0500
AWS	American Welding Society 8669 Doral Boulevard, Suite 130 Doral, Florida 33166 www.aws.org	800/443-9353 305/443-9353
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165-5874 www.awinet.org	571/323-3636
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235 www.awwa.org	800/926-7337 303/794 7711

BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 15th floor New York, NY 10017 www.buildershardware.com	212/297-2122
BIA	The Brick Industry Association 1850 Centennial Park Drive, Suite 301 Reston, VA 20191 www.gobrick.com	703/620-0010
CGA	Compressed Gas Association 14501 George Carter Way, Suite 103 Chantilly VA 20151-2923 www.cganet.com	703/788-2700
CISCA	Ceilings & Interior Systems Construction Association 1010 Jorie Blvd, Suite 30 Oak Brook, IL 60523 www.cisca.org	630/584-1919
CISPI	Cast Iron Soil Pipe Institute 1064 Delaware Avenue SE Atlanta, GA 30316 www.cispi.org	404/622-0073
CLFMI	Chain Link Fence Manufacturers Institute 10015 Old Columbia Road, Suite B-215 Columbia, MD 21046 www.associationsites.com/main-pub.cfm?usr=clfma	410/290-6267
CPA	Composite Panel Association 19465 Deerfield Avenue, Suite 306 Leesburg, VA 20176 www.compositepanel.org	703/724-1128
CPSC	Consumer Product Safety Commission 4330 East West Highway Bethesda, MD 20814 www.cpsc.gov	301/504-7923 800/638-2772
CRA	California Redwood Association 405 Enfrente Drive, Suite 200 Novato, CA 94949 www.calredwood.org	415/382-0662

CRI	Carpet and Rug Institute P.O. Box 2048 Dalton, Georgia 30722-2048 www.carpet-rug.org	706/278-3176
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173 4758 www.crsi.org	847/517-1200
CSI	The Construction Specifications Institute 110 South Union Street, Suite 100 Alexandria VA 22314 www.csinet.org	800/689-2900
CTIOA	Ceramic Tile Institute of America 12061 Jefferson Blvd. Culver City, CA 90230-6219 www.ctioa.org	310/574-7800
DHI	Door and Hardware Institute (formerly National Builders Hardware Association) 14150 Newbrook Dr. Chantilly, VA 20151 www.dhi.org	703/222-2010
DIPRA	Ductile Iron Pipe Research Association 2000 2nd Avenue, South Suite 429 Birmingham, AL 35233 www.dipra.org	205/402-8700
DOC	U.S. Department of Commerce 1401 Constitution Ave., NW Washington, D.C. 20230 www.commerce.gov	202/482-2000
DOT	U.S. Department of Transportation 1200 New Jersey Avenue, SE Washington, DC 20590 www.dot.gov	855/368-4200
EJMA	Expansion Joint Manufacturers Association, Inc. 25 North Broadway Tarrytown, NY 10591 www.ejma.org	914/332-0040

EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 www.epa.gov	202/272-0167
FCICA	Floor Covering Installation Contractors Association 7439 Millwood Drive West Bloomfield, MI 48322 www.fcica.com	248/661-5015 877/TO-FCICA
FM Global	Factory Mutual Insurance Company Amy Daley Global Practice Leader – Education, Public Entities, Health Care FM Global 270 Central Avenue Johnston, RI 02919-4949 www.fmglobal.com	401/275-3000 401/275-3029
FS	General Services Administration (GSA) Index of Federal Specifications, Standards and Commercial Item Descriptions 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407 www.gsa.gov	202/619-8925
GA	The Gypsum Association 6525 Belcrest Road, Suite 480 Hyattsville, MD 20782 www.gypsum.org	301/277-8686
GANA	Glass Association of North America 800 SW Jackson St., Suite 1500 Topeka, KS 66612-1200 www.glasswebsite.com	785/271-0208
HMA	Hardwood Manufacturers Association 665 Rodi Road, Suite 305 Pittsburgh, PA 15235 http://hmamembers.org	412/244-0440
HPVA	Hardwood Plywood & Veneer Association 1825 Michael Faraday Drive Reston, Virginia 20190 www.hpva.org	703/435-2900

IAPMO	International Association of Plumbing and Mechanical Officials (formerly the Western Plumbing Officials Association) 4755 E. Philadelphia St. Ontario, CA 91761 www.iapmo.org	909/472-4100
ICC	International Code Council 500 New Jersey Avenue, NW, 6th Floor Washington, DC 20001 www.iccsafe.org	888/422-7233
IEEE	Institute of Electrical and Electronics Engineers 3 Park Avenue, 17th Floor New York, NY 10016-5997 www.ieee.org	212/419-7900
IES	Illuminating Engineering Society 120 Wall Street, Floor 17 New York, NY 10005-4001 www.ies.org	212/248-5000
ITRK	Intertek Testing Services 3933 US Route 11 Cortland, NY 13045 www.intertek.com	607/753-6711
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive Rockville, MD 20850 www.mcaa.org	301/869-5800
MIA	Marble Institute of America 28901 Clemens Rd, Ste 100 Cleveland, OH 44145 www.marble-institute.com	440/250-9222
MMPA (formerly WMMPA)	Moulding & Millwork Producers Association (formerly Wood Moulding & Millwork Producers Association) 507 First Street Woodland, CA 95695 www.wmmpa.com	530/661-9591 800/550-7889

MSS	Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180-4602 http://mss-hq.org	703/281-6613
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Rd. Bldg. C, Suite 312 Glen Ellyn, IL 60137 www.naamm.org	630/942-6591
NAIMA	North American Insulation Manufacturers Association 44 Canal Center Plaza, Suite 310 Alexandria, VA 22314 www.naima.org	703/684-0084
NAPA	National Asphalt Pavement Association 5100 Forbes Blvd. Lanham, MD USA 20706-4407 www.asphaltpavement.org	888/468-6499 301/731-4748
NCSPA	National Corrugated Steel Pipe Association 14070 Proton Road, Suite 100 LB9 Dallas, TX 75244 www.ncspa.org	972/850-1907
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171-4662 www.ncma.org	703/713-1900
NEBB	National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877 www.nebb.org	301/977-3698
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814 www.necanet.org	301/657-3110
NEMA	National Electrical Manufacturers Association 1300 North 17th Street, Suite 1752 Rosslyn, Virginia 22209 www.nema.org	703/841-3200

NEII	National Elevator Industry, Inc. 1677 County Route 64 P.O. Box 838 Salem, New York 12865-0838 www.neii.org	518/854-3100
NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, Massachusetts USA 02169-7471 www.nfpa.org	617/770-3000
NHLA	National Hardwood Lumber Association PO Box 34518 Memphis, TN 38184 www.nhla.com	901/377-1818
NIA	National Insulation Association 12100 Sunset Hills Road, Suite 330 Reston, VA 20190 www.insulation.org	703/464-6422
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600 Rosemont, IL 60018-5607 www.nrca.net	847/299-9070
NSF	NSF International P.O. Box 130140 789 N. Dixboro Road Ann Arbor, MI 48113-0140, USA www.nsf.org	800/673-6275 734/769-8010
NTMA	National Terrazzo and Mosaic Association PO Box 2605 Fredericksburg, TX 78624 www.ntma.com	800/323-9736
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational Safety & Health Administration 200 Constitution Ave., NW Washington, D.C. 20210 www.osha.gov	800/321-OSHA (6742)

PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077 or 500 New Jersey Ave., N.W. 7th Floor Washington, D.C. 20001 www.cement.org	847/966-6200 202/408-9494
PCI	Precast/Prestressed Concrete Institute 200 W. Adams St. #2100 Chicago, IL 60606 www.pci.org	312/786-0300
PDCA	Painting and Decorating Contractors of America 2316 Millpark Drive, Ste 220 Maryland Heights, MO 63043 www.pdca.com	800/332-PDCA (7322) 314/514-7322
PDI	Plumbing & Drainage Institute 800 Turnpike Street, Suite 300 North Andover, MA 01845 http://pdionline.org	978/557-0720 800/589-8956
PEI	Porcelain Enamel Institute, Inc. P.O. Box 920220 Norcross, GA 30010 www.porcelainenamel.com	770/676-9366
PG&E	Pacific Gas & Electric Company www.pge.com	800/743-5000
PLANET	Professional Landcare Network 950 Herndon Parkway, Suite 450 Herndon, Virginia 20170 www.landcarenetwork.org	703/736-9666 800/395-2522 703/736-9668
RFCI	Resilient Floor Covering Institute 115 Broad Street, Suite 201 La Grange GA 30240 www.rfci.com	706/882-3833
RIS	Redwood Inspection Service 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523 www.redwoodinspection.com	925/935-1499
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021 www.sdi.org	847/458-4647

SDI	Steel Door Institute 30200 Detroit Road Westlake, Ohio 44145 www.steeldoor.org	440/899-0010
SJI	Steel Joist Institute 234 W. Cheves Street Florence, SC 29501 http://steeljoist.org	843/407-4091
SMA	Stucco Manufacturers Association 500 East Yale Loop Irvine, CA 92614 www.stuccomfgassoc.com	949/387.7611
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, Virginia 20151-1219 www.smacna.org	703/803-2980
SPI	SPI: The Plastics Industry Trade Association, Inc. 1667 K St., NW, Suite 1000 Washington, DC 20006 www.plasticsindustry.org	202/974-5200
SSPC	Society for Protective Coatings (formerly the Steel Structures Painting Council) 40 24th St 6th Fl Pittsburgh, PA 15222 www.sspc.org	412/281-2331 877/281-7772
TCA	The Tile Council of North America 100 Clemson Research Blvd. Anderson, SC 29625 www.tcnatile.com	864/646-8453
TPI	Truss Plate Institute 218 North Lee Street, Suite 312 Alexandria, VA 22314 www.tpinst.org	703/683-1010
TPI	Turfgrass Producers International 2 East Main Street East Dundee, IL 60118 www.turfgrasssod.org	800/405-8873 847/649-5555

TCIA	Tree Care Industry Association (formerly the National Arborist Association) 136 Harvey Road, Suite 101 Londonderry, NH 03053 www.tcia.org	800/733-2622
TVI	The Vermiculite Institute c/o The Schundler Company 150 Whitman Avenue Edison, NJ. 08817 www.vermiculiteinstitute.org	732/287-2244
UL	Underwriters Laboratories Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 www.ul.com	847/272-8800 877/854-3577
UNI	Uni-Bell PVC Pipe Association 2711 LBJ Freeway, Suite 1000 Dallas, TX 75234 www.uni-bell.org	972/243-3902
USDA	U.S. Department of Agriculture 1400 Independence Ave., S.W. Washington, DC 20250 www.usda.gov	202/720-2791
WA	Wallcoverings Association 401 North Michigan Avenue Suite 2200 Chicago, IL 60611 www.wallcoverings.org	312/321-5166

WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97281 or 6980 S.W. Varns Tigard, OR 97223 www.wclib.org	503/639-0651
WCMA	Window Covering Manufacturers Association 355 Lexington Avenue 15th Floor New York, New York 10017 www.wcmanet.org	212/297-2122
WDMA	Window & Door Manufacturers Association 401 N. Michigan Avenue, Suite 2200 Chicago, IL 60611 or 2025 M Street, NW, Ste. 800 Washington, D.C. 20036-3309 www.wdma.com	312/321-6802 202/367-1157
WI	Woodwork Institute P.O. Box 980247 West Sacramento, CA 95798 www.wicnet.org	916/372-9943
WRI	Wire Reinforcement Institute 942 Main Street Hartford, CT 06103 www.wirereinforcementinstitute.org	860/240-9545
WWCA	Western Wall & Ceiling Contractors Association 1910 N. Lime St. Orange, California 92865 www.wwcca.org	714/221-5520
WWPA	Western Wood Products Association 522 SW Fifth Ave., Suite 500 Portland, OR 97204-2122 www2.wwpa.org	503/224-3930

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 43 00

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Purchase of Materials and Equipment;

B. Special Conditions;

C. Imported Materials Certification.

1.02 MATERIAL AND EQUIPMENT

A. Only items approved by the District and/or Design Professional shall be used.

B. Contractor shall submit lists of products and other product information in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

1.03 MATERIAL AND EQUIPMENT COLORS

A. The District and/or Architect will provide a schedule of colors.

B. No individual color selections will be made until after approval of all pertinent materials and equipment and after receipt of appropriate samples in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

C. Contractor shall request priority in writing for any item requiring advance ordering to maintain the approved Construction Schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall deliver manufactured materials in original packages, containers, or bundles (with seals unbroken), bearing name or identification mark of manufacturer.

B. Contractor shall deliver fabrications in as large assemblies as practicable; where specified as shop-primed or shop-finished, package or crate as required to preserve such priming or finish intact and free from abrasion.

C. Contractor shall store materials in such a manner as necessary to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt, or from any other cause will not be accepted.

D. Materials are not acceptable that have been warehoused for long periods of time, stored or transported in improper environment, improperly packaged, inadequately labeled, poorly protected, excessively shipped, deviated from normal distribution pattern, or reassembled.

E. Contractor shall store material so as to cause no obstructions of sidewalks, roadways, access to the Site or buildings, and underground services. Contractor shall protect material and equipment furnished under Contract.

F. Contractor may store materials on Site with prior written approval by the District, all material shall remain under Contractor's control and Contractor shall remain liable for any damage to the materials. Should the Project Site not have storage area available, the Contractor shall provide for off-site storage at a bonded warehouse and with appropriate insurance coverage at no cost to District.

G. When any room in Project is used as a shop or storeroom, the Contractor shall be responsible for any repairs, patching, or cleaning necessary due to that use. Location of storage space shall be subject to prior written approval by District.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers listed in various sections of Contract Documents are names of those manufacturers that are believed to be capable of supplying one or more of items specified therein.

B. The listing of a manufacturer does not imply that every product of that manufacturer is acceptable as meeting the requirements of the Contract Documents.

2.02 FACILITIES AND EQUIPMENT

Contractor shall provide, install, maintain, and operate a complete and adequate facility for handling, the execution, disposal, and distribution of material and equipment as required for proper and timely performance of Work connected with Contract.

2.03 MATERIAL REFERENCE STANDARDS

Where material is specified solely by reference to “standard specifications” and if requested by District, Contractor shall submit for review data on actual material proposed to be incorporated into Work of Contract listing name and address of vendor, manufacturer, or producer, and trade or brand names of those materials, and data substantiating compliance with standard specifications.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Where not more specifically described in any other Contract Documents, workmanship shall conform to methods and operations of best standards and accepted practices of trade or trades involved and shall include items of fabrication, construction, or installation regularly furnished or required for completion (including finish and for successful operation, as intended).

B. Work shall be executed by tradespersons skilled in their respective lines of Work. When completed, parts shall have been durably and substantially built and present a neat appearance.

3.02 COORDINATION

A. Contractor shall coordinate installation of Work so as to not interfere with installation of others. Adjustment or rework because of Contractor's failure to coordinate will be at no additional cost to District.

B. Contractor shall examine in-place work for readiness, completeness, fitness to be concealed or to receive other work, and in compliance with Contract Documents. Concealing or covering Work constitutes acceptance of additional cost which will result should in-place Work be found unsuitable for receiving other Work or otherwise deviating from the requirements of the Contract Documents.

3.03 COMPLETENESS

Contractor shall provide all portions of the Work, unless clearly stated otherwise, installed complete and operational with all elements, accessories, anchorages, utility connections, etc., in manner to assure well-balanced performance, in accordance with manufacturer's recommendations and by Contract Documents. For example, electric water coolers require water, electricity, and drain services; roof drains require drain system; sinks fit within countertop, etc. Terms such as "installed complete," "operable condition," "for use intended," "connected to all utilities," "terminate with proper cap," "adequately anchored," "patch and refinish," "to match similar," should be assumed to apply in all cases, except where completeness of functional or operable condition is specifically stated as not required.

3.04 APPROVED INSTALLER OR APPLICATOR

Installation by a manufacturer's approved installer or applicator is an understood part of Specifications and only approved installer or applicator is to provide on-site Work where specified manufacturer has on-going program of approving (i.e. certifying, bonding, re-warranting) installers or applicators. Newly established relationships between a manufacturer and an installer or applicator who does not have other approved applicator work in progress or completed is not approved for this Project.

3.05 MANUFACTURER'S RECOMMENDATIONS

All installations shall be in accordance with manufacturer's published recommendations and specific written directions of manufacturer's representative. Should Contract Documents differ from recommendations of manufacturer or directions of his representative, Contractor shall analyze differences, make recommendations to the District and the Architect in writing, and shall not proceed until interpretation or clarification has been issued by the District and/or the Architect.

END OF DOCUMENT

DOCUMENT 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Inspector, Inspections and Tests, Uncovering of Work and Non-conforming of Work and Correction of Work;

B. Special Conditions.

1.02 RELATED CODES:

A. The Work is governed by requirements of Title 24, California Code of Regulations ("CCR"), and the Contractor shall keep a copy of these available at the job Site for ready reference during construction.

B. The Division of the State Architect ("DSA") shall be notified at or before the start of construction.

1.03 OBSERVATION AND SUPERVISION:

A. The District and Architect or their appointed representatives will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review. Administration by the Architect and any consulting Structural Engineer will be in accordance with applicable regulations, including, without limitation, CCR, Part 1, Title 24, Section 4-341.

B. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District, referred to hereinafter as the "Project Inspector", will observe the work in accordance with CCR, Part 1, Title 24, Sections 4-333(b) and 4-342:

(1) The Project Inspector and Special Inspector(s) shall have access to the Work wherever it is in preparation or progress for ascertaining that the Work is in accordance with the Contract Documents and all applicable code sections. The Contractor shall provide facilities and operation of equipment as needed, and access as required and shall provide assistance for sampling or measuring materials.

(2) The Project Inspector will notify the District and Architect and call the attention of the Contractor to any observed failure of Work or material to conform to Contract Documents.

(3) The Project Inspector shall observe and monitor all testing and inspection activities required.

The Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to CCR, Part 1, Title 24, Section 4-343. The Contractor shall supervise and direct the Work and maintain a competent superintendent on the job who is authorized to act in all matters pertaining to the Work. The Contractor's superintendent shall also inspect all materials, as they arrive, for compliance with the Contract Documents. Contractor shall reject defective Work or materials immediately upon delivery or failure of the Work or material to comply with the Contract Documents. The Contractor shall submit verified reports as indicated in the Contract Documents, including, without limitation, the Specifications and as required by Part 1, Title 24, Section 4-336.

1.04 TESTING AGENCIES:

A. Testing agencies and tests shall be in conformance with the General Documents and the requirements of Part 1, Title 24, Section 4- 335.

B. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer, if any, referred to hereinafter as the "Soils Engineer."

C. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory, referred to hereinafter as the "Testing Laboratory." The Testing Laboratory shall be under direction of an engineer registered in the State of California, shall conform to requirements of ASTM E329, and shall be employed by or in contract with the District.

1.05 TESTS AND INSPECTIONS:

A. The Contractor shall be responsible for notifying the District and Project Inspector of all required tests and inspections. Contractor shall notify the District and Project Inspector at least seventy-two hours (72) hours in advance of performing any Work requiring testing or inspection.

B. The Contractor shall provide access to Work to be tested and furnish incidental labor, equipment, and facilities to facilitate all inspections and tests.

C. The District will pay for first inspections and tests required by the “CCR”, and other inspections or tests that the District and/or the Architect may direct to have made, including the following principal items:

(1) Tests and observations for earthwork and paving.

(2) Tests for concrete mix designs, including tests of trial batches.

(3) Tests and inspections for structural steel work.

(4) Field tests for framing lumber moisture content.

(5) Additional tests directed by the District that establish that materials and installation comply with the Contract Documents.

(6) Tests and observations of welding and expansion anchors.

D. The District may at its discretion, pay and then back charge the Contractor for:

(1) Retests or reinspections, if required, and tests or inspections required due to Contractor error or lack of required identifications of material.

(2) Uncovering of work in accordance with Contract Documents.

(3) Testing done on weekends, holidays, and overtime will be chargeable to the Contractor for the overtime portion.

(4) Testing done off Site.

E. Testing and inspection reports and certifications:

(1) If initially received by Contractor, Contractor shall provide to each of the following a copy of the agency or laboratory report of each test or inspection or certification.

(a) The District;

(b) The Construction Manager, if any;

(c) The Architect;

(d) The Consulting Engineer, if any;

(e) Other engineers on the Project, as appropriate;

(f) The Project Inspector; and

(g) The Contractor.

(2) When the test or inspection is one required by the CCR, a copy of the report shall also be provided to the DSA.

PART 2 - PRODUCTS

2.01 TYPE OF TESTS AND INSPECTIONS

A. Testing and inspection shall be in accordance with DSA Form 103 (or current version)

B. Slump Test
ASTM C 143

C. Concrete Tests

Testing agency shall test concrete used in the work per the following paragraphs:

(1) Compressive Strength:

(a) Minimum number of tests required: One (1) set of three (3) cylinders for each 100 cubic yards (Sec. 2604(h) 01) of concrete or major fraction thereof, placed in one (1) day. See Title 24, Section 2605(g).

(b) Two cylinders of each set shall be tested at twenty-eight (28) days. One (1) cylinder shall be held in reserve and tested only when directed by the Architect or District.

(c) Concrete shall test the minimum ultimate compressive strength in twenty-eight 28 days, as specified on the structural drawings.

(d) In the event that the twenty-eight (28) day test falls below the minimum specified strength, the effective concrete in place shall be tested by taking cores in accordance with UBC Standard No. 26-13 and tested as required for cylinders.

(e) In the event that the test on core specimens falls below the minimum specified strength, the concrete will be deemed defective and shall be removed and replaced upon such direction of the Architect, and in a manner acceptable to the Division of the State Architect.

D. Reinforcing, Steel

E. Structural Steel Per Title 24 and as noted:

(1) Material: Steel per Table in Title 24, Section 2712.

(2) Qualification of Welders (UBC Std. 27-6).

(3) Shop fabrication (Section 2712(d). Structural steel only).

(4) Shop and field welding (Section 2712(e)).

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Site Standards; and

D. Construction Waste Management and Disposal.

1.02 TEMPORARY UTILITIES:

A. Electric Power and Lighting:

(1) Contractor will pay for power during the course of the Work. To the extent power is available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver that power service from its existing location in the building(s) or on the Site to point of intended use.

(2) Contractor shall verify characteristics of power available in building(s) or on the Site. Contractor shall take all actions required to make modifications where power of higher voltage or different phases of current are required. Contractor shall be fully responsible for providing that service and shall pay all costs required therefor.

(3) Contractor shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.

(4) Contractor shall be responsible for maintaining existing lighting levels in the project vicinity should temporary outages or service interruptions occur.

B. Heat and Ventilation:

(1) Contractor shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation and curing of materials, and to protect materials and finishes from damage due to improper temperature and humidity conditions. Portable heaters shall be standard units complete with controls.

(2) Contractor shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.

(3) Contractor shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.

C. Water:

(1) Contractor shall pay for water used during the course of the Work. Contractor shall coordinate and pay for installation or use of water meter in compliance with local water agency requirements. To the extent water is then available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver such utility service from its existing location in the building(s), on the Site, or other location approved by the local water agency, to point of intended use.

(2) Contractor shall use backflow preventers on water lines at point of connection to District's water supply. Backflow preventers shall comply with requirements of Uniform Plumbing Code.

(3) Contractor shall make potable water available for human consumption.

D. Sanitary Facilities:

(1) Contractor shall provide sanitary temporary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Inspector or Contractor completes all other work at the Site.

(2) Use of toilet facilities in the Work under construction shall not be permitted except by consent of the Inspector and the District.

E. Telephone Service:

(1) Contractor shall arrange with local telephone service company for telephone service as required for the performance of the Work.

Contractor shall, at a minimum, provide in its field office one line for telephone and one line for fax machine.

(2) Contractor shall pay the costs for telephone and fax lines installation, maintenance, service, and removal.

F. Fire Protection:

(1) Contractor shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California Fire, State Fire Marshall and/or its designee.

(2) Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection for adjacent surfaces.

G. Trash Removal:

(1) Contractor shall provide trash removal on a timely basis**.** Under no circumstance shall Contractor use District trash service.

H. Field Office:

(1) If Contractor chooses to provide a field office, it shall be an acceptable construction trailer that is well-lit and ventilated. The construction trailer shall be equipped with shelves, desks, filing cabinet, chairs, and such other items of equipment needed. Trailer and equipment are the property of the Contractor and must be removed from the Site upon completion of the Work. Contractor may use the corridor adjacent to the construction area for an office area, if approved in writing by District.

(2) Contractor shall provide any additional electric lighting and power required for the trailer. Contractor shall make adequate provisions for heating and cooling as required.

1.03 CONSTRUCTION AIDS:

A. Plant and Equipment:

(1) Contractor shall furnish, operate, and maintain a complete plant for fabricating, handling, conveying, installing, and erecting materials and equipment; and for conveyances for transporting workers. Include elevators, hoists, debris chutes, and other equipment, tools, and appliances necessary for performance of the Work.

(2) Contractor shall maintain plant and equipment in safe and efficient operating condition. Damages due to defective plant and equipment, and uses made thereof, shall be repaired by Contractor at no expense to the District.

B. None of the District's tools and equipment shall be used by Contractor for the performance of the Work.

1.04 BARRIERS AND ENCLOSURES:

A. Contractor shall obtain the District's written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.

B. Contractor shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises, the public, and workers. Contractor shall also protect the Work and existing facilities from the elements, and adjacent construction and improvements, persons, and trees and plants from damage and injury from demolition and construction operations.

C. Contractor shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.

D. Tree and Plant Protection:

(1) Contractor shall preserve and protect existing trees and plants on the Premises that are not designated or required to be removed, and those adjacent to the Premises.

(2) Contractor shall provide barriers to a minimum height of 4'-0" around drip line of each tree and plant, around each group of trees and plants, as applicable, in the proximity of demolition and construction operations, or as denoted on the Plans.

(3) Contractor shall not park trucks, store materials, perform Work or cross over landscaped areas. Contractor shall not dispose of paint thinners, water from cleaning, plastering or concrete operations, or other deleterious materials in landscaped areas, storm drain systems, or sewers. Plant materials damaged as a result of the performance of the Work shall, at the option of the District and at Contractor's expense, either be replaced with new plant materials equal in size to those damaged or by payment of an amount representing the value of the damaged materials as determined by the District.

(4) Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.

(5) Excavation around Trees:

(a) Excavation within drip lines of trees shall be done only where absolutely necessary and with written permission from the District.

(b) Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging and shall be approved by the District. Main lateral roots and taproots shall not be cut. All roots 2 inches in diameter and larger shall be tunneled under and heavily wrapped with wet burlap so as to prevent scarring or excessive drying. Smaller roots that interfere with installation of new work may be cut with prior approval by the District. Roots must first be cut with a Vermeer, or equivalent, root cutter prior to any trenching.

(c) Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If encountered immediately adjacent to location of new construction, roots shall be cut approximately 6 inches back from new construction.

(d) Approved excavations shall be carefully backfilled with the excavated materials approved for backfilling. Backfill shall conform to adjacent grades without dips, sunken areas, humps, or other surface irregularities. Do not use mechanical equipment to compact backfill. Tamp carefully using hand tools, refilling and tamping until Final Acceptance as necessary to offset settlement.

(e) Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be wrapped with four layers of wet, untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.

(f) Accidentally broken roots should be sawed cleanly 3 inches behind ragged end.

1.05 SECURITY:

The Contractor shall be responsible for project security for materials, tools, equipment, supplies, and completed and partially completed Work.

1.06 TEMPORARY CONTROLS:

A. Noise Control:

(1) Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work period, and it shall take all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.

(2) Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other

equipment, shall be submitted to the District a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration:

(1) Equipment and impact tools shall have intake and exhaust mufflers.

(2) Contractor shall cooperate with District to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt:

(1) Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.

(2) Contractor shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.

(3) Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.

(4) Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water:

(1) Contractor shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Contractor shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution:

(1) No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.

(2) Contractor shall comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting:

(1) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

1.07 JOB SIGN(S):

A. General:

(1) Contractor shall provide and maintain a Project identification sign with the design, text, and colors designated by the District and/or the Design Professional; locate sign as approved by the District.

(2) Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the District.

B. Materials:

(1) Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.

(2) Sign Surface: Minimum 3/4-inch exterior grade plywood.

(3) Rough Hardware: Galvanized.

(4) Paint: Exterior quality, of type and colors selected by the District and/or the Design Professional.

C. Fabrication:

(1) Contractor shall fabricate to provide smooth, even surface for painting.

(2) Size: 4'-0" x 8'-0", unless otherwise indicated.

(3) Contractor shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.

(4) Text and Graphics: As indicated.

1.08 PUBLICITY RELEASES:

A. Contractor shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s) without the written permission of the District.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF DOCUMENT

DOCUMENT 01 50 13

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions; and

C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

A. Administrative and procedural requirements for the following:

(1) Salvaging non-hazardous construction waste.

(2) Recycling non-hazardous construction waste.

(3) Disposing of non-hazardous construction waste.

1.03 DEFINITIONS:

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS:

A. General: Develop waste management plan that results in end-of Project rates for salvage/recycling of fifty percent (50%) by weight (or by volume, but not a combination) of total waste generated by the Work.

1.05 SUBMITTALS:

A. Waste Management Plan: Submit waste management plan within 30 days of date established for commencement of the Work.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:

(1) Material category.

(2) Generation point of waste.

(3) Total quantity of waste in tons or cubic yards.

(4) Quantity of waste salvaged, both estimated and actual in tons or cubic yards.

(5) Quantity of waste recycled, both estimated and actual in tons or cubic yards.

(6) Total quantity of waste recovered (salvaged plus recycled) in tons or cubic yards.

(7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Waste Reduction Calculations: Before request for final payment, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. CHPS Submittal: CHPS letter template for Credit ME2.0 and ME2.1, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

I. Qualification Data: For Waste Management Coordinator.

J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

K. Submittal procedures and quantities are specified in Document 01 33 00.

1.06 QUALITY ASSURANCE:

A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to waste management including, but not limited to, the following:

(1) Review and discuss waste management plan including responsibilities of Waste Management Coordinator.

(2) Review requirements for documenting quantities of each type of waste and its disposition.

(3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

(4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.

(5) Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN:

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measurement throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

(1) Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.

(2) Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

(3) Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

(4) Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

(5) Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

(6) Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION:

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

(1) Comply with Document 01 50 00 for operation, termination, and removal requirements.

B. **[**Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.**]**

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

(1) Distribute waste management plan to everyone concerned within 3 days of submittal return.

(2) Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

(1) Designate and label specific areas of Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

(2) Comply with Document 01 50 00 for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE:

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

(1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.

(a) Inspect containers and bins for contamination and remove contaminated materials if found.

(2) Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

(3) Stockpile materials away from construction area. Do not store within drip line of remaining trees.

(4) Store components off the ground and protect from the weather.

(5) Remove recyclable waste off District property and transport to recycling receiver or processor.

D. Packaging:

(1) Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

(2) Polystyrene Packaging: Separate and bag material.

(3) Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on Site, break down pallets into component wood pieces and comply with requirements for recycling wood.

(4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

E. Site-Clearing Wastes: Chip brush, branches, and trees on site.

F. Wood Materials:

(1) Clean Cut-Offs of Lumber: Grind or chip into small pieces.

(2) Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

(1) Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.03 DISPOSAL OF WASTE:

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

(1) Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on site.

(2) Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off District property and legally dispose of them.

END OF SECTION

DOCUMENT 01 64 00

OWNER-FURNISHED PRODUCTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions; and

C. Materials and Equipment.

1.02 SECTION INCLUDES

A. Requirements for the following:

(1) Installing Owner-furnished materials and equipment.

(2) Providing necessary utilities, connections and rough-ins.

1.03 DEFINITIONS

A. Owner: District, who is providing/furnishing materials and equipment.

B. Installing Contactor: Contractor, who is installing the materials and equipment furnished by the Owner.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Receive, store and handle products in accordance with the manufacturer's instructions.

B. Protect equipment items as required to prevent damage during storage and construction.

PART 2 – PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

A. Installing Contractor's Responsibilities:

(1) Verify mounting and utility requirements for Owner-furnished materials and equipment items.

(2) Provide mounting and utility rough in for all items where required.

(a) Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.

B. Owner and Installing Contractor(s) Responsibilities:

(1) Owner-Furnished/Contractor Installed ("OFCI"): Furnished by the Owner; installed by the Installing Contractor.

(a) General: Owner and Installing Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.

(b) Owner will furnish specified materials and equipment delivered to the site. Owner/vendor's representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 43 00, Materials and Equipment, Article 1.04.

(c) The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installing Contractor.

(d) The Installing Contractor shall:

1) Review, verify and accept the approved manufacturer's submittal/Shop Drawings for all materials and equipment required to be installed by the Installer Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.

2) Coordinate timely delivery. Installing Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installing Contractor shall assume responsibility for such defects and omissions.

3) Store materials and equipment until ready for installation and protect from loss and damage. Installing Contractor is responsible for providing adequate storage space.

4) Coordinate with other bid package contractors and field measurement to ensure complete installation.

5) Uncrate, assemble, and set in place.

6) Provide adequate supports.

7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and Shop Drawings, supply labor and material required, and make mechanical, plumbing, and electrical connections required to operate equipment.

8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.

9) Provide anchorage and/or bracing as required for seismic restraint per Title 24, UBC Standard 27-11 and all other applicable codes.

10) Provide the contract-required warranty and guarantee for all work, materials and equipment, and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.

C. Compatibility with Space and Service Requirements:

(1) Equipment items shall be compatible with space limitations indicated and as shown on the Contract Documents and specified in other sections of the Specifications.

(2) Modifications to equipment items required to conform to space limitations specified for rough in shall not cause additional cost to the District.

D. Manufacturer's printed descriptions, specifications, and instructions shall govern the Work unless specifically indicated or specified otherwise.

2.02 FURNISHED MATERIALS AND EQUIPMENT

A. All furnished materials and equipment are indicated or scheduled on the Contract Documents.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install equipment items in accordance with the manufacturer's instructions.

B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.

C. Make electrical and mechanical connections as indicated and required.

D. Touch-up and restore damaged or defaced finishes to the Owner's satisfaction.

3.02 CLEANING AND PROTECTION

A. Repair or replace items not acceptable to the Architect or Owner.

B. Upon completion of installation, clean equipment items in accordance with manufacturer's recommendations, and protect from damage until final acceptance of the Work by the Owner.

END OF DOCUMENT

SECTION 01 66 00

PRODUCT DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Access, Conditions and Requirements;

B. Special Conditions.

1.02 PRODUCTS

A. Products are as defined in the General Conditions.

B. Contractor shall not use and/or reuse materials and/or equipment removed from existing Premises, except as specifically permitted by the Contract Documents.

C. Contractor shall provide interchangeable components of the same manufacturer, for similar components.

1.03 TRANSPORTATION AND HANDLING

A. Contractor shall transport and handle Products in accordance with manufacturer's instructions.

B. Contractor shall promptly inspect shipments to confirm that Products comply with requirements, quantities are correct, and products are undamaged.

C. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

A. Contractor shall store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Contractor shall store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated Products, Contractor shall place on sloped supports, above ground.

C. Contractor shall provide off-site storage and protection when Site does not permit on-site storage or protection.

D. Contractor shall cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.

E. Contractor shall store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.

F. Contractor shall provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

G. Contractor shall arrange storage of Products to permit access for inspection and periodically inspect to assure Products are undamaged and are maintained under specified conditions.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;

B. Special Conditions;

C. Site-Visit Certification.

1.02 REQUIREMENTS INCLUDED:

A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:

(1) Survey work required in execution of the Project.

(2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:

Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

1.04 SURVEY REFERENCE POINTS:

A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.

B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:

(1) Make no changes or relocation without prior written notice to District and Architect.

(2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

(3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

1.05 RECORDS:

Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

1.06 SUBMITTALS:

A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.

B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.

C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 COMPLIANCE WITH LAWS:

Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

3.02 NONCONFORMING WORK:

Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF DOCUMENT

DOCUMENT 01 73 29

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;

B. Special Conditions;

C. Hazardous Materials Procedures and Requirements;

D. Hazardous Materials Certification;

E. Lead-Based Paint Certification;

F. Imported Materials Certification.

1.02 CUTTING AND PATCHING:

A. Contractor shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:

(1) Make several parts fit together properly.

(2) Uncover portions of Work to provide for installation of ill-timed Work.

(3) Remove and replace defective Work.

(4) Remove and replace Work not conforming to requirements of Contract Documents.

(5) Remove Samples of installed Work as specified for testing.

(6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

(7) Attaching new materials to existing remodeling areas – including painting (or other finishes) to match existing conditions.

B. In addition to Contract requirements, upon written instructions from the District, Contractor shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of

installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.

C. Contractor shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

1.03 SUBMITTALS:

A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Contractor shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:

(1) The work of the District or other trades.

(2) Structural value or integrity of any element of Project.

(3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.

(4) Efficiency, operational life, maintenance or safety of operational elements.

(5) Visual qualities of sight-exposed elements.

B. Contractor's Request shall also include:

(1) Identification of Project.

(2) Description of affected Work.

(3) Necessity for cutting, alteration, or excavations.

(4) Effects of Work on District, other trades, or structural or weatherproof integrity of Project.

(5) Description of proposed Work:

(a) Scope of cutting, patching, alteration, or excavation.

(b) Trades that will execute Work.

(c) Products proposed to be used.

(d) Extent of refinishing to be done.

(6) Alternates to cutting and patching.

(7) Cost proposal, when applicable.

(8) The scheduled date the Contractor intends to perform the Work and the duration of time to complete the Work.

(9) Written permission of District or other District contractor(s) whose work will be affected.

1.04 QUALITY ASSURANCE:

A. Contractor shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.

B. Contractor shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

1.05 PAYMENT FOR COSTS:

A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Contractor and/or deducted from the Contract by the District.

B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval of written Change Order. Contractor shall provide written cost proposals prior to proceeding with cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Contractor shall provide for replacement and restoration of Work removed. Contractor shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Contractor shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.

B. Materials to be cut and patched include those damaged by the performance of the Work.

PART 3 – EXECUTION

3.01 INSPECTION:

A. Contractor shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Contractor shall inspect conditions affecting installation of new products.

B. Contractor shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

3.02 PREPARATION:

A. Contractor shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.

B. Contractor shall provide devices and methods to protect other portions of Project from damage.

C. Contractor shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that may be exposed by cutting and patching Work. Contractor shall keep excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION:

A. With respect to performance, Contractor shall:

(1) Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.

(2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.

(3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage from settlement.

B. Contractor shall employ original installer or fabricator to perform cutting and patching for:

(1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.

(2) Sight-exposed finished surfaces.

C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances,

and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.

D. Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Contractor shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Contractor shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.

E. Contractor shall restore Work which has been cut or removed. Contractor shall install new products to provide completed Work in accordance with requirements of the Contract Documents and as required to match surrounding areas and surfaces.

F. Contractor shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

END OF DOCUMENT

DOCUMENT 01 76 00

ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;

B. Special Conditions.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK:

A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Contractor shall match existing products, conditions, and work for patching and extending work.

B. Type and Quality of Existing Products: Contractor shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Contractor shall verify that demolition is complete and that areas are ready for installation of new Work.

B. By beginning restoration Work, Contractor acknowledges and accepts the existing conditions.

3.02 PREPARATION:

A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Contractor shall replace and restore these at completion.

B. Contractor shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Contractor shall replace materials as specified for finished Work.

C. Contractor shall remove debris and abandoned items from all areas of the Site and from concealed spaces.

D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.

E. Contractor shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Contractor shall insulate ductwork and piping to prevent condensation in exposed areas. Contractor shall insulate building cavities for thermal and/or acoustical protection, as detailed.

3.03 INSTALLATION:

A. Contractor shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.

B. Designated Areas and Finishes: Contractor shall complete all installations in all respects, including operational, mechanical work and electrical work.

C. Contractor shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.

D. Contractor shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat and square or straight transition to adjacent finishes.

E. Contractor shall install products as specified in the Contract Documents, including without limitation, the Specifications.

3.04 TRANSITIONS:

A. Where new Work abuts or aligns with existing, Contractor shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.

B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Contractor shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

3.05 ADJUSTMENTS:

A. Where removal of partitions or walls results in adjacent spaces becoming one, Contractor shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

B. Where a change of plane of 1/4 inch or more occurs, Contractor shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.

C. Contractor shall trim and seal existing wood doors and shall trim and paint metal doors as necessary to clear new floor finish and refinish trim as required.

D. Contractor shall fit Work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES:

A. Contractor shall patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections, in the area where the Work is performed.

B. Contractor shall repair substrate prior to patching finish.

3.07 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS:

A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored by Contractor to their original condition or better, where indicated.

B. Contractor shall protect and replace, if damaged, all existing guard posts, barricades, and fences.

C. Contractor shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified in the Contract Documents, including without limitation, the Drawings.

3.08 FINISHES:

A. Contractor shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.

B. Contractor shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Contractor shall refinish entire surface to nearest intersections.

3.09 CLEANING:

A. Contractor shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF DOCUMENT

DOCUMENT 01 77 00

CONTRACT CLOSEOUT AND FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Completion of Work;

B. Special Conditions;

C. Temporary Facilities and Controls.

1.02 CLOSEOUT PROCEDURES

Contractor shall comply with all closeout provisions as indicated in the General Conditions.

1.03 FINAL CLEANING

A. Contractor shall execute final cleaning prior to final inspection.

B. Contractor shall clean interior and exterior glass and all surfaces exposed to view; remove temporary labels, tape, stains, and foreign substances, polish transparent and glossy surfaces, wax and polish new vinyl floor surfaces, vacuum carpeted and soft surfaces.

C. Contractor shall clean equipment and fixtures to a sanitary condition.

D. Contractor shall replace filters of operating equipment.

E. Contractor shall clean debris from roofs, gutters, down spouts, and drainage systems.

F. Contractor shall clean Site, sweep paved areas, and rake clean landscaped surfaces.

G. Contractor shall remove waste and surplus materials, rubbish, and construction facilities from the Site and surrounding areas.

1.04 ADJUSTING

Contractor shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 RECORD DOCUMENTS AND SHOP DRAWINGS

A. Contractor shall legibly mark each item to record actual construction, including:

(1) Measured depths of foundation in relation to finish floor datum.

(2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permit surface improvements.

(3) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

(4) Field changes of dimension and detail.

(5) Details not on original Contract Drawings

(6) Changes made by modification(s).

(7) References to related Shop Drawings and modifications.

B. Contractor will provide one set of Record Drawings to District.

C. Contractor shall submit all required documents to District and/or Architect prior to or with its final Application for Payment.

1.06 INSTRUCTION OF DISTRICT PERSONNEL

A. Before final inspection, at agreed upon times, Contractor shall instruct District's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. For equipment requiring seasonal operation, Contractor shall perform instructions for other seasons within six months or by the change of season.

C. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Contractor shall prepare and insert additional data in Operation and Maintenance Manual when the need for such data becomes apparent during instruction.

E. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. Contractor shall provide products, spare parts, maintenance, and extra materials in quantities specified in the Specifications and in Manufacturer's recommendations.

B. Contractor shall provide District with all required Operation and Maintenance Data at one time. Partial or piecemeal submissions of Operation and Maintenance Data will not be accepted.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Completion of the Work;

B. Special Conditions.

1.02 QUALITY ASSURANCE:

Contractor shall prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT:

A. Contractor shall prepare data in the form of an instructional manual entitled “OPERATIONS AND MAINTENANCE MANUAL & INSTRUCTIONS” (“Manual”).

B. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size. When multiple binders are used, Contractor shall correlate data into related consistent groupings.

C. Cover: Contractor shall identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL & INSTRUCTIONS"; and shall list title of Project and identify subject matter of contents.

D. Contractor shall arrange content by systems process flow under section numbers and sequence of Table of Contents of the Contract Documents.

E. Contractor shall provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: The content shall include Manufacturer's printed data, or typewritten data on 24 pound paper.

G. Drawings: Contractor shall provide with reinforced punched binder tab and shall bind in with text; folding larger drawings to size of text pages.

1.04 CONTENTS, EACH VOLUME:

A. Table of Contents: Contractor shall provide title of Project; names, addresses, and telephone numbers of the Architect, any engineers, subconsultants,

Subcontractor(s), and Contractor with name of responsible parties; and schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: Contractor shall list names, addresses, and telephone numbers of Subcontractor(s) and suppliers, including local source of supplies and replacement parts.

C. Product Data: Contractor shall mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Contractor shall supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Contractor shall not use Project Record Documents as maintenance drawings.

E. Text: Contractor shall include any and all information as required to supplement product data. Contractor shall provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

F. Warranties and Bonds: Contractor shall bind in one copy of each.

1.05 MANUAL FOR MATERIALS AND FINISHES:

A. Building Products, Applied Materials, and Finishes: Contractor shall include product data, with catalog number, size, composition, and color and texture designations. Contractor shall provide information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Contractor shall include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Contractor shall include product data listing applicable reference standards, chemical composition, and details of installation. Contractor shall provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: Contractor shall include all additional requirements as specified in the Specifications.

E. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS:

A. Each Item of Equipment and Each System: Contractor shall include description of unit or system, and component parts and identify function, normal operating characteristics, and limiting conditions. Contractor shall

include performance curves, with engineering data and tests, and complete nomenclature, and commercial number of replaceable parts.

B. Panelboard Circuit Directories: Contractor shall provide electrical service characteristics, controls, and communications.

C. Contractor shall include color coded wiring diagrams as installed.

D. Operating Procedures: Contractor shall include start-up, break-in, and routine normal operating instructions and sequences. Contractor shall include regulation, control, stopping, shut-down, and emergency instructions. Contractor shall include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Contractor shall include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Contractor shall provide servicing and lubrication schedule, and list of lubricants required.

G. Contractor shall include manufacturer's printed operation and maintenance instructions.

H. Contractor shall include sequence of operation by controls manufacturer.

I. Contractor shall provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Contractor shall provide control diagrams by controls manufacturer as installed.

K. Contractor shall provide Contractor's coordination drawings, with color coded piping diagrams as installed.

L. Contractor shall provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Contractor shall provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

N. Additional Requirements: Contractor shall include all additional requirements as specified in Specification(s).

O. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.07 SUBMITTAL:

A. Contractor shall submit to the District for review two (2) copies of preliminary draft or proposed formats and outlines of the contents of the Manual within thirty (30) days of Contractor's start of Work.

B. For equipment, or component parts of equipment put into service during construction and to be operated by District, Contractor shall submit draft content for that portion of the Manual within ten (10) days after acceptance of that equipment or component.

C. Contractor shall submit two (2) copies of a complete Manual in final form prior to final Application for Payment. Copy will be returned with Architect/Engineer comments. Contractor must revise the content of the Manual as required by District prior to District's approval of Contractor's final Application for Payment.

D. Contractor must submit two (2) copies of revised Manual in final form within ten (10) days after final inspection.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 36

WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Warranty/Guarantee Information;

B. Special Conditions.

1.02 FORMAT

A. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size.

B. Cover: Contractor shall identify each binder with typed or printed title "WARRANTIES" and shall list title of Project.

C. Table of Contents: Contractor shall provide title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible principal. Contractor shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the product or work item is specified.

D. Contractor shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information and using separate typed sheets as necessary. Contractor shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

1.03 PREPARATION:

A. Contractor shall obtain warranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s), within ten (10) days after completion of the applicable item or work. Except for items put into use with District's permission, Contractor shall leave date of beginning of time of warranty blank until the date of completion is determined.

B. Contractor shall verify that documents are in proper form, contain full information, and are notarized, when required.

C. Contractor shall co-execute submittals when required.

D. Contractor shall retain warranties until time specified for submittal.

1.04 TIME OF SUBMITTALS:

A. For equipment or component parts of equipment put into service during construction with District's permission, Contractor shall submit a draft warranty for that equipment or component within ten (10) days after acceptance of that equipment or component.

B. Contractor shall submit for District approval all warranties and related documents within ten (10) days after date of completion. Contractor must revise the warranties as required by the District prior to District's approval of Contractor's final Application for Payment.

C. For items of work delayed beyond date of completion, Contractor shall provide an updated submittal within ten (10) days after acceptance, listing the date of acceptance as start of warranty period.

PART 2 - PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 39

RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Documents on Work;

B. Special Conditions.

PART 2 - RECORD DRAWINGS

2.01 GENERAL:

A. As indicated in the Contract Documents, the District will provide Contractor with one set of reproducible, full size original Contract Drawings (mylars).

B. Contractor shall maintain at each Project Site one set of marked-up plans and shall transfer all changes and information to those marked-up plans, as often as required in the Contract Documents, but in no case less than once each month. Contractor shall submit to the Project Inspector one set of reproducible vellums of the Project Record Drawings ("As-Builts") showing all changes incorporated into the Work since the preceding monthly submittal. The As-Builts shall be available at the Project Site. The Contractor shall submit reproducible vellums at the conclusion of the Project following review of the blueline prints.

C. Label and date each Record Drawing "RECORD DOCUMENT" in legibly printed letters.

D. All deviations in construction, including but not limited to pipe and conduit locations and deviations caused by without limitation Change Orders, Construction Claim Directives, RFI's, and Addenda, shall be accurately and legibly recorded by Contractor.

E. Locations and changes shall be done by Contractor in a neat and legible manner and, where applicable, indicated by drawing a "cloud" around the changed or additional information.

2.02 RECORD DRAWING INFORMATION:

A. Contractor shall record the following information:

(1) Locations of Work buried under or outside each building, including, without limitation, all utilities, plumbing and electrical lines, and conduits.

(2) Actual numbering of each electrical circuit to match panel schedule.

(3) Locations of significant Work concealed inside each building whose general locations are changed from those shown on the Contract Drawings.

(4) Locations of all items, not necessarily concealed, which vary from the Contract Documents.

(5) Installed location of all cathodic protection anodes.

(6) Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.

(7) Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.

(8) Sufficient information to locate Work concealed in each building with reasonable ease and accuracy.

In some instances, this information may be recorded by dimension. In other instances, it may be recorded in relation to the spaces in the building near which it was installed.

B. Contractor shall provide additional drawings as necessary for clarification.

C. Contractor shall provide reproducible record drawings, made from final Shop Drawings marked "No Exceptions Taken" or "Approved as Noted."

D. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide electronic copies of the drawings (in PDF format) with one file with all of the sheets and one set of individual sheet files at the conclusion of the Project.

PART 3 - RECORD SPECIFICATIONS

3.01 GENERAL:

A. Contractor shall mark each section legibly to record manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.

B. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide one electronic copy of the specifications (in PDF format) at the conclusion of the Project.

PART 4 - MAINTENANCE OF RECORD DOCUMENTS

4.01 GENERAL

A. Contractor shall store Record Documents apart from documents used for construction as follows:

(1) Provide files and racks for storage of Record Documents.

(2) Maintain Record Documents in a clean, dry, legible condition and in good order.

B. Contractor shall not use Record Documents for construction purposes.

PART 5 – PRODUCTS Not Used.

END OF DOCUMENT

SECTION 02 41 19
MINOR DEMOLITION FOR REMODELING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Remove existing work as indicated and as necessary to permit new work.
   1. Removal of designated building equipment and fixtures.
   2. Removal of designated construction.

B. Disposal of materials.

C. Identification of utilities.

D. Salvaging, storing, and protecting existing work to remain or to be removed and re-installed.

1.02 RELATED SECTIONS

A. Section 01 11 00 - Summary: Work sequence and continued occupancy of the building.

B. Section 01 50 00 - Temporary Facilities and Controls: Temporary enclosures, dust control barricades, security at occupied areas, and cleanup during construction.

C. Section 01 73 29 - Cutting and Patching: Removal and re-installation of removed components.

D. Section 01 78 39 - Record Documents: Project record documents.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Project Record Documents: Accurately record actual locations of capped utilities.

1.04 REGULATORY REQUIREMENTS

A. Conform to TITLE 24 CBC code for demolition work, dust control, products requiring electrical disconnection and re-connection .

B. Do not close or obstruct egress from any building exit or site exit.

C. Do not disable or disrupt building fire or life safety systems without 10 (ten) days prior written notice to Owner.

D. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

1.05 SCHEDULING

A. Schedule work under the provisions of Section 01 32 13 - Scheduling of Work.

B. Schedule work to coincide with new construction.

C. Coordinate demolition with other trades to assure the proper sequence, limits, methods and time of performance. Schedule work so as to impose a minimum of hardship on the present operation of facilities and the performance of the work of other trades or contracts.

D. Perform noisy, malodorous, or dusty work. Conform to more stringent requirements of local authorities having jurisdiction, when applicable:
   1. Between the hours of 7:00 am and 5:00 pm.

1.06 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Use all means necessary to protect existing objects, construction and plantings designated to remain. In the event of damage, make all repairs and replacements necessary for approval of Architect at no additional cost to the Owner.

C. Protective measures: Provide all necessary safeguards, including warning signs and lights, barricades, and the like, for protection of the public, Contractor's employees and existing improvements during demolition. Prevent access of unauthorized persons to area of work

D. Provide at least one person who shall be present at all times during execution of this portion of the work, be thoroughly familiar with the type of work being performed and the best methods for its execution and who shall direct all work performed under this Section.

E. Control the use of water to prevent damage to the existing facilities to remain. Provide wet vacuum equipment where water, such as waste cooling water from concrete sawing or water used as dust emollient, is used adjacent to and in existing buildings.

F. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide, erect, and maintain temporary barriers at locations indicated.

B. Inspect the area of work and verify locations of all items designated to be removed or preserved.

C. Do not begin demolition work until temporary barricades, warning signs and other forms of protection are installed.

D. Erect and maintain weatherproof closures for exterior openings.

E. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued occupancy of adjacent buildings.

F. Protect existing materials and features that are not to be demolished.

G. Prevent movement of structure; provide bracing and shoring.
   1. Be responsible for the adequacy and design of all temporary shoring and bracing systems.

H. Notify affected utility companies before starting work and comply with their requirements.

I. Mark location and termination of utilities.

J. Provide appropriate temporary signage including signage for exit or building egress.

3.02 DEMOLITION

A. Disconnect, remove, and identify designated utilities within demolition areas.

B. Demolish in an orderly and careful manner. Protect existing supporting structural members and features indicated to remain.
   1. Cut openings in existing walls or roofs at locations necessary to accommodate new doors, windows, ductwork, piping, conduits, raceways or other building services or elements.
   2. Demolish concrete curbs at locations of walls to be removed.

3. Remove dry-rotted wood materials and other unsuitable materials as indicated and as required to provide sound substrates for other work.
4. Use of explosives will not be permitted.

C. Remove existing glazing, sealants, stops, and other elements at existing hollow metal frames indicated to receive new operable sash.

D. Remove existing glazing, sealants, stops, trim and other elements of existing windows indicated to be replaced with new windows. Coordinate full extent of demolition with Section 08 43 13 and Section 06 20 00.

E. Remove existing flooring, wall coverings, trim or other finishes in areas designated to receive new work.

F. Remove existing construction only to the extent necessary for the proper installation of new construction and junction with existing work. Cut back finished surfaces to straight, plumb or level lines as required.

G. Mechanical, Plumbing and Electrical systems : Demolish existing improvements as required to permit installation of new systems indicated. Refer to pertinent sections of Divisions 22, 23 and 26 for additional specific demolition required for mechanical, plumbing and electrical systems.

H. Securely seal exposed ends of existing ductwork systems left open by demolition operations. Prevent entry of foreign matter. Protect these seals from damage until connected to new work.

I. Remove all fasteners, anchors, supports and similar appurtenances from substrates indicated to remain. Leave substrates in good condition to receive new work.
1. Pull nails from wood framing. Unthread screws, do not pull out. Do not drive existing nails or screws flush.
2. Remove suspended ceiling support wires.
3. Remove staples, screws, and miscellaneous anchors from all gypsum board, wood paneling, masonry wall surfaces indicated to remain.

J. Demolish as follows:
1. Portland cement concrete, asphalt concrete paving: Saw cut or core drill; jack-hammering of central areas away from saw-cut joint is acceptable for removing large areas of concrete. Cut back concrete or paving to clean, straight saw-cut lines. Provide wet vacuum equipment as required for control of waste cooling water.
2. Modular materials such as ceiling, resilient and ceramic tile: Remove to a natural point of division in whole units to a joint line with no damaged or defective unit remaining to adjoin new construction.
3. Gypsum wallboard: Remove to a joint line on a support.
4. Wood trim: Remove to a natural existing joint line.

K. Examine substrates and surfaces exposed by demolition for water damage, dryrot, decay, termite infestation or other structural failure. Request direction from the Architect if these conditions are discovered. Additional demolition beyond scope originally indicated may be required to fully remove damaged or unsuitable materials.

L. Work not mentioned to be removed that interferes with new construction shall be cut to clean cut lines to provide for proper interface with new construction, or patching and repair, as required.

M. All holes or trenches created by removal of underground piping or other facilities demolished shall be filled with clean soil and compacted to the density for fills specified. Do not backfill if subsequent

excavation will occur at the same location. Do not backfill hole or trenches until inspected by the Soils Engineer or IOR.

N. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

O. Remove materials as demolition progresses. Upon completion of demolition, leave areas in clean condition.

P. Remove temporary facilities.

3.03 SALVAGE

A. Items indicated to be salvaged shall be removed carefully, cleaned and stored in a protected location on or off the site until re installed; salvaged items to be deliverd to the Owner shall also be removed carefully and presented to the Owner's designated representative.

B. Owner may take possession of any items of salvage for his use if he desires. Provide incidental labor to relocate designated salvage for Owner's storage.

3.04 PATCHING

A. Patch materials to remain when damaged by this work. Finish materials and appearance of the patch or repair work shall match the existing contiguous materials and finishes in all respects and shall be approved by Architect.

B. Where openings are cut oversize or in improper location, replace the excess removed material as instructed by Architect at no additional cost to the Owner.

3.05 CLEAN-UP AND DISPOSAL

A. Debris, waste, and removed materials, other than items to be salvaged, are Contractor's property for legal disposal off the site, as required by applicable Federal and State regulations. Continuously clean up and remove these items. Do not allow demolished items to accumulate. All materials to be disposed, shall meet the requirements of the Construction Waste Management program.

B. Leave the site in a neat and orderly condition prepared for the work of other trades.

3.06 SCHEDULES

A. Remove the following equipment for Owner's retention. Deliver to location designated by Owner.
   1. Storefront hinges and operating hardware.

END OF SECTION

SECTION 03 1000

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: All labor, materials and equipment and all operations required to complete all formwork as indicated on the drawings; to produce shapes and configurations as shown, as required; and as specified herein, including:

1. Forms, shores, bracing, removal and other operations as necessary for all cast-in-place concrete and masonry placed.
2. Setting and securing anchor bolts and other metal items embedded in concrete into formwork, using materials and layouts furnished and delivered to jobsite as specified under other sections.

B. Related Sections:

1. Pertinent Sections of Division 03 specifying concrete construction.
2. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete foundations and formwork.

1.02 REFERENCES

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 19A Concrete.

B. American Concrete Institute (ACI) 347 "Recommended Practice for Concrete Formwork".

C. American Plywood Association (APA) "Concrete Forming Guide".

D. West Coast Lumberman Inspection Bureau (WCLIB) "Standard Grading Rules for West Coast Lumber".

E. ACI SP-066 "ACI Detailing Manual".

F. ACI 301 "Specifications for Structural Concrete".

G. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice".

1.03 DESIGN REQUIREMENTS

A. Design, engineer, and construct formwork, shoring and bracing to conform to design and code requirements, resist imposed loads; resultant concrete to conform to required shape, line and dimension.

1.04 SUBMITTALS

A. Limitation of review: Structural Engineer's review will be required only where specifically requested for general architectural applications and features only. Contractor is responsible for structural stability, load-resisting characteristics and sufficiency of form work design.

1.05 QUALITY ASSURANCE

A. General: All form materials shall be new at start of work. Produce high quality concrete construction. Minimize defects due to joints, deflection of forms, roughness of forms, nonconforming materials, concrete or workmanship.

B. Reuse of Forms: Plywood forms may be reused, if thoroughly cleaned of all dirt, mortar, and foreign materials, and undamaged at edges and contact face. Reuse shall be subject to permission from the Architect without exception, and issued in writing. Reuse of any panel which will produce a blemish on exposed concrete, will not be permitted.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Form Materials:

1. Non-Exposed Surface Formwork Facing: Forms for concrete which is not exposed to view, may be of plywood as specified for exposed surfaces, or square edge 1x nominal Douglas Fir, Construction Grade, S4S.
2. Exposed Surface Formwork Facing:
   a. Forms for all exterior and interior concrete flat surfaces unless otherwise specified as board formed shall be new Douglas Fir Plywood (APA) ply, 5/8-inch, B-B Plyform, Class 1, Exterior Type, oiled and edged and edge-sealed conforming to U.S. Product Standard PS 1 in large sheet sizes to achieve joint patterns shown.
   b. All exposed concrete edges shall be chamfered 3/4" minimum or as noted on the drawings.
3. Exposed Surface Formwork - Special Pattern Form Liner:
   a. Forms for all exterior and interior concrete flat surfaces indicated shall be as designated by Architect.

B. Earth Forms: Allowed, subject to soil standing in excavations without ravel or caving.

C. Form Release Agent: Spray-on compound, not affecting color, bond or subsequent treatment of concrete surfaces. Maximum VOC content shall comply with local requirements and California Green Building Code.

D. Accessories: Types recommended by manufacturers or referenced standards to suit conditions indicated;

1. Anchors, spacers, void in-fill materials: sized to resist imposed loads.
2. Form Ties: Prefabricated rod, flat band, or wire snap ties with 1" break-back or threaded internal disconnecting type with external holding devices of adequate bearing area. Ties shall permit tightening and spreading of forms and leave no metal closer than 1" to surface.

E. Corner Chamfers and Rustications: Filleted, wood strip or foam type; sizes and shapes as detailed, or 3/4 x 3/4 inch size minimum if not detailed; maximum possible lengths.

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect the substrate and the conditions under which concrete formwork is to be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates and conditions.

B. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. If natural soil or compacted fill can be accurately cut and maintained, foundations and grade beams may be poured against earth without forming. Provide positive protection of trench top corners.

B. Maintain earth forms free of water and foreign materials.

3.03 ERECTION - FORMWORK

A. General: Construct formwork in accordance with calculations, and recommendations of Section 401 of ACI 347. Construct forms to the sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in finished structure. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes.

1. Construct cambers specified in concrete members and slabs in the formwork.
2. Schedule the work and notify other trades in ample time so that provisions for their work in the formwork can be made without delaying progress of the project. Install all sleeves, pipes, etc. for building services systems, or other work. Secure information about and provide for all openings, offsets, recessed nailing blocks, channel chases, anchors, ties, inserts, etc. in the formwork before concrete placement.
3. Deflection: Formwork and concrete with excessive deflection after concrete placement will be rejected. Excessive deflection is that which will produce visible and noticeable waves in the finished concrete.
4. Measure formwork for elevated structural slabs, columns, wall elevations points of maximum camber and submit in writing to the Architect/Engineer prior to placing concrete.

B. Formwork Construction: Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301. Uniform, substantial and sufficiently tight to prevent leakage of concrete paste, readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Tie, brace, shore, and support to insure stability against pressures from any source, without failure of any component part and without

excessive deflection. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

C. Provide all openings, offsets, inserts, anchorages, blocking, and other features of the work as shown or required. See INSERTS, EMBEDDED PARTS, AND OPENINGS for detailed requirements.

D. Warped, checked, or scuffed forms will be rejected.

E. Maintain membranes, reinforcing and other work free of damage; protect with plywood runway boards or other positive, durable means.

F. Align joints and make watertight. Keep form joints to a minimum.

G. Provide fillet and chamfer strips on external corners of exposed locations and as indicated to form patterns in finished work. Extend patterns around corners and into alcoves, on backs of columns and similar locations not otherwise shown.

1. Produce beveled, smooth, solid, unbroken lines, except as otherwise indicated to conform to patterns.
2. Form corners and chamfers with 3/4 inch x 3/4 inch strips, unless otherwise indicated, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer at changes in direction.

H. Unexposed corners may be formed either square or chamfered.

I. Ties and Spreaders: Arrange in a pattern acceptable to the Architect when exposed. Snap-ties may be used except at joints between pours where threaded internal disconnecting type shall be used.

J. Coordinate this section with other sections of work that require attachment of components to formwork.

K. Reglets and Rebates: Accurately locate, size, and form all reglets and rebates required to receive work of other trades, including flashing, frames, and equipment.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not allow excess form coating material to accumulate in the forms or to come into contact with reinforcement or surfaces which will be bonded to fresh concrete.

D. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork will be rejected.

E. Leave no residue or stain on the face of the concrete, nor affect bonding of subsequent finishes or work specified in other sections.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

1. Provide openings in concrete formwork to accommodate work of other sections including those under separate contracts (if any). Size and location of openings, recesses and chases shall be in accordance with the section requiring such items. Accurately place and securely support items to be built into forms.

B. Construction Joints: Construct and locate generally as indicated on Drawings and only at locations approved by Structural Engineer, so as not to impair the strength of the structure. Form keys in all cold joints shown or required.

C. Locate and set in place items that will be cast directly into concrete.

D. Rough Hardware and Miscellaneous Metal: Set inserts, sleeves, bolts, anchors, angles, and other items to be embedded in concrete. Set embedded bolts and sleeves for equipment to template and approved shop drawings prepared by trades supplying equipment.

E. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

F. Wood Inserts and Nailers: Provide approved preservative-treated lumber. Set all required nailing blocks, grounds, and other inserts as required to produce results shown. Wood plugs shall not be used.

G. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

H. Piping: Do not embed piping in structural concrete unless locations specifically approved by Structural Engineer.

I. Conduit: Place conduit below slabs-on-grade and only as specifically detailed on structural drawings. Minimum clear distance between conduits shall be 3 diameters. Location shall be subject to Engineer's written approval and shall not impair the strength of the structure.

J. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

1. Provide openings for the introduction of vibrators at intervals necessary for proper placement.
2. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

K. Install Form Liner inserts in accordance with manufacturer's recommendations, to produce patterns and textures indicated.

L. Install waterstops in accordance with manufacturer's recommendations to provide continuous waterproof barrier.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. Remove all dirt, chips, sawdust, rubbish, water and foreign materials detrimental to concrete.
2. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.07 FOOTINGS

A. Verify elevations and provide final excavation required for footings prior to placing of concrete.

3.08 EQUIPMENT BASES

A. Form concrete bases for all mechanical and electrical equipment in accordance with approved shop details furnished by other sections.

B. Sizes and locations as indicated and as required to produce results shown.

C. Provide coved base for all equipment bases placed on concrete slabs.

3.09 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI 301.

3.10 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.

C. Clean and repair surfaces to be re-used in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

D. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

3.11 FORM REMOVAL

A. Do not loosen or remove forms before minimum curing period has elapsed without employment of appropriate alternate curing methods, approved by the Architect in writing.

B. Remove forms without damage to the concrete using means to insure complete safety of the structure and without damage to exposed beams, columns, wall edges, chamfers and inserts. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Do not remove forms until the concrete has hardened sufficiently to permit safe removal and the concrete has attained sufficient strength to safely support imposed loads. The minimum elapsed time for removal of forms after concrete has been placed shall be as follows:

1. Columns and Walls: 7 days, provided members are not subjected to overhead loads.
2. Retaining Walls: 21 days minimum.
3. Footings: 7 days minimum. If backfilled immediately, side forms may be removed 24 hours after concrete is placed.
4. Beams, elevated slab, and similar overhead conditions: 28 days unless adequate shoring is provided.

D. Durations listed above are minimums and are subject to extension at the sole judgment of the Architect/Engineer.

E. Reshoring: Reshore members where and if required by Formwork Design Engineer.

F. Do not subject concrete to superimposed loads (structure or construction) until it has attained full specified design strength, nor for a period of at least 14 days after placing.

G. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

3.12 CLEANING

A. Remove excess material and debris associated with this work from the job site.

END OF SECTION

SECTION 03 2000

CONCRETE REINFORCING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Reinforcing steel work for all concrete and masonry work as indicated on the drawings and specified herein.
2. Coordinate this work with other work affected by these operations, such as forms, electrical work, mechanical work, structural steel, masonry and concrete.

B. Related Sections:

1. Pertinent Sections of Division 01 specifying Quality Control and Testing Laboratory services.
2. Pertinent Sections of Divisions 03 specifying concrete construction.
3. Pertinent Sections of Divisions 04 specifying masonry construction.
4. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete work.

1.02 REFERENCE STANDARDS

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC) Chapter 19A Concrete.

B. American Concrete Institute (ACI) 301 "Specifications for Structural Concrete for Buildings".

C. ACI 318 "Building Code Requirements for Reinforced Concrete and Commentary".

D. ACI SP-066 "ACI Detailing Manual".

E. American Society for Testing and Materials (ASTM) A185 "Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete".

F. ASTM A615 "Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement".

G. ASTM A706 "Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement".

H. American Welding Society (AWS) D1.4 - "Structural Welding Code for Reinforcing Steel".

I. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice".

1.03 SUBMITTALS

A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. Submit for review prior to fabrication.

B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer.

C. Shop Drawings: Show complete fabrication and placing details of all reinforcing steel. Comply with requirements of ACI SP-66. Include:

1. Bar sizes and schedules;
2. Shapes of bent bars, layout and spacing of bars, location of splices.
3. Stirrup spacing, arrangements and assemblies,
4. References to Contract Document detail numbers and designations.
5. Wall elevations corresponding to elevations shown in Contract Documents.

D. Product Data: Submit manufacturer's product data, specifications, location and installation instructions for proprietary materials and reinforcement accessories. Provide samples of these items upon request.

E. Certificates: Submit all certifications of physical and chemical properties of steel for each heat number as manufactured, including location of material in structure as specified below in Article titled QUALITY ASSURANCE. All materials supplied shall be tagged with heat numbers matching submitted Mill Test Report analyses.

F. Samples: Provide to the Owner's Testing laboratory as specified in Article SOURCE QUALITY CONTROL.

1.04 QUALITY ASSURANCE

A. Perform work of this Section in accordance with CRSI DA4, CRSI P1, ACI 301, and ACI 318.

B. Requirements of Regulatory Agencies, refer to pertinent Sections of Division 01 and CBC.

C. Certification and Identification of Materials and Uses: Provide Owner's Testing Agency with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection and all material identification/test information listed below.

1. Provide manufacturer's Mill Test Reports for all materials. Include chemical and physical properties of the material for each heat number manufactured. Tag all fabricated materials with heat number.
2. Provide letter certifying all materials supplied are from heat numbers covered by supplied mill certificates. Include in letter the physical location of each grade of reinforcing and/or heat number in the project (i.e. foundations, walls, etc.).
3. Unidentified Material Tests: Where identification of materials by heat number to mill tests cannot be made, Owner's Testing Agency shall test unidentified materials as described below.

D. Testing and Inspection: Tests and Inspections required by Independent Testing Agency are specified below in Articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and test reports in conformance with pertinent Sections of Division 01.

1.05 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent requirements of Division 01.

B. Deliver reinforcement to project site in bundles marked with durable tags indicating heat number, mill, bar size and length, proposed location in the structure and other information corresponding with markings shown on placement diagrams.

C. Handle and store materials above ground to prevent damage, contamination or accumulation of dirt or rust.

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcing Steel: Deformed billet steel bars, ASTM A706 Grade 60 or ASTM A615 Grade 60.

1. Exception: Bars #3 and smaller shall be Grade 40 minimum, unless otherwise noted on the drawings.
2. Welded reinforcement shall be ASTM A706, or A615 meeting carbon requirements of AWS D1.4. Welding shall conform with AWS D1.4.
3. All reinforcement to be unfinished.
4. ASTM A615 reinforcement at special structural concrete walls, concrete coupling beams, and special concrete moment frames shall have maximum yield stress of 78,000 psi and the tensile strength shall be greater than 125% of the actual yield strength. Test ASTM A615 reinforcement for conformance to these criteria prior to fabrication and/or installation.

B. Welded Wire Reinforcement: ASTM A185.

C. Tie Wire: No. 16 AWG or heavier, black annealed.

D. Concrete Blocks: Slab-on-grade conditions only, as required to support reinforcing bars in position.

E. Reinforcing Supports: Plastic or galvanized steel chairs, bolsters, bar supports, or spacers sized and shaped for adequate support of reinforcement and construction loads imposed during concrete placement, meeting ACI and CRSI standards.

1. For use over formwork: Galvanized wire bar type supports complying with CRSI recommendations. Provide plastic tips where exposed to view or weather after removal of formwork. Do not use wood, brick, or other unacceptable materials.
2. For slabs on grade: Supports with sand plates or horizontal runners where base material will not support chair legs.

F. Reinforcement Splice Couplers: For use only where specified on drawings. Submit other locations proposed for use to Engineer for review. "L-Series Bar Lock" Coupler Systems for Splicing Reinforcement Bars, ESR-2495, by Dayton-Superior Corporation.

2.02 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4), unless specifically shown otherwise. Details not specifically shown or indicated shall conform to SP-066 and specified codes and standards.

1. Accurately shop-fabricate to shapes, bends, sizes, gauges and lengths indicated or otherwise required.
2. Bend bars once only. Discard bars improperly bent due to fabricating or other errors and provide new material; do not re-bend or straighten unless specifically indicated. Rebending of reinforcement in the field is not allowed.
3. Do not bend reinforcement in a manner that will injure or weaken the material or the embedding concrete.
4. Do not heat reinforcement for bending. Heat-bent materials will be rejected.

B. Unacceptable materials: Reinforcement with any of the following defects will not be permitted in the work.

1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
2. Bends or kinks not indicated on Drawings or final shop drawings.
3. Bars with reduced cross-section due to rusting or other cause.

C. Tag reinforcement with durable identification to facilitate sorting and placing.

2.03 SOURCE QUALITY CONTROL

A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform the following:

1. Sampling and Tests of Reinforcing Bars per CBC 1910A.2.
2. Material Testing:
   a. Identified Steel: When samples are taken from bundled steel identified by heat number, matched with accompanying mill analyses as delivered from the mill, Owner's Testing Agency will perform one tensile test and one bend test per each ten tons or fraction thereof for each required size of reinforcing steel.
   b. Unidentified Steel: When identification of materials by heat number matched to accompanying mill analyses cannot be made, perform one tensile test and one bend test per each two and one-half tons or fraction thereof for each required size of reinforcing steel. Tests of unidentified steel shall be performed by the Owner's Testing Agency and costs for these tests shall be paid by the Contractor by deductive change order.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect the conditions under which concrete reinforcement is to be placed. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Coordinate with work of other sections to avoid conflicts or interference. Bring conflicts between reinforcement and other elements to Architect's attention. Resolve conflicts before concrete is placed.

C. Notify Architect, Structural Engineer, and Authority Having Jurisdiction for review of steel placement not less than 48 hours before placing concrete.

3.02 PLACEMENT

A. General: Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean bars free of substances which are detrimental to bonding. Maintain reinforcement clean until embedded in concrete.

C. Place reinforcement to obtain the minimum coverages for concrete protection. Do not deviate from required position. Maintain required distance, spacing and clearance between bars, forms, and ground.

D. Location and Support: Provide metal chairs, runners, bolsters, spacers and hangers, as required.

E. Provide additional steel reinforcement as necessary or as directed, to act as spreaders or separators to maintain proper positioning.

F. Tying and Attachment: Securely tie at all intersections and supports with wire. Prevent dislocation or movement during placement of concrete. Direct twisted ends of wire ties away from exposed concrete surfaces.

G. Separate reinforcing from pipes or conduits with approved non-metallic separators. Do not use wood or steel form stakes or reinforcement used as stakes as support for reinforcement.

H. Accommodate placement of formed openings required by other sections.

I. Obstructions:

1. Where obstructions, block-outs, or penetrations (conduits, raceways, ductwork) prevent continuous placement of reinforcement as indicated, provide additional reinforcing as detailed and as directed by the Structural Engineer to supplement the indicated reinforcement around the obstruction.
2. Place additional trim bars, ties, stirrups, or other elements as detailed and as directed at all opening, sleeves, pipes or other penetrations through structural elements.

J. Welded Wire Reinforcement: Reinforce slabs with 6"x 6"-W1.4 x W1.4 welded wire reinforcement reinforcing, unless otherwise noted on drawings.

1. Provide flat sheets only, no rolls. Straighten, cut to required size, and lay out flat in place.
2. Securely wire-tie reinforcement to other reinforcement at frequent intervals.
3. Extend reinforcement over supporting beams and walls, and to within 1 inch of edge of slabs, construction joints, and expansion joints.
4. Support reinforcement in mid-depth of slab.
5. Lift reinforcement at intervals as slab concrete is placed, ensure proper embedment

3.03 REINFORCING SPACING AND COVERAGE

A. Spacing: Do not space bars closer than four (4) diameters of the largest of two adjacent bars, except at bar laps, which shall be placed such that a minimum of 2 bar diameters is clear between bars.

B. Where reinforcing in members is placed in two layers, the distance between layers shall not be less than four bar diameters of the largest bar and the bars in the upper layers shall be placed directly above those in the bottom layer, unless otherwise detailed or dimensioned.

C. Coverage of bars (including stirrups and columns ties) shall be as follows, unless otherwise shown:

1. Footings and Mat Foundation: 3 inches to any soil face, 2 inches to top.
2. Slabs (on grade): 2 inches to grade face, 1-1/2 inches to top face.
3. Slabs (elevated): 1-1/2 inches top and bottom.
4. Beam & Column: 1-1/2inches to form.
5. Walls: 1-1/2 inches clear to form and 2 inches clear to form at soil face.

3.04 DOWELS, SPLICES, OFFSETS AND BENDS

A. Provide standard reinforcement splices at splices, corners, and intersections by lapping ends, placing bars in contact, and tightly tying with wire at each end. Comply with details shown on structural drawings and requirements of ACI 318.

B. Provide minimum 1-1/2 inch clearance between sets of splices. Stagger splices in horizontal bars so that adjacent splices will be 4 feet apart.

C. Laps of welded wire reinforcement shall be at least two times the spacing of the members in the direction lapped but not less than twelve inches.

D. Splices of reinforcement shall not be made at points of maximum stress. Provide splice lengths as noted on the structural drawings, with sufficient lap to transfer the stress between bars by bond and shear.

E. Spacing:

1. Space bars minimum distance specified and all lapped bars 2 bar diameters (minimum) clear of the next bar.
2. Stagger splices of adjacent bars where possible and where required to maintain bar clearance.
3. Beam or slab top bars shall be spliced mid-span of column support and bottom bars spliced at column supports.
4. Request Architect/Engineer review prior to placement for all splices not shown on the drawings.

F. Reinforcement Couplers: Install at all locations indicated and may be used as an alternate to lap splices in general. Install couplers in accordance with manufacturer's recommendations.

3.05 WELDING

A. No reinforcing shall be welded unless specifically indicated or without prior approval of the Structural Engineer and the Authority Having Jurisdiction.

B. Only when so approved for use as noted above, all welding shall conform to AWS D1.4, ACI 318 Section 26.6.64, and CBC 1903A.8 and the following;

1. All welding performed by certified welders.
2. All reinforcement requires preheat prior to welding. All preheat and welding shall be continuously inspected by the Testing Agency.

3.06 MISPLACED REINFORCEMENT

A. Notify Architect/Engineer immediately if reinforcing bars are known to be misplaced after concrete has been placed.

B. Perform no correction or cutting without specific direction. Do not bend or kink misplaced bars.

C. Correct misplaced reinforcing only as directed in writing by the Architect/Engineer. Bear all costs of redesign, new, or additional reinforcing required because of misplaced bars at Contractor's expense.

3.07 FIELD QUALITY CONTROL

A. The Testing Agency as specified in the Article QUALITY ASSURANCE, will inspect the work for conformance to contract documents before concrete placement.

1. Inspection: Provide inspection and verification of installed reinforcement. Confirm that the surface of the rebar is free of form release oil or other coatings.
2. Inspect all preheat and welding activities for steel reinforcement, when these occur.
3. Exception: Non-structural patios, driveways, and sidewalks do not require special inspection.

3.08 CLEANING

A. Remove excess material and debris associated with this work from the job site.

END OF SECTION

SECTION 03 3000

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Provide all labor, materials, equipment and services to complete all concrete work required, including, but not limited to, the following:

1. Foundations, beams, columns, elevated slabs, slabs-on-grade, walls, and retaining walls.
2. Installation of all bolts, inserts, sleeves, connections, etc. in the concrete.
3. Joint devices associated with concrete work.
4. Miscellaneous concrete elements, including, but not limited to: equipment pads, light pole bases, flagpole bases, thrust blocks, and manholes.
5. Concrete curing.
6. Coordination with other sections:
   a. Make all preparations and do all work necessary to receive or adjoin other work. Install all bolts and anchors, including those furnished by other sections, into formwork and provide all required blocking.
   b. Install all accessories embedded in the concrete and provide all holes, blockouts and similar provisions necessary for the work of other sections. Provide all patching or cutting made necessary by failure or delay in complying with this requirement at the Contractor's expense.
   c. Coordinate with other sections for the accurate location of embedded accessories.

B. Related Sections:

1. Pertinent Sections of Division 01 specifying Quality Control and Testing Laboratory services.
2. Pertinent Sections of Division 03 specifying concrete construction.
3. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete.
4. Pertinent sections of other Divisions specifying floor finishes and sealants applied to concrete substrates.

1.02 REFERENCES

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC) Chapter 19A Concrete.

B. American Concrete Institute (ACI) 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete"; ACI 211.2 "Standard Practice for Selecting Proportions for Lightweight Concrete".

C. ACI 301 "Specifications for Structural Concrete".

D. ACI 302.1R "Guide for Concrete Floor and Slab Construction".

E. ACI 304R "Guide for Measuring, Mixing, Transporting, and Placing Concrete".

F. ACI 305R "Hot Weather Concreting".

G. ACI 306R "Cold Weather Concreting".

H. ACI 308 "Standard Practice for Curing Concrete".

I. ACI 318 "Building Code Requirements for Reinforced Concrete and Commentary".

1.03 SUBMITTALS

A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer. Submittals that do not meet these requirements will be returned for correction without review. Submit for review prior to fabrication.

B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents.

C. Product Data: Submit manufacturers' data on manufactured products and other concrete related materials such as bond breakers, cure/sealer, admixtures, etc. Demonstrate compliance with specified characteristics. Provide samples of items upon request. Submit material certificates for concrete aggregates and cementitious materials. Certificates shall show compliance to applicable ASTM's, the CBC, and additional requirements stated herein.

D. Mix Designs: Submit Mix Designs for each structural concrete type required for work per requirements of articles CONCRETE MIXES and QUALITY ASSURANCE. Resubmit revised designs for review if original designs are adjusted or changed for any reason. Non-Structural mixes need not be submitted for review by Structural Engineer.

E. Shop Drawings: Proposed location of construction and cold joints. Proposed location of all slab construction/dowel joints, control joints, and blockouts.

F. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.

G. Batch Plant Certificates: Include with delivery of each load of concrete. Provide Certificates to the Testing Agency and the Architect/Engineer as separate submittals. Concrete delivered to the site without such certificate shall be rejected and returned to the plant. Each certificate shall include all information specified in Article SOURCE QUALITY CONTROL below.

H. Engineering Analysis: Prepared by a California-licensed Civil or Structural Engineer, justifying construction-imposed loads on slabs, beams, and walls which exceed those allowed by CBC for the specified use.

1. 2000 lbs maximum allowable construction load without analysis.
2. 10,000 lbs maximum allowable construction load with analysis.

I. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Concrete construction verification and inspection to conform to CBC 1705A.3.

C. Common Sourcing: Provide each of the following materials from a single source for entire project.

1. Cement.
2. Fly ash.
3. Aggregate.

D. Follow recommendations of ACI 305R when concreting during hot weather. Follow recommendations of ACI 306R when concreting during cold weather.

E. Services by the Independent Testing Agency (includes "Special" Inspections) as specified in this Section and as follows:

1. Perform tests and inspections specified below in articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and reports to be in conformance with pertinent Sections of Division 01.

F. Contractor shall bear the entire cost of remediation, removal, and/or replacement of concrete determined defective or non-conforming, including Architect/Engineer fees for redesign.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials specified by brand name shall be delivered in unbroken packages bearing manufacturer's label and shall be brand specified or an approved equal.

B. Delivery, Handling and Storage of other materials shall conform to the applicable sections of the current editions of the various reference standards listed in this Section.

C. Protect materials from weather or other damage. Sort to prevent inclusion of foreign materials.

D. Specific Requirements:

1. Cement: Protect against dampness, contamination, and warehouse set. Store in weather tight enclosures.
2. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregates. Use only one supply source for each aggregate stock pile.
3. Admixtures:
   a. Store to prevent contamination, evaporation, or damage.
   b. Protect liquid admixtures from freezing and extreme temperature ranges.
   c. Agitate emulsions prior to use.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather (Freezing or near-freezing temperatures) per ACI 306R:

1. Heat concrete materials before mixing, as necessary to deposit concrete at a temperature of at least 50°F but not more than 90°F.

2. Do not place concrete during freezing, near-freezing weather, snow, rain or sleet unless protection from moisture and/or cold is provided.
3. Protect from freezing and maintain at a temperature of at least 50°F for not less than seven days after placing. Take special precautions to protect transit-mixed concrete.
4. No salts, chemical protection or admixture are permitted without written approval of Architect/Engineer.
5. Contractor shall maintain an air temperature log for the first 7 days after placement with entry intervals not to exceed 8 hours.

B. Hot Weather per ACI 305R:

1. Cool concrete materials before mixing, or add ice in lieu of mix water as necessary to deposit concrete at a temperature below 85°F.
2. Do not place concrete in hot/windy weather without Architect/ Engineer review of procedures.
3. Provide sunshades and/or wind breakers to protect flat work during finishing and immediate curing operations. Do not place flatwork concrete at air temperature exceeding 90°F.
4. Provide modified mix designs, adding retarders to improve initial set times and applying evaporation reducers during hot/windy weather for review by Independent Testing Agency prior to use.

1.07 MOCK-UP

A. Construct and erect mock-up panel for architectural concrete surfaces indicated to receive special treatment or finish, as result of formwork.

1. Panel Size: Sufficient to illustrate full range of treatment.
2. Number of Panels: 2.
3. Locate as indicated on drawings.

B. If requested by Architect / Engineer, cast concrete against mock-up panel. Obtain acceptance of resulting surface finish prior to erecting formwork.

C. Accepted mock-up panel is considered basis of quality for the finished work. Keep mock-up exposed to view for duration of concrete work.

D. Mock-up may remain as part of the Work.

1.08 SCHEDULING AND SEQUENCING

A. Organize the work and employ shop and field crew(s) of sufficient size to minimize inspections by the Testing Agency.

B. Provide schedule and sequence information to Testing Agency in writing upon request. Update information as work progresses.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 1000.

2.02 REINFORCEMENT

A. Comply with requirements of Section 03 2000.

2.03 MATERIALS

A. General Requirements: All materials shall be new and best of their class or kind. All materials found defective, unsuitable, or not as specified, will be condemned and promptly removed from the premises.

B. Cementitious Materials:

1. Portland Cement: ASTM C150, Type II, low alkali conforming to CBC 1903A.1.
2. Fly Ash (Pozzolan): ASTM C618, Class F.

C. Concrete Aggregates:

1. Coarse and Fine Aggregates: ASTM C33; Stone aggregate and sand. Specific source aggregate and/or sand or shrinkage characteristics as required for class of concrete specified.
2. Lightweight aggregate: ASTM C330 and C332.
3. Source shall remain constant throughout the duration of the job. The exact portions of the fine aggregates and coarse aggregates to be used in the mix shall be determined by the mix design.
4. Aggregates shall be tested for alkali reactivity per CBC section 1903A.5. Where test results exceed allowable limits, additional testing of mitigation procedures shall be provided, as outlined per CBC section 1903A.5

D. Water: Potable, clean, from domestic source.

E. Admixtures: All admixtures shall be used in strict accordance with the manufacturer's recommendations. Admixtures containing calcium chlorides or other accelerators shall not be used without the approval of the Architect/Engineer and the Owner's Testing Laboratory.

1. Mid Range Water Reducing Admixtures: ASTM C494 Type A, "MasterPolyHeed" (formerly "PolyHeed") series by BASF, "WRDA" series by W.R. Grace, or equal.
2. High Range Water-Reducing Admixtures: ASTM C494 Type F, "MasterRheoBuild 1000" (formerly "RheoBuild 1000") or "MasterGlenium" (formerly "Glenium") series by BASF or equal.
3. Water Reducing Admixture and Retarder: ASTM C494 Type B or D, "MasterPozzolith" (formerly "Pozzolith") series or "MasterSet DELVO" (formerly "DELVO") series by BASF, "Plastiflow-R" by Nox-crete, or equal.
4. Air Entraining Admixtures: ASTM C260, product suit condition by BASF or equal.
5. Viscocity Modifiers: ASTM C494 Type S.

F. Slurry: Same proportion of cement to fine aggregates used in the regular concrete mix (i.e. only coarse aggregate omitted); well mixed with water to produce a thick consistency.

G. High Strength Grout: See section 05 1100 for requirements.

H. Dry Pack: Dry pack (used only for cosmetic concrete repairs) shall consist of:

1. One part cement to 2-1/2 parts fine aggregate (screen out all materials retained on No.4 sieve), mixed with a minimum amount of water, added in small amounts.
2. Mix to consistency such that a ball of the mixture compressed in the hand will retain its shape, showing finger marks, but without showing any surface water.

2.04 ACCESSORIES

A. Bonding Agent: ASTM C881, Type II Grade 2 Class B or C. Do not allow epoxy to set before placing fresh concrete.

1. "MasterEmaco ADH 326" (formerly "Concresive Liquid LPL") by BASF;
2. "Rezi-Weld 1000" by W.R. Meadows.

B. Chemical Hardener: Fluorosilicate solution designed for densification of cured concrete slabs. "MasterKure HD 310 WB" (formerly "Lapidolith") by BASF, "LIQUI-HARD" W.R. Meadows Co, or equal.

C. Moisture-Retaining Cover: ASTM C171, type 1, one of the following;

1. Regular Curing Paper, Type I, reinforced waterproof: Fortifiber Corporation "Orange Label Sisalkraft", "Pabcotite" paper, or equal.
2. Polyethylene Film: ASTM D 2103, 4 mil thick, clear or white color.
3. White-burlap-polyethylene sheet, weighing not less than 10 oz/per linear yd.

D. Liquid Curing Compound: ASTM C 309, Type 1, Class B, clear or translucent, 25% minimum solids, water base acrylic cure/sealer which will not discolor concrete and compatible with bonding of finishes specified in related sections. W.R. Meadows Co. "Vocomp 25" or equal. Maximum VOC content shall comply with local requirements and California Green Building Code.

E. Under Slab Water Vapor Retarder: Vapor retarder sheet to be ASTM E1745 Class A; 15 mil, single ply extruded polyolefin; permeance no greater than 0.01 U.S. Perms per ASTM E154, ASTM E96 procedure B or ASTM F1249.

1. "Stego Wrap Vapor Barrier (15mil)" by Stego Industries LLC.
2. "Vaporguard" by Reef Industries.
3. Approved Equal.

F. Evaporation Reducer: "MasterKure ER 50" (formerly Confilm), by BASF.

G. Permeability Reducer: Use only where specifically referred to.

1. Admixture Type: Xypex Chemical Corporation "XYPEX Admix C-500". Dosage: 2-3% of cement content by weight; 15 lb/cu. yd. max. or BASF "MasterLife 300D" (formerly "Rheomac 300D"). Dosage: 2% of cement content by mass.
2. Surface-Applied Type: Xypex Chemical Corporation "XYPEX Concentrate. Brush application: 1.25-1.50lb/sq. yd., 5 parts powder to 2 parts water. BASF "MasterSeal 500" (formerly "Tegraproof"). Slurry coat: one part water to 2.25-2.5 parts powder by volume.
3. Approved equal.

2.05 JOINT DEVICES AND MATERIALS

A. Waterstops: Resilient type, meeting Corps of Engineers CRD-C 572. Consult manufacturer for appropriate product for specific use. Submit for review. Install per manufacturers recommendation. Provide W. R. Meadows "Seal Tight" PVC waterstop, Sika "Greenstreak" PVC waterstop, or approved equal.

B. Expansion Joint Filler: ASTM D1751, Nonextruding, resilient asphalt impregnated fiberboard or felt, 3/8 inch thick and 4 inches deep; tongue and groove profile.

1. Products: "Servicised Products", W.R. Meadows, Inc., "National Expansion Joint Company", "Celotex Corporation", or equal.

C. Joint Filler: ASTM D944, Compressible asphalt mastic with felt facers, 1/4 inch thick and 4 inches deep.

D. Sealant and Primer: As specified in Section 07 9200.

E. Slab Joint Sealant: Compatible with floor finishes specified in related sections.

2.06 CONCRETE MIXES

A. General requirements for mix design and submittal of structural class concrete:

1. Provide Contractor submittals to Architect/Engineer not less than 15 days before placing concrete.
2. Contractor shall review mix designs and proposed placing requirements prior to submittal for compatibility to insure that the concrete as designed can be placed in accordance with the drawings and specifications.
3. Changes or revisions require re-submittal: All variations to approved mix designs, including changing type and/or quantity of admixtures shall be resubmitted to the Architect/Engineer for review prior to use.
4. Mix design(s) for all structural classes of concrete to be prepared by qualified person experienced in mix design. Allow for time necessary to do trial batch testing when required.
5. Mix designs utilizing greater than 15% replacement of cement with fly ash (by weight) shall not be designed per ACI 318 Chapter 19 Provide break histories or trial batching.
6. Preparer to provide backup data and certify in writing that mix design meets:
   a. Requirements of the specifications for concrete durability and quality;
   b. Requirements of the California Building Code and ACI 318 Section 26.4, including break histories, trial batching test results, and/or a mix designed by a California Registered Civil Engineer per ACI 318 Chapter 19 and bearing the Engineer's seal & signature.
7. Clearly note on mix designs with specified maximum WCR if design permits addition of water on site, or clearly identify in the mix design that no water is to be added on site.
8. Deviations: Clearly indicate proposed deviations, and provide written explanation explaining how the deviating mix design(s) will provide equivalent or better concrete product(s) than those specified.
9. Include adjustments to reviewed mix designs to account for weather conditions and similar factors.

B. Proportioning - General: The following provisions apply to all mix designs:

1. Proportion concrete mixes to produce concrete of required average strength (as defined by California Building Code Section 1904A and ACI 318 Section 19.2.1). Select slump, aggregate sizes, shrinkage, and consistency that will allow thorough compaction without excessive puddling, spading, or vibration, and without permitting the materials to segregate, or allow free water to collect on the surface.
2. Select aggregate size and type to produce dense, uniform concrete with low to moderate shrinkage, free from rock pockets, honeycomb and other irregularities.
3. Mix designs may include water reducing and retarding admixtures to meet or exceed minimum set times (time required to place and finish) and to minimize Water Cement Ratios (WCR). Minimum and maximum criteria presented in this section are guidelines and do not represent a specific mix design.
4. Cement Content: Minimum cement content indicates minimum sacks of cementitious material. Increasing cement content to increase early strengths or to achieve specified WCR while maintaining water content is discouraged in order to minimize effects of shrinkage.
    a. Substitution of fly ash for Portland cement on an equivalent weight basis up to 25% replacement is permitted, except at high early strength concrete. Replacement in excess of 25% is not permitted unless part of a specified mix design that has been submitted for review.
    b. Such substitution requests may be denied by the Engineer.
5. Water Content: Mix designs with a specified maximum Water Cement Ratio (WCR) may be designed with a lower WCR than specified in order to allow addition of water at the site.
6. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301 and this section.
    a. For trial mixtures method, employ independent testing agency acceptable to Architect/Engineer for preparing and reporting proposed mix designs.
7. Placement Options: Mix designs may, at the Contractor's option, be designed for either pump or conventional placement with aggregate size, slumps, etc. to be maintained as specified in this section.

C. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations and this section.

D. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations and this section. Maximum cured weight of lightweight concrete shall be 110 pounds per cubic feet.

E. Special mix design requirements for interior concrete floor slabs on grade to receive floor coverings or coatings:

1. Proportion concrete mixes per this specification, ACI 211.1, and the requirements below:
2. Minimum strength at 28 days to be 3000 psi; minimum strength at 56 days to be 4000 psi.
3. Fly Ash Type F, shall be substituted for cement on a 1 lb. per 1 lb. basis, with a minimum replacement of 25% and a maximum of 35%. Mix design must comply with CBC 1904A requirements.
4. 200 lbs. of 3/8(-) aggregate shall be added to reduce total sand.
5. Reduce total sand to minimum practical.
6. Admixture dosage shall be per manufacturer's recommendations. Dosage may be increased for workability as long as set times are not excessive for placement and finishing.

F. Special mix design requirements for high volume fly ash concrete:

1. Proportion concrete mixes per this specification, ACI 211.1, and the requirements below:
2. Fly Ash Type F, shall be substituted for cement on a 1 lb. per 1 lb. basis, with a replacement of 50%.
3. Minimum strength at 28 days to be 2500 psi; minimum strength at 56 days to be 3000 psi.
4. Add 200-300 pounds 3/8" aggregate to replace portion of fine aggregate.
5. Admixture dosage shall be per manufacturer's recommendations. Dosage may be increased for workability as long as set times are not excessive for placement and finishing.
6. Concrete shall be wet cured per CONCRETE CURING.

G. Mix Design Minimum Requirements:

Concrete Class	Coarse Aggregate Size (Inches) & Fine Aggregate[3]	Maximum WCR or Maximum Nominal Slump & Tolerance (Inches)[1,2]	Minimum 28-Day Design Strength	Minimum Cement Sacks/per yd[4]
NON-STRUCTURAL				
1) Lean Concrete (use only where specified)	---	---	---	3.0
2) Slab on Grade Exterior (Walks & Patios)	1" x #4	4" ± 1"	2,500	4.5
STRUCTURAL				
3) Interior Slab on Grade w/floor coverings/coatings[5]	1" x #4	WCR = .45	—	6.1
4) Interior Slab on Grade w/o floor coverings/coatings	1" x #4	WCR = .45	3,000 (4,000 at 56-days)	5.0
5) Foundation (including stem walls)	1" x #4	WCR = .53	3,000	5.0
6) Formed Cast Slab Above Grade	1" x #4	WCR = .46	4,000	6.0
7) Cast Slab Above Grade on Metal Deck	3/4" x #4	WCR = .53	3,000	5.0
8) Columns, Walls, Retaining Walls & Beams	1" x #4	WCR = .46	4,000	6.0
9) Tilt-Up Concrete Wall Panels	1" x #4	WCR = .53	3,000	5.25
10)Light Weight Concrete	3/4" x #4 Expanded Shale	3" ± 1/2"	3,000	5.5
11)High Volume Fly Ash Concrete[6]	1" x #4	WCR = .45	—	6.0

1. The tolerance is the maximum deviation allowable without rejection. The mix design shall be based on the nominal value specified and is without water reducing mixtures. Slump to be measured at the end of the hose.
2. The maximum water cement ratio (WCR) is limited at time of placement as noted. No water is to be added on site such that the specified WCR or maximum slump is exceeded without approval of the testing laboratory and the Architect/Engineer. Workability is to be achieved utilizing an acceptable mid range to high range water reducing admixture.
3. Gradation of aggregate is per CBC Section 1903A5 ACI 318 section 26.4.1.2, and ASTM C33.
4. Minimum cement content includes all cementitious materials.
5. See Article 2.06E for additional requirements at slabs on grade with coverings/coatings.
6. See article 2.06F for additional requirements at high volume fly ash concrete.

2.07 MIXING CONCRETE

A. Batch final proportions in accordance with approved mix designs. All adjustments to approved proportions, for whatever reason, shall be reviewed by the Architect/Engineer prior to use.

B. Batch and mix concrete in accordance with ASTM C94, at an established plant. Site mixed concrete will be rejected.

C. Provide batch and transit equipment adequate for the work. Operate as necessary to provide concrete complying with specified requirements.

D. Place mixed concrete in forms within 1-1/2 hours from the time of introduction of cement and water into mixer or 300 revolutions of the drum whichever comes first. Use of, re-mixing, and/or tempering mixed concrete older than 1 hour will not be permitted.

E. Do not add water at the site to concrete mixes with a maximum specified WCR unless the water content at batch time provides for a WCR less than specified and this provision, including the quantity of water which may be added at the site, is specifically noted on the mix design and certification by the mix preparer. See ASTM C94 for additional requirements.

2.08 SOURCE QUALITY CONTROL

A. Services by independent Testing Agency:

1. Where aggregate alkali reactivity testing (and, when applicable, mitigation testing) per the MATERIALS section is not available, the Testing Agency shall perform this testing to verify materials conformance to CBC section 1903A.5.
2. Batch Plant inspection at automated plants to occur at commencement of concrete work each day (first truck). Batch Plant inspection at non-automated plants and when accuracy is questionable shall be continuous. Additionally, water cement ratio (WCR) is to be verified where a WCR is specified herein. The computed WCR is to be written on the Batch Plant Certificate to be taken to the job site prior to the truck leaving the plant. See requirements of CBC 1705A.3.3.
3. Batch Plant Certificates: Obtain the weighmaster's Batch Plant Certificate at arrival of truck at the site. If no batch plant certificate is provided, recommend to the General Contractor that the truckload of concrete be rejected. So note in daily log, along with the location of the load of concrete in the structure if the load is not rejected. See requirements of CBC 1705A.3.3.
    a. Laboratory's inspector shall obtain for each transit mixer Batch Plant Certificates to verify mix design quantities and condition upon delivery to the site.
    b. Certificates to include: Date, time, ingredient quantities, water added at plant and on job, total mixer revolutions at time of placement, and time of departure.
    c. Concrete with specified water cement ratio: Add no water on site unless mix design and batch records each show additional water may be added. See ASTM C94 for additional requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

B. Verify work of other sections is complete and tested as required before proceeding.

3.02 PREPARATION

A. Observation, Inspection and Testing:

1. Architect/Engineer: Notify not less than 2 working days before each concrete placement, for observation and review of reinforcing, forms, and other work prior to placement of concrete.
2. Testing Agency: Notify not less than 24 hours before each placement for inspection and testing.

B. Placement Records: Contractor shall maintain records of time, temperature and date of concrete placement including mix design and location in the structure. Retain records until completion of the contract. Make available for review by Testing Agency and Architect/Engineer.

C. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

D. Verify location, position and inclusion of all embedded and concealed items.

E. Verify installation of vapor retarder under interior slabs on grade, as specified in related section, is complete.

F. Cleaning and Preparation:

1. Remove loose dirt, mud, standing water, and foreign matter from excavations and cavities.
2. Close cleanout and inspection ports securely.
3. Thoroughly clean reinforcement and other embedded items free from loose rust and foreign matter. Maintain reinforcing securely in place. Do not place concrete on hot reinforcing.
4. Dampen form materials and substrates on which concrete is to be placed at least 1 hour in advance of placing concrete; repeat wetting as necessary to keep surfaces damp. Do not saturate. Do not place concrete on saturated material.
   a. Thoroughly wet wood forms (except coated plywood), bottom and sides of trenches, adjacent concrete or masonry and reinforcement.
   b. Concrete slabs on base rock, dampen rock.
   c. Concrete slabs on vapor retarder, do not wet vapor retarder.
5. Verify that metal forms are clean and free of rust before applying release agent.
6. Thoroughly clean metal decking. Do not place concrete on wet deck surface.
7. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

G. Drill holes in existing concrete at locations where new concrete is doweled to existing work. Insert steel dowels and prepare connections as detailed.

H. Do not overcut at existing concrete work to remain. Contractor is responsible for repair/replacement of overcut concrete to the Owner's satisfaction.

3.03 PIPES AND CONDUITS IN CONCRETE

A. Slabs-on-Grade:

1. No pipe or conduit exceeding 1 inch outside diameter shall be embedded within the specified slab thickness except as specifically detailed.
2. Do not stack or abut pipes, maintain 3 inches minimum clearance.

B. Sleeving and Wrapping:

1. Foundations: Sleeve or wrap all individual pipe penetrations, minimum 1-1/2 inches clear to reinforcing all around.
   a. Sleeves: PVC. Provide 1 inch minimum clear all around O.D. pipe to I.D sleeve, UNO at ends, fill void space with mastic or plastic bituminous cement.
   b. Wrapped Vertical Pipes: Provide 1/8 inch nominal sheet foam with three wraps minimum, UNO.
   c. Wrapped Horizontal Pipes: Provide 1/8 inch nominal sheet foam with eight wraps minimum, UNO.
   d. Underground Fire Lines 4" and Larger: At sleeves provide 2 inch minimum clear all around O.D. pipe to I.D sleeve. At wrapped pipes, provide 1/8 inch nominal sheet foam with sixteen wraps minimum.
2. Slabs or Curbs: Wrap pipes as described above.

C. Space groups of pipes/conduits at least 3 sleeve diameters apart, do not interrupt specified concrete and reinforcement.

1. Provide block-outs as detailed when grouping of pipes/conduits in foundation or other structural member prevents spacing as described. Notify Architect/Engineer for review of any conditions not conforming to details.
2. Center pipe/conduit penetrations in the depth and/or thickness of foundations.
3. Maximum size of pipe/conduit penetrations shall not exceed the least dimension of concrete divided by 3.

D. Do not embed pipes/conduits in concrete slabs on metal deck.

E. Provide the following at pipes/conduits detailed to be embedded in a concrete beam, wall or column:

1. Place as near as possible to center of member with reinforcing as specified on each side.
2. Where reinforcing is located near or at center of member, place pipe or conduit 1 inch minimum clear from reinforcing and provide #3 at 12 inches on center perpendicular to the pipe/conduit. Reinforcing to extend 12 inches minimum past pipe/conduit each side.
3. Maintain ¾ inch clear minimum from added reinforcing to face of concrete where not exposed to weather and 1-1/2 inches clear where exposed to weather.
4. Space embedded items (groups of pipe/conduit, junction boxes or other elements) minimum 3 inches apart.
5. Provide reinforcing in walls, beams, columns as detailed for groups of pipe/conduit. Provide minimum replacement reinforcement of same size and number for interrupted or displaced reinforcement for the full height, length, width of the wall, beam, and/or column on each side of the "effective opening."

3.04 CONCRETE PLACEMENT

A. Transporting:

1. Provide clean, well-maintained equipment of sufficient quantity and capacity to execute the work and produce concrete of quality specified.
2. Handle and transport concrete from mixer to final deposit location as rapidly as practicable. Prevent separation or loss of ingredients.

B. Perform concrete placement by methods which will not puncture, damage or disturb vapor retarder membrane. Repair all damage to vapor retarder membrane before covering.

C. Placement - General: Placement, once started, shall be carried on as a continuous operation until section of approved size and shape is completed. Provide construction joints as detailed on the drawings. Engineer's written approval required for all deviations.

1. Deposition:
   a. Deposit concrete to maintain an approximately horizontal plastic surface until the completion of the unit placement.
   b. Deposit as neatly as practicable in final position, minimize re-handling or flow.
   c. Do not drop concrete freely where reinforcing bars, embeds, or obstructions occur that may cause segregation. Provide spouts, elephant trunks, or other means to prevent segregation during placement.
2. Depth: Layered placement in columns and walls shall not exceed ten feet vertical depth.
   a. Place concrete in minimum 32 inch horizontal lifts.
   b. Schedule placement to ensure that concrete will not take initial set before placement of next lift.
   c. No horizontal cold joints are allowed in columns or walls.
3. Progress Cleaning: Remove all concrete spilled on forms or reinforcing steel in portions of structure not immediately concreted. Remove completely before concrete sets.
4. Interruptions: Shut down placement operations and dispose of all remaining mixed concrete and concrete in hoppers or mixers following all interruption in placement longer than 60 minutes.
   a. If such interruption occurs, provide new or relocate existing construction joints as directed by Engineer.
   b. Cut concrete back to the designated line, cleaning forms and reinforcing as herein specified.
   c. Prepare for resumption of placement as for new unit when reason for interruption is resolved.

D. Placement - Elevated Structural Systems: Place as noted for "General" above and as follows:

1. Metal Decking and Structural Steel Beam Systems that are not to be shored: Locate screed lines on primary structural members. Review proposed screed line locations and expected structural deflections with the Architect/Engineer prior to placement of concrete.
2. Place screed lines to match camber of primary girders made of material other than concrete. Locate screeds to provide the minimum specified thickness of concrete at all locations.
3. Compensate for deflection of intermediate structural members and decking by placement of additional concrete.
4. Adjust embedded items to compensate for camber and deflection. Maintain locations within specified tolerances.

E. Consolidation:

1. Consolidate all concrete thoroughly during placement with high-speed mechanical vibrators and other suitable tools. Perform manual spading and tamping to work around reinforcement, embedded fixtures, and into corners of formwork as required to obtain thorough compaction.
   a. Provide vibrators with sufficient amplitude for adequate consolidation.
   b. Use mechanical vibrators at each point of concrete placement.

c. Keep additional spare vibrators, in addition to those required for use, at the site for standby service in case of equipment failure.

2. Consolidate each layer of concrete as placed.
   a. Insert vibrators vertically at points 18 to 30 inches apart; work into top area of previously placed layer to reconsolidate, slowly withdraw vibrator to surface.
   b. Avoid contact of vibrator heads with formwork surfaces.
   c. Systematically double back and reconsolidate wherever possible. Consolidate as required to provide concrete of maximum density with minimized honeycomb.

F. Unacceptable Materials:

1. Do not place concrete that has started to set or stiffen. Dispose of these materials.
2. Do not add water on site to concrete except as specified in the approved mix design, see PART 2 above.

G. Protection of installed work:

1. Do not introduce any foreign material into any specified drainage, piping or duct systems.
2. Contractor shall bear all costs of work required to repair or clean affected work as a result of failure to comply with this requirement.

3.05 CONCRETE JOINTS

A. Structural Joints (Construction/Cold Joints):

1. Locate joints only where shown, or as approved.
2. Review Required: Joints not indicated on the plans shall be located to meet the minimum requirements below, shall not impair the strength of the structure and shall be submitted to Architect/Engineer for review prior to placement of concrete.
   a. Indicate proposed location(s) of construction/cold/expansion joints on shop drawing submittals for review prior to placing concrete.
3. Clean and roughen all surfaces of previously placed concrete at construction joints by washing and sandblasting to expose aggregate to 1/4 inch amplitude.
4. Slabs-On-Grade: Maximum Length of continuous placement shall not exceed 60 feet without special review by the Architect/Engineer. Alternate or stagger placement sections.
5. Foundations, Beams, Elevated Slabs and Joists: Maximum Length of continuous placement shall not exceed 200 foot increments. Provide "keyed" shut-off locations made up with form boards. Extend reinforcing one lap length or more through shut-off.
   a. All reinforcement shall be continuous through construction/cold joint, lapping to adjacent reinforcing in future placement.
   b. Construction Joints in Elevated Slabs: Review all proposed locations with Architect/Engineer.
   c. Construction Joints in Slabs on Metal Decking: Review all proposed locations with Architect/Engineer. Do not locate closer than 24 inches to faces of girder or beam.
6. Horizontal Construction Joints: Place 2 inch slurry (specified concrete mix less coarse aggregate) at beginning of pour at the bottom of walls unless a prior review of a mock-up section demonstrates that segregation of aggregate will not occur.

B. Expansion/Construction Joints (Dowel Joints and Control Joints):

1. Interior and Exterior Floor Slabs-on-Grade:

a. Expansion/Construction Joints: Provide dowel joints or control joints at a maximum dimension (in feet) of three times the slab thickness (in inches) in each direction unless noted otherwise (15'-0" maximum). Install joints to match slab level and in straight lines. Locate joints at all reentrant corners including blockouts.
b. Proportions: Install joints to divide slab into rectangular areas with long dimensions less than 1.5 times short dimension.

2. Exterior Concrete Paving (walkways, patios) and other non-structural concrete flatwork at grade:
   a. Expansion/ construction joints: Provide a 2 inch deep troweled groove or asphalt impregnated joint material embedded 50 percent of the slab depth at 12 feet on center, maximum.
   b. Proportions: Place no section with a length larger than two times width. Additionally, place joints at all inside corners and at all intersections with other work.
3. Elevated Structural Slabs: Locate construction joints as specifically indicated on the drawings. All additional proposed locations shall be reviewed by the Architect/Engineer prior to placement.

C. Joint Types:

1. Dowel Joint: A keyed joint with smooth dowels passing through to allow unrestricted movement due to contraction and expansion. Joints are as specified on the drawings.
2. Control Joint(s): Shrinkage crack control joints may be of the following types when shown on the drawings. Install joints in a straight line between end points with edges finished appropriate to type. Depth shall be 25% of the slab thickness, unless noted otherwise. Fill joints with sealant as shown on the drawings or as required by related sections.
   a. 1/4 inch wide troweled joint.
   b. Keyed joint: Only at locations where concealed by other finishes.
   c. Masonite Strip, 1/8 inch: Only at locations where concealed by other finishes.
   d. Saw Cut, 1/8 inch: Must be performed within eight hours of completion of finishing. Do not make saw cuts if aggregate separates from cement paste during cutting operation. Prevent marring of surface finish. Fill with flexible sealant.

3.06 VAPOR RETARDER

A. Vapor Retarder Installation: Install as specified in PART 2, ASTM E1643, and per manufacturer's recommendations including taping and lapping of seams, sealing of penetrations, and repair of damage. Do not extend vapor retarder below footings.

3.07 FLATWORK

A. General Requirements for All Concrete Formed & Finished Flat:

1. Edge Forms and Screeds: Set accurately to produce indicated design elevations and contours in the finished surface, edge forms sufficiently strong to support screed type proposed.
2. Jointing: Located and detailed as indicated.
3. Consolidation: Concrete in slabs shall be thoroughly consolidated.

B. Flatwork Schedule:

1. Exterior Slabs-On-Grade: Place concrete directly over sub-base as indicated.

a. Sub-Base: Clean free-draining, crushed base rock, 6 inch minimum thickness, thoroughly compacted.

2. Interior Slabs-On-Grade without floor covering:
   a. Sub-Base: Clean free-draining, crushed base rock, 6 inch minimum thickness, thoroughly compacted.
3. Concrete Slabs-On-Grade with floor coverings specified in related sections:
   a. Sub-Base: Clean free-draining, crushed base rock, 6 inch minimum thickness, thoroughly compacted.
   b. Vapor Retarder: Install over sub-base.

3.08 FORMED SURFACES

A. Form all concrete members level and plumb, except as specifically indicated. Comply with tolerances specified in ACI 318 Section 26.11, ACI 301 Section 2, and this specification, except that maximum permissible deviation is 1/4 inch end-to-end for any single member.

B. Cambers: Provide all cambers indicated in the formwork construction. Set screeds to produce specified cambers in the finished concrete.

3.09 CONCRETE FINISHES

A. Flatwork Finishing:

1. Perform with experienced operators.
2. Finish surfaces monolithically. Establish uniform slopes or level grades as indicated. Maintain full design thickness.
3. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains as indicated on drawings.
4. Flatwork Finish Types:
   a. Wood Float Finish: Surfaces to receive quarry tile, ceramic tile, or cementitious terrazzo with full bed setting system, or wood frame for raised finished floors.
   b. Steel Trowel Finish: Surfaces to receive carpeting, resilient flooring, seamless flooring, thin set terrazzo, thin set tile or similar finishes specified in related sections. Trowel twice, minimum.
   c. Broom Texture Finish: Exterior surfaces as indicated or for which no other finish is indicated. Finish as for steel trowel finish, except immediately following first troweling, (depending on conditions of concrete and nature of finish required) provide uniform surfaces texture using a medium or coarse fiber broom.

B. Other Concrete: Provide as required to achieve appearance indicated on structural and architectural drawings and related sections.

1. Repair surface defects, including tie holes, immediately after removing formwork.
2. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
3. Exposed Form Finish: Finish concrete to match forms. Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   a. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
   b. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.

c. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.

4. Intermediate joint and score marks and edges: Tool smooth and flush unless otherwise indicated or as directed by the Architect.
5. Use steel tools of standard patterns and as required to achieve details shown or specified. All exposed corners not specified to be chamfered shall have radiused edges.

3.10 TOLERANCES

A. Minimum Flatwork Tolerances: Measure flatness of slabs with in 48 hours after slab installation in accordance with ACI 302.1R and ASTM E1155 and to achieve the following FF and FL tolerances:

1. Exterior surfaces: 1/8 inch minimum per foot where sloped to drain. Level otherwise. FF20 and FL15.
2. Interior surfaces not otherwise shown or required: Level throughout. FF25 and FL20
3. Interior surfaces required to be sloped for drainage: 1/8 inch in 10 ft.
4. Finish concrete to achieve the following tolerances:
   a. Under Glazed Tile on Setting Bed: FF30 and FL20.
   b. Under Resilient Finishes: FF35 and FL25.
   c. Flooring manufactureer and pertainent section of Division 9.

B. Formed Surface Tolerances:

1. Permanently Exposed Joints and Surfaces: Provide maximum differential height within two feet of, and across construction joints of 1/16 inch.
2. Vertical Elevations: Elevation of surfaces shall be as shown or approved.

3.11 SEPARATE FLOOR TOPPINGS

A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.

B. Place required dividers, edge strips, reinforcing, and other items to be cast in.

C. Apply bonding agent to substrate in accordance with manufacturer's instructions.

D. Apply sand and cement slurry coat on base course, immediately prior to placing toppings.

E. Place concrete floor toppings to required lines and levels. Place topping in checkerboard panels not to exceed 20 feet in either direction.

F. Screed toppings level, maintaining surface tolerances per above.

3.12 CONCRETE CURING

A. Curing - General: Cure in accordance with ACI 308. Maintain concrete water content for proper hydration and minimize temperature variations. Begin curing immediately following finishing.

B. Protection During Curing: Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. The General Contractor is responsible for the protection of the finished slab from damage.

1. Avoid foot traffic on concrete for minimum of 24-hours after placement.
2. Protect concrete from sun and rain.
3. Maintain concrete temperature at or above 50 degrees F. during the first 7 days after placement. See Article ENVIRONMENTAL REQUIREMENTS.
4. Do not subject concrete to design loads until concrete is completely cured, and until concrete has attained its full specified 28-day compressive strength or until 21 days after placement, whichever is longer.
5. Protect concrete during and after curing from damage during subsequent building construction operations. See Article PROTECTION.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than 7 days.
2. High early strength concrete: Not less than 4 days.

D. Begin curing immediately following finishing.

E. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

F. Surfaces Not in Contact with Forms:

1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than 3 days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
2. Begin final curing after initial curing but before surface is dry.
   a. Moisture-retaining cover: Seal in place with waterproof tape or adhesive.
   b. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

G. Flatwork on Grade: Cure by one of the following methods:

1. Water Cure (Ponding): Maintain 100 percent coverage of water over floor slab areas, continuously for minimum 7 calendar days.
2. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
3. Moisture-Retaining Film or Paper: Lap strips not less than 6 inches and seal with waterproof tape or adhesive; extend beyond slab or paving perimeters minimum 6 inches and secure at edges; maintain in place for minimum 7 days.
4. Absorptive Moisture-Retaining Covering: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides and extend beyond slab or paving perimeters 6 inches minimum; maintain in place for minimum 7 days.
5. Liquid Membrane-forming Curing Compound: Provide only when subsequent concrete treatments or finish flooring specified in related sections will not be affected by cure/sealer. Apply curing compound in accordance with manufacturer's instructions at the maximum recommended application rate in two coats, with second coat applied at right angles to first.

H. Elevated Flatwork: Cure by one of the following methods.

1. Moisture-Retaining Sheet: As specified for Flatwork on Grade above.
2. Water Cure: As specified above for minimum 14 days.
3. Apply Membrane Curing Compound as specified above after initial curing period.

I. Flatwork on Metal Decking: Moisture-Retaining Sheet method as specified above.

J. Formed Concrete Members: Cure by moist curing with forms in place for full curing period.

1. Protect free-standing elements from temperature extremes.
2. Maintain forms tight for minimum 7 days. Maintain exposed surfaces continuously damp and completely covered by sheet materials thereafter.
3. Maintain all shoring in place. Refer to related sections specifying formwork.
4. Membrane Curing Compound: Apply compound in accordance with manufacturer's instructions in one coat.

K. Foundations: Apply curing compound immediately after floating.

3.13 CONCRETE HARDENER

A. Apply hardener to all floor slabs not receiving other finishes after 30 days minimum curing. Clean slabs of non-compatible cure/sealers or other foreign material(s) and apply in strict accordance with the manufacturer's directions.

3.14 GROUTING AND DRY PACK

A. Set steel plates on concrete or masonry with high strength grout bed, completely fill all voids; thoroughly compact in place. See Section 05 1100.

B. Bolts or inserts dry packed or grouted in place shall cure for minimum 7 days before tensioning.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspections by Independent Testing Agency: Provided verification and inspection of concrete per CBC Table 1705A.3. Provide written reports for to Engineer, Architect, Contractor and Building Official for the following tests and inspections:

B. Testing & Inspection: Provide periodic inspection of reinforcing steel. Provide continuous inspection during placement of structural class concrete, 3000 psi or more. Non-structural class concrete with a design strength of 2500 psi or less to have periodic inspection on a 150 cubic yard basis as required to assure conformance.

1. Provide periodic inspection of bolts in concrete prior to and during placement where so noted on the construction documents.
2. Structural Concrete Cylinder Tests: Perform in accordance with ASTM C31.
   a. Take four standard 6 inch x 12 inch (or five 4 inch x 8 inch) cylinder specimens on the site, of each class of concrete as specified in PART 2, not less than once a day or for each 50 cubic yards or 2000 sq ft or fraction thereof placed each day.
   b. Record the location of each concrete batch in the building in a log and also note on each specimen.
   c. Perform standard compression test of cylinders in accordance with ASTM C39, one at 7 days and two (three for 4x8 cylinders) at 28 days.

d. Hold fourth (fifth) cylinder untested until specified concrete strengths are attained.

3. Structural Concrete Slump Test and Air Tests: Perform in accordance with ASTM D143 and C231 or C173 at the time of taking test cylinders, and/or at one-hour intervals during concrete placing.
4. Measure and record concrete temperature upon arrival of transit mixers and when taking specimens. Note weather conditions and temperature.
5. Propose adjustments to reviewed mix designs for Architect / Engineer review to account for variations in site or weather conditions, or other factors as appropriate.
6. Water Vapor Transmission Tests: Floors receiving floor finishes specified in related sections will be tested prior to installation of flooring systems. Refer to sections specifying floor finishes for related requirements.

C. Services by Contractor:

1. Rejection of Concrete Materials: Do not use the following without prior written approval of the Architect/Engineer;
   a. Materials without batch plant certificates.
   b. Materials not conforming to the requirements of these specifications.

3.16 ADJUSTING

A. Inspect all concrete surfaces immediately upon formwork removal. Notify Architect/Engineer of identified minor defects. Repair all minor defects as directed.

B. Surface and Finish Defects: Repair as directed by the Architect/Engineer, at no added expense to the Owner. Repairs include all necessary materials; reinforcement grouts, dry pack, admixtures, epoxy and aggregates to perform required repair.

1. Repair minor defective surface defects by use of drypack and surface grinding. Specific written approval of Architect/Engineer is required. Submit proposed patching mixture and methods for approval prior to commencing work.
2. Slabs-on-Grade, Elevated Slabs and on Slabs on Metal Deck: Review for "curled" slab edges and shrinkage cracks prior to installation of other floor finishes. Grind curled edges flush, fill cracks of 1/16 inch and greater with cementitious grout.
3. Grind high spots, fins or protrusions caused by formwork; Fill-in pour joints, voids, rock pockets, tie holes and other void not impairing structural strength. Provide surfaces flush with surrounding concrete.

3.17 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required compressive strength, lines, details, dimensions, tolerances, finishes or specified requirements; as determined by the Architect/Engineer.

B. Repair or replacement of defective concrete will be determined by the Architect/Engineer who may order additional testing and inspection at his option. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

C. Specific Defects:

1. "Low-Strength"; Concrete Not Meeting Specified Compressive Strength after 28 days:

a. Concrete with less than 25% Fly Ash as cementitious material: Test remaining cylinder(s) at 56 days. If strength requirements are met, concrete strength is acceptable.
b. Concrete with 25% or more Fly Ash as cementitious material: Test remaining cylinder(s) at 70 days. If strength requirements are met, concrete strength is acceptable.

2. Excessive Shrinkage, Cracking, Crazing or Curling; Defective Finish: Remove and replace if repair to acceptable condition is not feasible.
3. Lines, Details, Dimensions, Tolerances: Remove and replace if repair to acceptable condition is not feasible.
4. Slab sections not meeting specified tolerances for trueness/flatness or lines/levels: Remove and replace unless otherwise directed by the Architect/Engineer. Minimum area for removal: Fifteen square feet area unless directed otherwise by the Architect/Engineer.
5. Defective work affecting the strength of the structure or the appearance: Complete removal and replacement of defective concrete, as directed by the Architect/Engineer.

3.18 CLEANING

A. Maintain site free of debris and rubbish. Remove all materials and apparatus from the premises and streets at completion of work. Remove all drippings; leave the entire work clean and free of debris.
B. Slabs to Receive Floor Finishes Specified in other sections: Remove non-compatible cure/sealers or other foreign material(s) which may affect bonding of subsequent finishes. Leave in condition to receive work of related sections.

3.19 PROTECTION

A. Protect completed work from damage until project is complete and accepted by Owner.

B. Construction Loads: Submit engineering analysis for equipment loads (including all carried loads) specified in article submittals.

C. Keep finished areas free from all equipment traffic for a minimum of 4 additional days following attainment of design strength and completion of curing.

D. Protection of Drainage Systems:

1. Care shall be taken not to introduce any foreign material into any specified drainage, piping or duct system.
2. Cost of work to repair or clean drainage system as a result of failure to comply with this requirement will be back charged to the contractor.

E. Cover traffic areas with plywood sheets or other protective devices; maintain protection in place and in good repair for as long as necessary to protect against damage by subsequent construction operations.

END OF SECTION

SECTION 05 1100

STRUCTURAL AND MISCELLANEOUS STEEL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: All labor, materials, equipment and operations required to complete structural and miscellaneous metals in shapes and configurations indicated; including:

1. Structural steel columns, beams, bracing, base plates, bolts, joist hangers, and stud bolts welded to structural steel.
2. Miscellaneous structural steel and connections; fabricated connectors and hangers installed by related sections.
3. Anchor bolts and steel inserts embedded in concrete or masonry, installed by related sections.
4. Fabricated steel items embedded in concrete or masonry installed by related sections.
5. Supervision of anchor bolt setting, leveling and elevations to insure required fit of steel work.
6. Shop priming and field touch-up, galvanizing.
7. Bracing, Shoring, Fabrication and Erection.

B. Related Sections:

1. Pertinent sections of Division 01 specifying Quality Control and Testing Agency services.
2. Pertinent Sections of other Divisions specifying concrete reinforcement, formwork, concrete, structural and miscellaneous metal fabrications, steel joists, metal decking, cold-formed metal framing, rough carpentry.

1.02 REFERENCES

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 22A Steel.

B. American Institute of Steel Construction (AISC) 303 "Code of Standard Practice for Steel Buildings and Bridges".

C. AISC 360 "Specification for Structural Steel Buildings".

D. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel".

E. Underwriters Laboratories (UL) FRD "Fire Resistance Directory".

1.03 SUBMITTALS

A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer. Submittals that do not meet these requirements will be returned for correction without review.

B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents.

C. Product Data: Submit manufacturer's product data, specifications, location and installation instructions for proprietary materials and reinforcement accessories. Provide samples of these items upon request.

D. Shop drawings: Submit each building as a complete unit. Do not mix components from multiple buildings or units of work in a submittal. Include all of the following;

1. Profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Fabrication tolerances for all steel.
3. Connections: All, including type and location of shop and field connections.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths, type, size, and sequence. Designate demand critical welds.
5. Designation of Seismic Force Resisting System (SFRS) members and connections. Locate and dimension protected zones. Brace frame gusset plates shall be drawn to scale.
6. Cross-reference all shop drawing detail references to contract document detail references.
7. Secure all field measurements as necessary to complete this work prior to submitting shop drawings for review.
8. Provide holes, welded studs, etc. as necessary to secure work of other sections.
9. Provide the following as separate submittals for each building or unit of work:
   a. Bolt and anchor setting plans.
   b. Layout, fabrication and erection drawings.

E. Certifications:

1. Steel Materials: Submit the following for identified materials.
   a. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
   b. Mill Test Reports: Indicate structural strength, destructive test analysis, and non-destructive test analysis.
   c. Contractor's affidavit certifying that all identified steel materials provided are of the grades specified and match the certificates supplied.
2. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification per AWS D1.1.

F. Samples: Provide samples to the Testing Agency as specified in Article SOURCE QUALITY CONTROL, at no additional costs.

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies, refer to pertinent sections of Division 01 and CBC Chapter 17A.

B. All tests shall be performed by a recognized testing agency as specified in pertinent sections of Division 01.

C. Certification and Identification of Materials and Uses: Provide Testing Agency with access to fabrication plant to facilitate inspection of steel. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection and all material identification/test information listed below.

1. Test all steel as required by ASTM A6.
2. Provide manufacturer's Mill Test Reports for all materials. Include chemical and physical properties of the material for each heat number manufactured. Tag all fabricated materials with heat number.
3. Provide letter certifying all materials supplied are from heat numbers covered by supplied mill certificates. Include in letter the physical location of each material type and/or heat number in the project (i.e. walls, braced frames etc.).
4. Unidentified Material Tests: Where identification of materials by heat number or mill tests cannot be made, Owner's Testing Agency shall test unidentified materials.
5. Provide all certification, verifications, and other test data required to substantiate specified material properties at no additional cost to the Owner.

D. Testing and Inspection: Tests and Inspections performed by Independent Testing Agency are specified below in Articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and test reports in conformance with pertinent sections of Division 01.

E. The following standards are the minimum level of quality required. Provide higher quality work as specifically indicated in the Contract Documents.

1. Workmanship and details of structural steel work shall conform to the CBC and AISC 360.
2. The quality of materials and the fabrication of all welded connections shall conform to AWS D1.1.
3. Comply with Section 10 of AISC 303 for architecturally exposed structural steel.

F. The Testing Agency will review all submittals and testing of materials.

G. All re-inspections made necessary by non-conforming work shall be at the Contractor's expense.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to project site in bundles marked with durable tags indicating heat number, mill, member size and length, proposed location in the structure and other information corresponding with markings shown on placement diagrams.

B. Handle and store materials above ground to prevent damage, contamination or accumulation of dirt or rust.

1.06 SCHEDULING AND SEQUENCING

A. Organize the work and employ shop and field crew(s) of sufficient size to minimize inspections by the Testing Agency.

B. Provide schedule and sequence information to Testing Agency in writing upon request. Update information as work progresses.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Steel W Shapes: ASTM A992 Gr. 50 or ASTM A572 Gr. 50.

B. Structural Steel Plates: ASTM A36 or ASTM A572 Gr. 50 or ASTM 529 Gr. 50

C. Structural Steel Channels, Angles: ASTM A36 or ASTM A572 Gr. 50.

D. HSS (Hollow Structural Sections):

1. Round: ASTM A500, Gr. B.
2. Rectangular or Square: ASTM A500, Gr. B.

E. Pipe: ASTM A53, Grade B.

F. Bolts and Washers: ASTM A307 grade A machine bolts with washers to match. See FINISHES section for galvanization, where required.

G. Anchor Bolts/Rods: ASTM F1554 Gr. 36 or 55. No upset thread allowed.

H. Arc-Welding Electrodes: AWS Standards E70 or equivalent, except no E70T-4 allowed.

I. Other Welding Materials: AWS D1.1; type required for materials being welded.

J. Welded Headed/Threaded Studs: ASTM A108. Minimum yield strength is 51,000 pounds per square inch.

K. Deformed Bar Anchors: ASTM A496.

2.02 ACCESSORIES

A. High Strength Grout: ASTM C1107, non-shrink, premixed compound consisting of aggregate, cement, and water reducing plasticizing agents. Minimum compressive strength f'c = 7000 psi at 28 days. Non-metallic where exposed to view. BASF "MasterFlow 928" or equivalent.

B. Building Structural Steel Primers: Comply with local VOC limitations of authorities having jurisdiction and the California Green Building Code. Verify compatibility with finish coats specified in other sections. Follow manufacturers printed instructions. Apply one coat unless otherwise directed.

1. Type A: Self-Crosslinking Hydrophobic Acrylic passing 1942 hours ASTM D4585 & D1654. "Series 115 Uni-Bond DF" by Tnemec (2.0 to 4.0 mils DFT).
2. Type B: Organic Zinc-Rich Urethane passing 10,000 hours ASTM B117 & G85. "Series 90-97/H90-97 Tneme-Zinc" by Tnemec (2.5 to 3.5 mils DFT) or "Series 94-H20 Hydro-Zinc" by Tnemec (2.5 to 3.5 mils DFT).
3. Type C: MIO-Zinc Filled Urethane passing 10,000 hours ASTM B117. "Series 394 PerimePrime" by Tnemec (2.5 to 3.5 mils DFT).

C. Galvanizing: ASTM A153 and A123.

D. Touch-Up Primer for Galvanized Surfaces: Type B primer.

2.03 FABRICATION

A. Shop fabricate to greatest extent possible.

B. Continuously seal joined members by continuous welds. Grind welds smooth where exposed to view and where noted on drawings.

C. Fabricate connections for bolt, nut, and washer connectors.

D. Protect all materials, before and after fabrication, from rust, corrosion, dirt, grease, and other foreign matter.

E. Fabricate framing members free from twists or bends. Form holes, cut and sheared edges neatly without kinks, burrs, or warped edges.

F. Exposed Steel: Straight, smooth, free of nicks, scars or dents.

G. Gas Cutting: Gas cutting of holes in a member shall not be permitted.

H. Splicing of members: Members requiring splicing due to length requirements may be spliced using full penetration butt welds when such welds and procedures are inspected and certified by the Testing Agency, in conformance with AWS and AISC standards. The location of splices shall be approved by the Architect/Engineer in writing prior to fabrication.

I. Welding: Welding of structural steel connections shall be performed by qualified welders in accordance with AWS Standards. All weld sizes shall match those shown on the drawings.

1. Preparation: Clean all surfaces free of rust, paint and all foreign matter. Remove paint or scale by brushing, chipping or hammering as required. Chip clean and wire brush burned or flame cut edges before welding. Space and alternate welds, clamping as necessary to prevent warp or misalignment.
2. Sequence Welding: When welds enclose, or partially enclose, the perimeter or portion of the surface of a member, make weld bead in sequence, or staggered. Minimize internal stresses. Weld groups of members occurring in a single line in staggered sequence to minimize distortion of the structural frame.
3. Faulty and Defective Welding: Welds failing to meet AWS standards and the Contract Documents shall be rejected and remade at Contractor expense. All welds showing cracks, slag inclusion, lack of fusion, bad undercut or other defects, ascertained by visual or other means of inspection shall be removed and replaced with conforming work.
4. Minimum Weld Strengths: All welds shall match the minimum weld sizes recommended by AISC. Details of fabrication not specifically shown shall match similar details which are specifically shown. All bevel and groove welds shall be full penetration unless size is noted otherwise.
5. Threaded studs, headed studs, and deformed bar anchors shall be full-fusion welded conforming to ASW D1.1.

J. Camber: Fabricate all beams cambered as indicated on the drawings.

1. Fabricate beams without camber for installation with any "natural" crown up.
2. Exception: Fabricate cantilever beams with "crown" down.

K. Grinding: Grind smooth the following structural steel and connections;

1. Exposed cut ends of structural and fabricated shapes.
2. All welds exposed to view.
3. Mitered and fit-up corners and intersections.

L. Back-Up Bars: Required for all complete penetration welds.

M. Bolt Holes: Edge, end distances and spacing shall conform to dimensions shown on the drawings, and as follows;

1. Round: Size indicated and 1/16 inch maximum oversize
2. Slotted: At locations specifically noted on the drawings, provide size indicated and 1/16 inch by 1/4 inch oversize slotted in direction perpendicular to applied loads.
3. Holes in base plates for anchor bolts may be 1/8 inch oversize.

2.04 FINISHES

A. Steel exposed to inclement atmospheric conditions or weather (such as coastal moisture or seasonal rain) shall be sufficiently primed or otherwise protected against corrosion. If condition of steel is suspect due to weathering/corrosion, Contractor shall bear cost of inspection to determine if excessive corrosion is present and if steel member(s) requires repair or replacement. Contractor shall bear cost of repair or replacement.

B. Prepare and finish structural and miscellaneous steel component surfaces as follows, unless a higher standard-of-care is determined necessary per item A:

1. Unpainted, interior, dry exposure surfaces need not be primed.
2. Finished painted, interior, dry exposure surfaces:
   a. Surface Preparation: SSPC-SP2 Hand-Tool or SP3 Power-Tool Cleaning. Where jobsite exposure is expected to exceed 6 months, SSPC-SP6 Commercial Blast-Cleaning is required.
   b. Apply Primer Type A. Field touchup with Type A or Type B.
3. Finish painted surfaces with exterior exposure, interior exposure subject to wet conditions or fumes, or surfaces to receive high performance finish coatings (for example epoxy or urethane for use at frequently abraded surfaces).
   a. Surface Preparation: SSPC-SP6 Commercial Blast-Cleaning. For severe (immersion) exposure, SSPC-SP10 Near-White Blast-Cleaning is required.
   b. Apply Primer Type B. Field touchup with Type B.
4. Surfaces to be fire proofed need not be primed unless required by the fireproofing manufacturer or if jobsite exposure is expected to be inclement per item A. Where unprimed steel is to receive fireproofing, prepare steel surface as required by fireproofing manufacturer. If fireproofed surfaces are to be primed, provide primer as follows:
   a. Surface Preparation: SSPC-SP3 Power-Tool Cleaning.
   b. Apply Primer Type C. Field touchup with Type C.
5. Exterior exposed (unpainted) surfaces and as otherwise indicated to receive galvanizing:
   a. Galvanize per ASTM A123 Class 55 minimum. Passivation agents are not permitted on galvanized metal that is to be painted. Provide vent holes per ASTM A385 at closed sections (such as HSS). Submit proposed location of vent holes for review by Engineer.
   b. Connection hardware shall be hot-dip galvanized per ASTM A153 or F2329. Mating bolts and nuts shall receive the same zinc-coating process.

c. Repair all uncoated, damaged, or altered galvanized surfaces per ASTM A780.

C. Do not prime the following surfaces unless otherwise indicated:

1. Connections to be field welded.
2. Steel in contact with concrete.
3. Surfaces to receive welded metal decking.

D. Do not cover up work with finish materials until inspection is complete and work is approved by the Testing Agency.

2.05 SOURCE QUALITY CONTROL

A. An independent Testing Agency will perform source quality control tests and submit reports, as specified in pertinent sections of Division 01.

B. Steel Materials Testing:

1. No testing is required for materials identified in accordance with CBC 2203A.1 (heat number, grade stencil, etc.).
2. Unidentified steel- General: Test all structural shapes. In addition, test to verify Fy and Fu values when engineering requirements exceed Fy = 25 ksi for design.

C. Shop Welding Inspection:

1. Testing Agency shall inspect and certify all structural welds, unless the fabricating shop has been accredited in conformance with CBC requirements. Submit certification to the Architect/Engineer for review and the Building Official for approval.
2. Welder Qualifications: Welding inspector shall verify that all the welders are properly qualified prior to steel fabrication and state the qualifications of each welder in the welding inspection report.
3. Welding Inspection: Continuous inspection required unless otherwise noted below. Comply with requirements of AWS D1.1.
   a. Welding Inspector shall check all welds, materials, equipment and procedures.
   b. Welding Inspector shall provide reports certifying the welding is as required and has been done in conformity with the plans, specifications and codes.
   c. Welding Inspector shall use radiographic, ultrasonic, magnetic particle, or any other necessary aid to visual inspection to assure adequacy of welds.
4. Periodic Inspection Acceptable:
   a. Single pass fillet welds not exceeding 5/16 inch.

D. Bolts, Nuts, and Washers: Provide samples to Testing Agency for required testing, at no additional cost.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

A. Erect structural steel in compliance with AISC 303.

B. Framing:

1. Erect all structural steel true and plumb.
2. Verify proper final alignment prior to making final connections.

C. Field Connections:

1. Workmanship of field bolted and welded connections shall conform in all respects to methods and tolerances specified for fabrication.
2. Field weld components indicated on shop drawings. Sequence field welds to minimize built-up stress and distortion of the structural frame. Verify sequence with Engineer. Coordinate field welding schedule with Testing Laboratory.
3. Welded Studs: Install in accordance with manufacturer's instructions and structural welding code AWS D1.1.

D. Templates: Provide bolt setting templates for all anchor bolts. Provide instructions for the setting of anchors and bearing plates, verify these items are set correctly as work progresses.

E. Column base plates: Set level to correct elevations, support temporarily on steel wedges, shims, or leveling nuts where shown, until the supported members are plumbed and base plate is grouted.

1. Grout solid the full bearing area under base plates prior to installation of floor and/or roof decks.
2. Comply with manufacturer's instructions for high strength grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

F. Bolting:

1. Inspect mating surfaces to insure that bolt head and nut will have full bearing and that metal plies will mate flush between bolts.
2. Install bolts in matching holes. Do not distort metal or enlarge holes by drifting during assembly. Remake mismatched components to achieve tolerances indicated.
3. Holes mismatched in excess of 1/8 inch will be rejected.
4. Holes mismatched less than 1/8 inch may be reamed to the next larger size bolt.
5. Do not enlarge holes by flame cutting or air/arc ("plasma") cutting.
6. Provide flat washer(s) at over-size holes.
7. Provide washer at bolt head and nut where connected part is less than ¼ inch thick.
8. Provide ASTM F436 beveled washers when the slope of the surfaces of parts in contact with the bolt head or nut is greater than 1:20.
9. Do not install bolts with damaged threads.
10. Threads shall commence outside of the shear plane.
11. Machine Bolts (MB): Install and tighten to a snug condition (ST) such that laminated surfaces bear fully on one another, using an impact wrench or "full effort" of an installer

using a standard spud wrench.

G. Supports, Shoring and Bracing: Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing. Conform to requirements of all applicable laws and governing safety regulations. Resist imposed loads, including those of stored materials and equipment.

1. Provide all temporary supports, shoring and bracing necessary to achieve work of tolerances indicated.
2. Provide all necessary temporary flooring, planking and scaffolding required for erection of steel, and support of erection machinery.
3. Construction Loading: Do not overload the structure or temporary supports with stored materials, equipment or other loads.
4. Maintain temporary bracing and shoring until work is complete, and longer as required to ensure stability and safety of structure.

H. Do not make final connections until structure is aligned to meet specified tolerances.

3.03 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. The independent Testing Agency will perform field quality control tests, as specified in pertinent sections of Division 01.

B. Field Welding Inspection: Conform to all requirements of section SOURCE QUALITY CONTROL.

1. Inspect mating surfaces.
2. Test all materials prior to use. Use only materials meeting specified requirements.

3.05 ADJUSTING

A. Touch-up damaged finishes with compatible specified primer.

B. Replace defective or damaged work with conforming work. Replace all defective work at Contractor's expense.

C. Straighten materials by means that will not injure the materials.

D. Replace defective or damaged work which cannot be corrected in the field with new work, or return defective items to the shop for repair.

E. Architect/Engineer shall review all proposals for the repair or replacement of damaged, defective, or missing work.

F. Pay expenses incurred by Owner for Architect/Engineer's costs for (re-)design and obtaining

approvals of Authorities Having Jurisdiction (AHJ) necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work, as specified in pertinent sections of Division 01.

G. Pay expenses due to re-testing and re-inspection necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work, as specified in pertinent sections of Division 01.

3.06 CLEANING AND PROTECTION

A. Clean all surfaces upon completion of erection; leave free of grime and dirt. Remove unused materials, tools, equipment and debris from the premises and leave surfaces broomed clean.

B. Protect work from damage by subsequent operations.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. All miscellaneous metal work not classified as structural steel.

B. Iron and steel work for wood framing, including bracing.

C. Inserts and anchorages: Furnish only, inserts and anchoring devices for installation of miscellaneous metal work. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work.

D. Miscellaneous nonferrous metal items not specifically specified under other Sections of Specifications.

E. Fabrication and installation of metal work, including shop and field welding, drilling, cutting, connecting and shop painting.

F. Miscellaneous shapes, plates, angles, clip angles, supports, bolts, and specialty iron and steel items indicated and as necessary to complete the work, including, but not limited to, the following:
   1. Pipe sleeves.
   2. Fences, gates and enclosures.
   3. Steel pipe rain water leaders and brackets.
   4. Decorative grilles, trusses, and architectural features.
   5. Pipe bollards.

1.02 RELATED REQUIREMENTS

A. Pertinent sections of Division 33 specifying storm drain piping.

B. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

C. Division 06 Sections: Installation of anchorage and support items. Framing connectors for wood framing.

D. Section 05 52 05 - Handrails and Railing.

E. Section 07 62 00 - Sheet Metal Flashing and Trim

F. Section 08 71 00 - Door Hardware

G. Section 09 91 13 - Exterior Painting: Paint finish systems and required level of finish for substrates.

H. Section 09 91 23 - Interior Painting: Paint finish.

I. Other sections requiring metal fabrications or referencing this section for fabrication and installation.

J. Pertinent Division 22, 23 and 26 sections: Sleeves and inserts for mechanical piping and ducts, and electrical conduit, bracing and support of mechanical and electrical equipment.

K. Section 32 31 19 - Ornamentat Metal Fencing

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

F. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric).

G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

H. AHDGA - American Hot Dip Galvanizing Association.

I. NAAMM MBG 531 - Metal Bar Grating Manual; The National Association of Architectural Metal Manufacturers; 2000 (ANSI/NAAMM MBG 531).

J. NAAMM - Metal Stairs Manual.

K. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society.

L. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society.

M. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; Society for Protective Coatings.

N. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings.

O. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings.

P. SSPC (PM2) - Painting Manual, Vol. 2, Systems and Specifications; Steel Structures Painting Council.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Include details of cuts, connections, camber, holes, and other pertinent data.
   2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths, sizes and types.

C. Product Data:
   1. Catalog cuts for all manufactured items demonstrating compliance with specified requirements.
   2. Structural steel primer paint.

D. Welding procedures: For welding structural steel as required in accordance with AWS D1.1, submit prequalified joints.

E. Certification: Copy of approved fabricator's license.

F. Manufacturer's data: Submit certified copies of the following prior to any fabrication. Include laboratory test reports and other data as required to show compliance with these specifications, including specified standards.

1. Structural steel, including certified copies of mill reports covering the chemical and physical properties.
2. Unfinished bolts and nuts.

1.05 SUBMITTALS FOR RECORD

A. Section 01 33 00 - Submittals: Procedures for submittals. Architect will not review these submittals.

B. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.06 QUALITY ASSURANCE

A. Design criteria: Design, fabricate and erect miscellaneous metal items complete, in accord with AISC's Design, Fabrication and Erection of Structural Steel for Buildings.

B. Welders:
1. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".
2. Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous 12 months, and are qualified in the State of California.

C. Welding Inspection: All structural welding shall be specially inspected according to CBC 1705A.2.5 and DSA IR-17-3 except as otherwise provided below.
1. Special inspection shall not be required if welding is done in an approved fabricator's shop licensed in accordance with CBC 1705A.2.5.

1.07 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 66 00.

B. Deliver anchor bolts, anchorage devices, sleeves and inserts, which are to be incorporated into other work in ample time to avoid delay.

C. Store materials to permit easy access for inspection and identification. Store steel materials off the ground, using pallets, platforms or other supports. Protect steel members, package materials and identifications from deterioration.

D. Store material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

E. Prevent contact with materials which may cause discoloration or staining. Clean materials which are discolored or stained.

F. Replacements: In the event of damage, immediately make repairs and replacements necessary to the approval of the Architect and Division of the State Architect without change in contract amount or time.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Furnish new tested stock complying with reference specifications.

B. Steel Sections: ASTM A36/A36M.

C. Steel Tubing: Hot formed, welded or seamless, ASTM A 501, or cold-formed, ASTM A500, Grade B cold-formed.

D. Plates: ASTM A283/A283M.

E. Pipe: ASTM A53/A53M, Grade B Schedule 40, black and hot-dip galvanized finish, as indicated.

F. Bars and bar-size shapes: ASTM A 663, Grade 65, or ASTM A 36.

G. Sheets: ASTM A 446 with zinc-coating in accord with ASTM A 525, G-90.

H. Hot-rolled carbon steel bars and bar-size shapes: ASTM A 575, Grade as selected by fabricator.

I. Steel plate, checkered pattern: Steel with checkered (diamond) pattern, galvanized, ASTM A 525, coating designation G90.

J. Carbon steel sheets and strips:
1. Hot-rolled: ASTM A 568 and ASTM A 569, pickled and oiled.
2. Cold-rolled: ASTM A 366.
3. Galvanized sheets: ASTM A 525, or A 526 with G-90 zinc coating

K. Masonry anchorage devices: Expansion shields, FS FF-S-325.

L. Toggle bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.

M. Fasteners: Select fasteners for type, grade and class required for the installation of miscellaneous metal items, compatible for material in contact. Provide hot-dipped galvanized at exterior exposures or when in contact with pressure-treated wood materials..

N. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1 , plain.
1. Standard bolts and nuts: Regular square or hexagon head type, ASTM A 307, Grade A.
2. Lag bolts: Square head type, galvanized.
3. Machine screws: Cadmium-plated steel, ASTM F 468 and FS FF-S-92.
4. Plain washers: ANSI B18.22.1 and FS FF-W-92.
5. Anchors: Manufactured by Ramset Fastening System Division, Olin Corp., Rawlplug Co., Diamond Division, General Cable, Hilti or ITT Phillips Drill Division. Provide type best suited for intended application and indicate on shop drawings.
6. Lock washers: FS FF-W-84, helical spring type carbon steel.
7. Anchor Bolts: ASTM A307.

O. Brackets, flanges and anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

P. Concrete inserts: Threaded or wedge type, galvanized ferrous castings, either malleable iron ASTM A 47 or cast steel ASTM A 27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A 153.

Q. Welding Materials: AWS D1.1; type required for materials being welded. Comply with AWS D1.1, D1.3 and CBC Title 24 Part 2.

R. Non-shrink Grout for Guardrail post inserts: Masterflow 928 Grout by Master Builders or equal.

S. Zinc-rich paint (cold galvanizing): ZRC-221 by ZRC WorldWide, or equal.

T. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction, compatible with intermediate and finish coatings specified in other Sections.

U. Touch-Up Primer for Galvanized Surfaces: ZRC Zero-VOC by ZRC Wordwide, or equal, compatible with intermediate and finish coatings specified in other Sections

2.02 FABRICATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. Allow for trimming and fitting where field conditions preclude accurate measurements or where final dimensions cannot be established prior to fabrication.

B. Fit and shop assemble items in largest practical sections, for delivery to site.
   1. Minimize field splicing and site assembly. Disassemble only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
   2. Complete assembly, including welding, before start of finishing operations. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.
   3. Use materials and items necessary to complete the work, using the best materials and methods ordinarily used for this type of work whether explicitly specified, indicated and detailed or not.

C. Fabricate items with joints tightly fitted and secured.

D. Machine-roll components or elements required to be curved or radiused. Do not field bend or "walk-down". Provide curves true to indicated dimensions, minimizing joints; segmented fabrication not allowed unless specifically noted.

E. Continuously seal joined members by continuous welds.
   1. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
   2. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
   3. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Use only materials smooth and free of blemishes including pitting, seam marks, roller marks, trade names and roughness.

G. Fabricate steel members in accordance with drawings and as recommended by A.I.S.C. Verify all dimensions with field conditions prior to fabrication.
   1. Clean, prepare and shop-prime steel members. Do not prime surfaces to be field welded or in direct contact with concrete.
   2. Galvanizing: ASTM A153, ASTM A123; all steel exposed to weather.
   3. Cutting and drilling: Provide holes for fabrication and for attachment of work specified elsewhere. Countersink holes for bolts and screws.

H. Welding: Comply with the AWS Structural Welding Code, and with the following:
   1. Welds shall be free from excessive oxides, nonmetallic inclusions, and gas pockets.
   2. Welds shall be uniform in section, smooth in weld metal, feather edged, without overlaps.
   3. Surfaces to be welded shall be free from loose scale, rust, paint, or other foreign matter.
   4. Tack welds located in way of design welds shall be melted out when encountered in final welding, or shall be thoroughly fused in with final weld.
   5. Use proper care and procedures to minimize locked-in stress and distortion.
   6. Welder qualification requirements, welding procedure and welding electrodes shall conform to CBC 2204 and most recent editions of AWS D1.1, D1.3; CBC IR-17-3.

2.03 GATES

A. Fabrication: Fabricate perimeter frames of gates from steel tubing as specified for fences. Finish to match fence panels. Assemble gate frames by welding at corners.
   1. Gate frames: Infill with panels or pickets to match adjacent fence.

B. Swinging Gate Hardware: Provide all hardware necessary for a complete, operational gate assembly, sizes and types recommended by manufacturer to suit conditions indicated, galvanized and shop finished to match adjacent gate components.
   1. Hardware specified in Section 32 31 19 - Ornamental Metal Fencing and Gates.

2.04 STEEL PIPE RAIN WATER LEADERS (RWL)

A. Steel pipe or tube rain water leaders: Fabricate to dimensions and details shown, with welded joints ground smooth and flush, hot-dipped galvanized.
   1. Structural Performance: Rain water leaders shall withstand the following structural loads:
      a. Concentrated Load: 200 lbs., applied non-concurrently, in any direction.
      b. Uniform Load:50 lb/ft. applied simultaneously in both vertical and horizontal direction.
      c. Concentrated loads and uniform loads need not be assumed to act concurrently.
   2. Shop fabricate to greatest extent possible.
   3. Interconnect rainwater leader members by butt-welding or by welding with internal connectors, unless otherwise indicated.
   4. At intersections and changes of direction, notch ends of intersection members to fit contour of pipe and weld all around. Seal weld all joints water-tight.
   5. Form changes in direction of water flow by mitered connections, maintaining cylindrical cross-section of pipe throughout bend without buckling, twisting, cracking or otherwise deforming exposed surface of pipe.
   6. Provide support brackets of sizes and types indicated and with configurations required to suit substrates and framing spacing.

2.05 FINISHES - STEEL

A. Hot-dip galvanize steel items fully or partially exposed to exterior conditions or to wet environments such as locker rooms, food service, custodial or toilet rooms. Prime paint steel items in all other locations.
   1. Exceptions: Galvanize items to be embedded in concrete or masonry.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2 SSPC SP-3, "Power Tool Cleaning", minimum. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning".
   1. Review coating systems specified in other Sections. Provide level of substrate surface finish required or recommended by coating manufacturer for each specified system.

C. Prime Painting: One coat, primer in accordance with the coating manufacturer's printed instructions. Select products compatible with coating systems specified in other Sections.

D. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work. Correct conditions detrimental to the proper and timely performance of this work before proceeding with installation. Commencement of work indicates acceptance of substrates.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, measured from established lines and levels, accurately fitted, free from distortion or defects.

B. Provide temporary bracing or anchors in formwork for items which are to be built into concrete or similar construction.

C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place construction; including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

E. Cutting and fitting:
   1. Perform cutting, drilling and fitting required for installation of miscellaneous metal items. Fit exposed connections accurately together to form tight hairline joints.
   2. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.
   3. Do not weld, cut or abrade the surfaces of exterior units which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.

F. Perform field welding in accordance with AWS D1.1/D1.1M.

G. Obtain approval prior to site cutting or making adjustments not scheduled.

H. Immediately after erection, clean and prime welds, abrasions , and surfaces not shop primed or galvanized , except surfaces to be in contact with concrete with the same materials used for shop finishing.

I. Steel Pipe or Tube Fences and Railings: Plumb posts in each direction.
   1. Anchor posts in concrete by means of galvanized steel pipe sleeves, not less than 6" long, with an outside diameter not less than 1/2" greater than the outside diameter of the inserted pipe post. Provide steel plate closure secured to bottom of sleeve of width and length not less than 1" greater than outside diameter of sleeve. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with non-shrink, non-ferrous grout.
   2. Anchor rail ends into masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.
   3. Secure handrails to walls using wall brackets, and wall return fittings at handrail ends. Provide brackets with not less than 3" projection from finish wall surface to center of pipe handrail, and with wall plate portion of bracket drilled to receive one 3/8" bolt. Locate brackets at not more

than 5 ft. o.c. Provide flush-type wall return fittings with same projection as that specified for wall brackets. Secure brackets and return fittings as follows:

a. Wood framing: Use lag screws.
b. Steel Framing: Stainless steel threaded self- tapping screws.
c. Masonry or Concrete: Stainless steel threaded tap-in anchor bolts.

J. Gates: Install gates plumb, level, and secure for full opening without interference. Anchor ground-set items in concrete. Adjust hardware for smooth operation and lubricate where necessary.

K. Rainwater Leader Installation: Plumb units in each direction.
1. Accurately locate rainwater leaders in proximity to underground storm drain connections. Coordinate with work of other sections for accurate placement and alignment of the work.
2. Secure Rainwater Leaders to walls using wall brackets. Secure brackets and return fittings as follows:
   a. Wood framing: Stainless steel lag screws.
   b. Steel Framing: Stainless steel threaded self- tapping screws.
   c. Masonry or Concrete: Stainless steel threaded tap-in anchor bolts.
   d. Structural Steel column or member: Weld.
3. Locate supporting brackets at approximately equal intervals, not less than 5'-4" on center, not less than 18 inches from ends, with a minimum of three per supports per unit, and additional brackets within 18 inches of change in direction or substrate mounting material.
4. Connect rain water leaders to storm drains with water-tight connection.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.05 PROTECTION

A. Protect finished work in accordance with Section 01 66 00 - Product Delivery and Handling.

B. Repair and replacement: In the event of damage, immediately make repairs and replacements necessary to satisfaction of Architect without change in contract sum or time.

3.06 CLEAN-UP

A. When work of this section has been completed, and at such other times as may be directed, remove all trash, debris, surplus materials, tools and equipment from site.

B. Comply with pertinent requirements of Section 01 77 00 - Contract Closeout and Final Cleaning.

END OF SECTION

SECTION 05 52 05

HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Steel tubing handrails.

B. Steel tubing guardrails and posts.

C. Brackets and fittings.

1.02 REFERENCES

A. CAS/CAR – California Accessibility Statues/California Accessibility Regulations, Books 1 and 2, May, 1994.

B. ASTM - American Society for Testing and Materials

C. California Building Code current edition Volume 2, Chapter 22A, (noted herein as CBC).

D. "Standard Code for Welding in Building Construction", American Welding Society (AWS).

E. ASTM A53 – Type E or S, Grade B Pipe.

F. ASTM A153 – Zinc coating (Hot-Dip) on iron and steel hardware.

G. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

H. ASTM A123 – Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.

1.03 SUBMITTALS FOR REVIEW

A. Submit under provisions of Section 01 33 00.

B. Stop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners and accessories.

C. Sample: Submit three samples of handrail and each component.

D. Welder Certifications.

1.04 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 - PRODUCTS

2.01 STEEL RAILING SYSTEM

A. Fasteners, Plates, Brackets, Flanges and Bases: Manufactured by Craneveyor Corp., South El Monte, CA., or equal.

B. Handrails, Railings, Guardrails, Posts, Pickets, Rails: size as shown on Drawings. Round steel pipe. Welded joints, galvanized, ASTM A123.

(1) Pipe yield strength: 35 ksi.

(2) Flat Bar for Guide Rail: ASTM A36 ¼" thick by 2" wide steel plate as shown on drawings with welded joints, galvanized, ASTM A123.

C. Fittings: Elbows, T-shapes, wall brackets, escutcheons: Cast steel. Brackets: Round top to accept tube rail, size to allow minimum 1-1/2 inch clearance from rail to wall.

D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

E. Galvanizing: Thickness of coating on tubing in accordance with ASTM A123. Fittings shall be galvanized in accordance with ASTM A153.

F. Finish: Clean galvanized finish, no paint.

G. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 5,000 psi in 24 hours and 8,000 psi in 7 days; SUPER POR-ROK ANCHORING CEMENT manufactured by Minwax Construction Products Division, Montvale, NJ, or an approved equal meeting the same standard of performance.

H. Touch-Up Primer for Galvanized Surfaces: Ready mixed Zinc rich galvanizing compound, DEVCON 2, by Devcon Corp., Danvers, MA, GALVICON by Southern Coatings, Sumter, SC, or equal.

I. Epoxy Adhesive: Two component material suitable for anchoring into dry or damp concrete. Same as Burke's "Burk Epoxy MV", Covert's "CIA-Gel 7000", Hilti's "HIT C-100" or equal product.

2.02 FABRICATION

A. Fabricate handrails of specified tubing only in conformance with CSAS requirements.

B. Fit and stop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

G. Accurately form components to each other and to building structure.

H. Hot-dip galvanize all fabricated assemblies in accordance with ASTM A123.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

A. Clean and strip steel items to bare metal where site welding is required.

3.03 INSTALLATION

A. Set vertical supports in core-drilled holes with the specified non-shrink grout or epoxy adhesive.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Provide anchors, plates or angles required for connecting railings to structure. Anchor railing to structure.

D. Field weld anchors as indicated on shop drawings. Grind welds smooth.

E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

F. Touch up welds and chipped surfaces with specified galvanizing compound prior to completion.

3.04 ERECTION TOLERANCES

A. Maximum Variation from Plumb: ¼ Inch in 10 feet.

3.05 DEFECTIVE WORK AND MATERIALS

A. Work found to be defective, missing or damaged shall be immediately replaced with proper work. Such replaced work and the inspection for same shall be at the expense of the Contractor. All proposals for the repair or replacement of damaged, defective, or missing work to be reviewed by the Architect.

B. Straightening of any materials, if necessary, shall be done by a process and in a manner that will not injure the materials.

C. If defects or damage work cannot be corrected in the field, the material shall be returned to the shop or new parts furnished. The Contractor shall replace all work at his own expense.

3.06 CLEANING

A. After erection, all surfaces shall be cleaned and left free of all grime and dirt. Remove unused materials, tools, equipment and debris from the premises and leave broom clean.

B. For Galvanized Surfaces: Clean welds, bolted connections and abraded areas and apply galvanizing repair. Paint to comply with ASTM A780.

END OF SECTION

SECTION 06 1000

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: All labor, materials and equipment and all operations required to complete all rough carpentry and structural framing as indicated on the drawings; to produce shapes and configurations as shown, as required; and as specified herein, including:

1. Structural floor, wall, and roof framing.
2. Floor, wall, and roof sheathing.
3. Rough hardware, framing connectors and fasteners.
4. Treatment of wood.
5. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, and other work requiring supporting blocking.
6. Miscellaneous wood nailers and furring strips, including roof applications, other wood framing, furring, shims or blocking as required to complete the work.

B. Related Sections:

1. Pertinent sections of Division 01 specifying Quality Control and Testing Agency services.
2. Pertinent sections of Division 01 specifying Structural Product Requirements: Structural Product Options, Substitution procedures and limitations, transportation, handling and storage.
3. Pertinent sections of Division 03 specifying wood formwork construction and/or setting anchors in concrete.
4. Pertinent section of Division 06 specifying wood construction and materials.
5. Pertinent sections of other divisions specifying steel or concrete construction.

1.02 REFERENCES

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 23 Wood.

B. American National Standards Institute (ANSI) / American Wood Council (AWC) "NDS - National Design Specification for Wood Construction".

C. National Institute of Standards and Technology (NIST) / Engineered Wood Association (APA) "PS 1 - Voluntary Product Standard for Structural Plywood".

D. NIST / APA "PS 2 - Performance Standard for Wood-Based Structural-Use Panels".

E. NIST "PS 20 - American Softwood Lumber Standard".

F. Redwood Inspection Bureau (RIS) "Standard Specifications for Grades of California Redwood Lumber".

G. West Coast Lumber Inspection Bureau (WCLIB) "Standard Grading Rules for West Coast Lumber No. 17".

H. Western Wood Products Association (WWPA) "Western Lumber Grading Rules".

I. American Wood Preservers Association (AWPA) "Book of Standards".

1.03 SUBMITTALS

A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. Submit for review prior to fabrication. Submittals that do not meet these requirements will be returned for correction without review.

1. Substitutions for products specified require conformance to substitution requirements in Division 01.
2. Review of materials and hardware for substitution to products specified is at the additional expense of the Contractor.

B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer.

C. Product Data:

1. Submit manufacturer's product data, specifications, and installation instructions for & location of framing connectors, wood preservative materials, application instructions, and fasteners. Include complete, accurate equivalence data when submitting alternate products to those specified. Provide samples of these items upon request.
2. Submit product data and current ICC-ES report for machine-driven nails, fasteners, and equipment, including dimensions of all fasteners, including head, shank diameter and length.
3. Submit samples of each and every type and size of proposed machine-driven nails and fasteners.

D. Shop drawings: For manufactured wood products, submit each building as a complete unit. Do not mix components from multiple buildings or units of work in a submittal. Include all of the following;

1. Indicate profiles, sizes, and spacing locations of structural members.
2. Cross-reference all shop drawing detail references to contract document detail references.
3. Secure all field measurements as necessary to complete this work.

E. Manufacturer's Certificate: Submit all certifications of physical and chemical properties of materials as specified below in Article titled QUALITY ASSURANCE.

1. Certify that wood products supplied for rough carpentry meet or exceed specified requirements, including specified moisture content.

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies, refer to pertinent sections of Division 01 and CBC Chapter 17A.

B. All tests shall be performed by a recognized testing agency as specified in pertinent sections of Division 01.

C. Inspection of fabricators is required per CBC 1704A.2 unless fabricator is registered and approved by the building official. Wood product quality standards:

1. All wood products to comply with article REFERENCES.
2. Factory-mark each piece of lumber and sheathing with type, grade, mill, and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.
3. Sheathing panels to be marked by APA (The Engineered Wood Association).

D. End-Jointed lumber shall not be used.

E. Hardware and engineered wood products shall have current ICC ES Evaluation/research reports that are equivalent to products specified.

F. Employ competent workmen experienced in work of the types specified and required.

1.05 MOCK-UP

A. Construct mock-ups of machine-driven nailed sheathing panels using submitted products and demonstrating conditions indicated. Locate where directed.

B. Mock-up shall be accepted and approved by the Inspector of Record (IOR) before commencement of machine-driven nailing activity.

C. Accepted mock-up shall remain exposed for reference for the duration of machine-driven nailing activity.

D. Remove all mock-ups at the completion of the work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent requirements of Division 01.

B. Delivery: Time delivery and installation of carpentry products to avoid delaying other trades whose work is dependent on or affected by this section and to comply with moisture content, protection and storage requirements.

C. Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and sheathing panels to prevent deformation and provide air circulation within stacks.

1. Store materials for which a maximum moisture content is specified only in areas where relative humidity has been reduced to a level where specified moisture content can be maintained.
2. Handle and store materials above ground to prevent damage, contamination, or accumulation of dirt or foreign materials.

3. Provide special protection for horizontal sheathing panels. Deformation of panels due to moisture is not acceptable.

1.07 PROJECT/SITE CONDITIONS

A. Verify all conditions at project site affecting the work; work to field dimensions as required. Coordinate carpentry installation with size, location, and installation of service utilities.

B. Sequence rough carpentry installation activities to allow sufficient time for:

1. Review of all submittals, including machine-driven nail sample submittals.
2. Fabrication of mock-ups and required durations as specified.
3. Indicate submittal review, procurement, mock-up, and testing activities in the project schedule prior to the start of installation. Installation durations shall be based on hand-nailed installation methods specified.
4. Attainment of specified maximum lumber moisture content.

PART 2 PRODUCTS

2.01 DIMENSIONED LUMBER

A. General

1. Size per industry standards for nominal sizes shown; S4S (sanded four sides).
2. Warped/twisted and excessively checked members shall not be used regardless of grade marks.
3. At the Contractor's option, engineered lumber of equivalent size and material properties may be substituted for solid sawn lumber where material is difficult to source due to length, availability, etc. Submit proposed substitution to Engineer for review prior to purchasing materials.

B. Moisture content of framing:

1. All lumber to be maximum 19% at time of fastener installation, except 3x and 4x studs may be 25% at time of sheathing panel nailing. All lumber to be maximum 19% at time of close-in, unless noted otherwise.
2. The Owner's Testing Laboratory will test for moisture content prior to commencement of close-in.
3. The Contractor shall recognize that excessive shrinkage of lumber results from excess moisture content at the time of installation. The Contractor will compensate for use of such lumber by waiting for acceptable moisture content before close in and/or by replacing/repairing lumber that has sagged, twisted, or warped prior to close in.
4. Deviation from this specification would require structural redesign of connections and fasteners.

C. Sills on concrete or masonry: No. 2 pressure treated Douglas Fir and as called for on the drawings.

D. Interior structural framing shall be Douglas Fir (D.F.) with grades as noted below, unless otherwise specified on the drawings. All grades are per WCLIB standard grading rules.

1. All permanently exposed (interior or protected from weather) framing shall be select structural grade with no box heart.
2. Except per 1 above, unless noted otherwise, minimum grades are:
   a. Floor/roof joists/rafters (2x) and 2x8 & larger studs: D.F. No. 1
   b. 2x4 and 2x6 studs and plates: D.F. No. 2
   c. 4x and larger: D.F. No. 1
   d. Blocking: D.F. No. 2
   e. 6x8 and larger posts and beams may be SGL/CGL per below unless noted otherwise on the drawings.

E. Exterior structural framing (exposed to weather) shall be redwood select structural grade or pressure treated D.F. No. 1, unless noted otherwise.

F. Structural decking shall be D.F. select decking or White Pine select where not exposed to moisture. Where directly exposed to moisture or high humidity for prolonged periods of time, decking shall be Alaskan Yellow Cedar or Port Orford Cedar. Moisture content at time of installation to be less than 12%.

G. Framing not otherwise shown or specified: Douglas Fir construction grade per WCLIB paragraphs applicable to uses and sizes required.

2.02 MANUFACTURED LUMBER

A. Structural (Certified) Glued Lumber (SGL): SGL shall be manufactured following the American Lumber Standards Committee (ALSC) "Glued Lumber Policy" and meet the requirements of Voluntary Product Standard PS 20 "American Softwood Lumber Standard". Grading shall be per the West Coast Lumber Inspection Bureau (WCLIB) or Western Wood Products Association (WWPA). SGL shall be manufactured with waterproof adhesive. "Stud use only" SGL is not permitted.

   1. Acceptable products:
      a. "RMT" by Rosboro.
      b. Approved equal.
   2. Where specified for use on plan, SGL shall be entirely Douglas Fir lumber. SGL shall be grademarked to match the grade as would be specified for solid sawn lumber in the same location/use.
   3. At the contractor's option, SGL may be substituted for solid sawn lumber. SGL species and grade shall match that for the solid sawn member. SGL shall not be substituted for glued-laminated (glulam) members.

B. Laminated Veneer Lumber (LVL): for use as joists, beams, blocking, or studs when so noted on the drawings. Conform to ICC AC 47. Minimum F_b = 2,600 PSI. Minimum E=1,900,000 PSI. Acceptable products:

   1. "Microllam LVL" by Trus Joist, ICC ESR-1387
   2. "Redlam LVL" by RedBuilt, ICC ESR-2993
   3. Approved equal

C. Laminated Strand Lumber (LSL): for use as blocking (flat or vertical) or rim joist when used with I-joist or LVL, when so noted on the drawings. Conform to ICC AC 124. Minimum F_b =

1,700 PSI. Minimum E=1,300,000 PSI. Acceptable products:

1. "Timberstrand LSL" by Trus Joist, ICC ESR-1387
2. Approved equal

D. Parallel Strand Lumber (PSL): for use as beams and posts when so noted on the drawings. Conform to ICC AC 47. Minimum material properties for beams: E = 2,000,000 psi; F_b = 2,900 psi; F_c = 2,900 psi (parallel); F_v = 290 psi. Minimum material properties for posts: E = 1,800,000 psi; F_b = 2,400 psi; F_c = 2,500 psi (parallel); F_v = 190 psi. Acceptable products:

1. "Parallam PSL" by Trus Joist, ICC ESR-1387
2. Approved equal

2.03 MANUFACTURED STRUCTURAL PANELS

A. Plywood: Structural sheathing shall conform to product standard PS-1 or PS-2. All panels shall have an exterior exposure rating and bear the trademark of the Engineering Wood Association (APA) or other qualified agency. Grades shall be as required on the drawings.

B. Oriented Strand Board (OSB): All structural OSB shall be grade marked by a qualified agency for conformance with Product Standard PS-2 and shall be fabricated with exterior glue. Grades shall be as required on the drawings.

2.04 TREATED WOOD:

A. Treated Lumber and Plywood: Comply with requirements of AWPA Standard U1. See Standard U1 for "Use Category" designations. Do not provide higher Use Category lumber than that specified. Maximum moisture content shall be the same as required for "dimensioned lumber" as specified above.

B. Preservative Treated Lumber

1. General
   a. Preservatives shall be waterborne. Preservative retention rate shall be as required per AWPA Standards U1 & T1. Lumber shall be Douglas Fir No. 2 (or better). Cut faces of treated wood shall be brush treated (two complete applications) prior to installation.
   b. Lumber less than 8 inches above grade and lumber less than 6 inches above exterior hard-surface flatwork shall be treated.
   c. Each piece of wood shall be stamped by the wood preservative applicator to identify its treatment and preservative retention.
2. Lumber at interior, non-weather exposed locations installed adjacent to concrete or masonry shall be Use Category UC2. Examples include sill plates & ledgers and lumber in contact with roofing, flashing, or water proofing.
3. Lumber at exterior locations, not in contact with soil/ground, shall be Use Category UC3B. Examples include Douglas Fir decking and deck framing.
4. Lumber in contact with soil/ground shall be Use Category UC4A. Examples include timber retaining walls.
5. Poles, posts, and sheathing panels shall be treated as recommended by AWPA Standard U1 per use and exposure.

6. Maximum Volatile Organic Compound (VOC) content of field-applied preservative shall meet local air quality standards and the California Green Building Code. Provide either of the following:
   a. Copper Azole (CA-B) per ICC-ES AC143.
   b. Alkaline/Copper/Quaternary (ACQ).

C. Fire Retardant Treatment: Product and application process must be recommended by manufacturer of treatment as being suitable for painting. Application shall be by a California State Fire Marshal approved licensed contractor.

1. Exterior Type: Use Category UCFB, chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
   a. Treat exposed exterior rough carpentry items, including stairways, balconies, and covered walkways.
   b. Do not use treated wood in direct contact with the ground.
2. Interior Type: Use Category UCFA, low temperature (low hygroscopic) type, chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
   a. Treat rough carpentry items as indicated.
   b. Do not use treated wood in applications exposed to weather or where the wood may become wet.

2.05 FASTENERS AND ACCESSORIES

A. General requirements for fasteners:

1. Fasteners shall be of adequate size, spacing, and number to resist design loads under intended use, and types shall be appropriate for the materials or conditions for which used.
2. Provide washers, pre-drilling, etc. as required for proper installation and to prevent damage to framing.
3. Fasteners shall be hot-dip galvanized (ASTM A153), mechanically galvanized (ASTM B695 class 55 minimum), stainless steel (type 303, 304, 305, or 316), silicon bronze, or copper by approved methods for the following applications:
   a. Exterior, exposed use.
   b. In contact with preservative or fire-retardant treated wood.
4. Fasteners in moist corrosive atmosphere to be of stainless steel (type 303, 304, 305, or 316).
5. Where the retention level of ACQ or MCQ preservative is greater than 0.40 pcf, CBA-A preservative is greater than 0.41 pcf, or CA-B preservative is greater than 0.21 pcf, provide stainless steel fasteners (type 303, 304, 305, or 316).
6. All fasteners specified by manufacturer shall be installed in framing hardware, unless noted otherwise.

B. Nails and nailing not otherwise shown or specified:

1. Comply with requirements of governing building code.

2. For securing materials to hardened concrete or masonry provide hardened steel masonry nails or Simpson Strong-Tie "Titen" screws.
3. For framing and general woodwork: Common bright wire nails (not box nails) per ASTM F1667. 16d cement coated sinker nails may be used in lieu of common nails for framing, where noted on the drawings.
4. Nails for sheathing panels shall be of common wire with full round heads and shall be of sufficient length to fully develop the nails.
5. Machine-driven nails of all types must comply with the requirements of this section. All proposed nails shall match diameter and penetration of specified nails.
6. Staples shall conform to length and gauges specified and shall be installed to match specified patterns and spacing.
7. Powder-Driven Pins (PDP): Use only as approved by the Architect/Engineer; operators shall be qualified.

C. Bolts: Malleable iron washers or steel plate washers, unless otherwise shown, shall be provided under all bolt heads and nuts.

1. Machine Bolts: ASTM A307 and ANSI/ASME B18.2.1, standard semi-finished machine bolts as shown or required. Nuts shall be standard size unless noted otherwise and shall be per ASTM A563.
2. Bolts in Concrete: Post-installed concrete anchors shall be Hilti "Kwik Bolt TZ", Simpson Strong-Tie "Strong Bolt 2", Hilti "Kwik HUS EZ", or Simpson Strong-Tie "Titen HD" except where shown to be cast-in-place machine bolts or anchor rods.
3. Anchor bolts shall conform to ASTM F1554 or ASTM A307. Anchor bolts shall be headed or end in two nuts tightened against one another, unless noted otherwise. Provide embedded plate washer as indicated on drawings. No upset threads allowed. No L or J bolts allowed.

D. Lag screws: Standard hex lag screws per ANSI/ASME B18.2.1.

E. Wood screws: Standard wood screws per ANSI/ASME B18.6.1.

F. Powder-Driven Pins (PDP): Hilti X-CP72, ICC ESR-2379; Simpson PDPWL-300 MG, ICC ESR-2138.

G. Framing hardware: Fabricated sheet metal timber framing connectors shall be manufactured from painted or galvanized G90 steel by Simpson Strong-Tie (connectors specified on drawings are per Simpson Strong Tie, USP Lumber Connectors, or approved equivalent. Connectors shall be at least 16 gauge material, (1/8 inch plate materials where welded), unless otherwise noted, punched for nailing. All heavy hardware to be fabricated from A36 steel per Division 05, Metals. All hardware intended for exterior exposed use shall be galvanized per G185 ASTM A653 or stainless steel.

1. For contact with preservative or fire-retardant treated wood, provide minimum G185 galvanizing per ASTM A653.
2. Nails and nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. Nails to be used with framing accessories are subject to the requirements specified in this Section for fasteners and anchors.

H. Subfloor Glue: Water proof, water base, air cure type, cartridge dispensed conforming to APA Standard AFG-01 or ASTM D3498. Maximum Volatile Organic Compound (VOC) shall meet local air quality standards and the California Green Building Code.

2.06 SOURCE QUALITY CONTROL

A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform testing for moisture content of all lumber at time of fastener installation.

B. The Testing Agency will submit reports as specified in Division 01.

PART 3 EXECUTION

3.01 REQUIREMENTS FOR STRUCTURAL FRAMING

A. General

1. Refer to drawings for layouts, notes and details, provide framing as required; comply with governing building code requirements.
2. Provide framing to achieve true alignments as surfaces receiving finish materials.
3. It shall be the responsibility of the Contractor to provide and install all wood blocking, furring strips, or grounds detailed or required to provide anchorage for all finishes, accessories, fixtures, etc. as required to complete all work. All blocking and/or backing shall be securely bolted or otherwise anchored in place.
4. Contractor shall be responsible for layout of anchor bolts, and other hardware embedded in concrete when placed by other trades.
5. Provide and install all structural framing, blocking, fasteners, brackets, clips, etc. as required to complete work specified in the Construction Documents.

B. Framing

1. Sill Plates and Ledgers:
   a. Sill plates and ledgers on concrete shall be anchored with bolts, unless noted otherwise, shall have full bearing on concrete, and shall be placed for sheathing panel nailing as indicated. All bolt nuts shall be provided with a cut plate steel washer for bearing on wood.
   b. Provide a minimum of two sill anchor bolts per sill piece with a bolt no less than 4 ½" and no more than 12" from the end of the sill. Bolts to be 5/8" diameter x 12" (18" at curb) long at 48" on centers, unless otherwise shown or noted. Provide additional anchor bolts each side of a notch or hole, as per a typical plate splice, where notch or hole is in excess of 1/3 the plate width. At shear walls, provide a plate washer 3" x 3" x 0.229" minimum between the sill and nut at anchor bolts. Plate washer to extend within ½ inch of the structural wall sheathing. Offset and/or stagger anchor bolts, or provide larger plate washer as required.
   c. Anchor bolt holes in sill plates or ledgers shall be 1/16" maximum larger than anchor bolt.
2. Stud Walls and Framing:
   a. Cut studs and posts with square ends, unless otherwise shown or noted. All posts and beams shall be "cut to bear" unless otherwise detailed.

b. All studs in walls shall be placed with the shortest dimension parallel to the run of the wall. Bearing studs shall extend full height to be the supporting framing as shown; non-bearing studs shall extend to the supporting framing.
c. Provide double studs on each side of all openings, unless shown or noted otherwise.
d. All openings in stud walls and partitions shall be framed with headers across the top, as shown, with a minimum size (6" nominal depth x stud width) resting on short cripple studs, and as shown on the drawings.
e. All stud partitions and walls shall have horizontal solid blocking not less than 2x and of the same width as the stud, fitted and nailed into the studs at mid-height of stud, for studs over 8 feet in height, except as otherwise shown or specified. This blocking shall be so spaced that there shall be no concealed air spaces greater than eight feet in any dimension.
f. Stud partitions containing plumbing, heating or other pipes shall be so framed as to give proper clearance for piping. Plumbing, heating and vent pipes exceeding 1-1/2" in inside diameter shall not be placed in partitions used as bearing or shear walls unless completely furred clear of the wall. No notching shall be allowed. Pipes shall be placed in the center of the plate using a neat bored hole and the plates shall be strapped on each side with 3" x 36" x 14 gauge steel punched for 10d nails 3" on center, staggered, or as shown on the drawings.

3. Top Plates
   a. Top plates shall be double, set single. Corners where stud wall or partitions meet shall be framed with studs on all surfaces and blocking to form a "rigid" corner with nailing for all corners. Double top plates shall be lapped at corners. Lap splices and nailing per the drawings.
4. Floor, Roof and Ceiling Framing
   a. Joists and beams shall be accurately aligned and the position and spacing of all joists and beams shall be as shown and be coordinated with other framing and to other trades prior to actual construction.
   b. Place all joists and beams with crown up. Cantilevered joists and beams shall be placed with the crown down.
   c. Cutting of wood girders, beams or joists for electrical and mechanical lines shall be limited to cuts and bored holes not deeper than 1/5 of the beam depth from the top and located not farther from the support than three times the beam depth and not less than the beam depth. Cuts in excess of this, or single bored holes with a diameter of more than 1" are not permitted without special provisions for framing the beams. Location of all cuts in framing shall receive the prior review of the Architect/Engineer.
   d. Provide vent holes in rafters and/or blocking as shown and/or directed by the Architect.

3.02 STRUCTURAL SHEATHING

A. General

1. Sheathing nailing shall be as required on the drawings. Do not overdrive (Do not break skin of sheathing face sheet). Over driving will be cause for rejection.
2. Form sheathing may be re-used for concealed sheathing provided the lumber at the time of re-use is approved by the Architect, meets with the framing grade requirements specified herein, is in good condition, and is thoroughly cleaned with all nails removed.

3. Pneumatic nailing devices shall be adjustable so that nail heads do not penetrate skin of sheathing. Contractor shall submit equipment and nails for review prior to use. Refer to PART 2 for other nailing requirements.

B. Roof and Floor Sheathing: Except "Panelized Roofs", lay with face grain perpendicular to roof rafters, roof trusses or floor joists. Stagger sheets. Block all unsupported sheet edges with 2x material unless noted otherwise.

C. Wall Sheathing: Lay with face grain either parallel or perpendicular to studs. Exposed bottom edges shall be sealed as recommended by manufacturer. Block all unsupported sheet edges with 2x materials unless noted otherwise.

D. Panelized Roofs: Where sheathing is set @ 8'-0 1/8" spacing, cut every fourth sheet short by 1/2" to re-align structural framing that has been specified to be spaced at even units of 2, 4 or 8 feet.

3.03 ROUGH HARDWARE

A. General: Nails, spikes, screws, fabricated sheet metal anchors, ties, hangers and any other materials shown or required for the attachment of wood to concrete and wood to steel and wood to wood shall be furnished and installed as part of this work.

B. Framing Nailing: All framing nailing shall conform to minimum requirements of the Building Code, and with details shown on the drawing.

C. Bolts, Lag Screws and Washers:

1. Bolts in wood shall be machine bolts unless otherwise noted and shall be of such length that the bearing length of the treads does not exceed ¼ of the full bearing length in the member holding the treads. Bolt holes in wood shall be 1/32" oversized. Bolt holes for sill plates may be 1/16" maximum oversize. Holes in steel shall be 1/16" oversize. See Section 3.1 for anchor bolts at sill plates and ledgers.
2. Provide square plate or malleable iron washer and nut at head where bearing is against wood; cut washer under nut where it is against steel. Washer will not be required under head of carriage bolts. Provide malleable iron washers where exposed.
3. All nuts shall be tightened when placed and retightened at completion of the job or immediately before closing with final construction.
4. Lag screws shall be screwed (not driven) into place. Drill pilot hole to 70% of shank diameter. Drill clearance hole to full shank diameter and depth of unthreaded screw length.

D. Wood Screws: Minimum penetration is 10 diameters unless noted otherwise. Where fastening hardwood timber species or where wood tends to split, provide pilot hole 70% of screw shank diameter.

3.04 INSTALLATION OF ACCESSORIES AND MISCELLANEOUS WOOD

A. Coordinate installation of wood decking, metal-web wood joists, glued-laminated wood construction, shop-fabricated wood trusses, and wood I- joists.

B. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members. Fasten curbs corner-to-corner and to rafters with framing connectors configured for this application.

C. Blocking:

1. Provide fire blocking at locations and spacing's as required by CBC Chapter 7. Locate other blocking, supplementary framing, backing plates and bracing to facilitate installation of finish materials, fixtures, equipment, services, accessories, and trim requiring attachment and support.
2. Solid block joists and rafters over all supports with blocking of the same size and material as the joist or rafter.

D. Furring:

1. Nominal 1 inch x 3 inch minimum, continuous and spaced at 16 inches on center, maximum.
2. Install plumb, rigid, and level. Shim where necessary to provide a true, even plane suitable to receive the finish required.
3. Attach to concrete and masonry as shown in the contract drawings.

E. Bridging: Use 2 inch solid cross bridging. Nail bottom ends of bridging only after sheathing has been nailed.

F. Stair Framing: Provide with 3 stair stringers for each set of stairs, unless otherwise shown. Cut notches to receive exact size of treads and risers (if any) shown, with no change in dimensions between landings. Provide stringers of size shown, or if not shown, of a size to allow not less than 3-1/2 inch of effective depth, measured perpendicular to the rake of the stringer, after notching.

G. Install miscellaneous metal angles, bolts, and other items; secure into formwork where embedded in concrete.

H. Install accessory items not otherwise set under other sections; after completion of painting and other finishing work; in locations shown or directed by the Architect. Set items plumb, level, and secure using appropriate fastening as applicable.

3.05 FIELD APPLIED WOOD TREATMENT

A. Field treat all end cuts and holes in preservative treated materials per PART 2.

B. Apply two brush coats; or full-immersion dip not less than 15 minutes; or as required to thoroughly saturate all surfaces after cutting.

C. Air dry 2-hours minimum before installation.

3.06 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

C. Variation from Plane (Other than Floors): 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum. Provide framed substrates meeting requirements for application of finishes specified in other sections.

D. Exposed surfaces shall be free from dents and tool marks, unsanded rough or torn faces and corners, and other defects.

3.07 FIELD QUALITY CONTROL

A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform the following tests and submit reports as specified in Division 01:

1. Moisture content of all lumber at time of close-in.
2. Periodic special inspection of nailing, bolting, and other fastening within the seismic-force-resisting system including shear walls, wood diaphragms, etc. per CBC Section 1705A.12.2.
3. Special inspection of high load diaphragms per CBC Section 1705A.5.1 where designated on documents.

3.08 ADJUSTING

A. Replace all defective work at Contractor's expense.

B. Replace defective or damaged work with conforming work.

C. Correct defects using means that will not injure the materials.

D. Replace defective or damaged work which cannot be corrected in the field with new work, or return defective items to the shop for repair.

E. Repair or replace framing lumber sagged, twisted or warped due to shrinkage from excessive moisture content at time of installation, or from other causes.

F. Adjust to meet specified tolerances.

G. Architect/Engineer shall review all proposals for the repair or replacement of damaged, defective, or missing work.

H. Pay expenses incurred by Owner for Architect/Engineer's costs for (re-)design and obtaining approvals of Authorities Having Jurisdiction (AHJ) necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work.

I. Pay expenses due to re-testing and re-inspection necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work.

3.09 CLEANING AND PROTECTION

A. Clean all surfaces upon completion of erection, leave free of grime and dirt. Remove unused materials, tools, equipment, and debris from the premises and leave surfaces broomed clean.

B. Waste Disposal: Comply with the requirements of pertinent sections of Division 01 specifying cleaning and disposal.

1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.

C. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

D. Prevent sawdust and wood shavings from entering the storm drainage system.

E. Protect work from damage by subsequent operations.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Wood door frames, glazed frames.

C. Interior and exterior wood trim;

D. Wood casings and moldings.

E. Hardware and attachment accessories.

1.02 RELATED SECTIONS

A. Section 01 50 13 - Construction Waste Management and Disposal

B. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.

C. Section 06 41 00 - Custom Cabinets: Shop fabricated custom cabinet work.

D. Section 09 91 23 - Interior Painting: Painting and finishing of finish carpentry items.

1.03 REFERENCE STANDARDS

A. ASTM Standards: A153, A165, D 226

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.

D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0.

E. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.

F. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association ; 2010 (ANSI/BHMA A156.9).

G. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

H. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

I. PS 1 - Structural Plywood.

J. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce).

K. PS-51 for decorative plywood.

L. Redwood Inspection Service (RIS): "Standard Specifications for Grades of California Redwood Lumber" 2000 ed, www.calredwood.org.

M. West Coast Lumber Inspection Bureau (WCLIB): "Standard Grading and Dressing Rules No. 16".

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals for submittal procedures.

B. Product Data:
   1. Manufacturer's storage, handling and installation instructions
   2. Provide instructions for attachment hardware and finish hardware.

C. CAL-GREEN Submittals:
   1. Product Data - VOC Limits: For adhesives, sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Composite Wood Formaldehyde Limits: Provide certification that all products meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.

D. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

E. Mill grade certificate, if material cannot be marked on a concealed surface.

F. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, and details of anchorage, to a minimum scale of 1-1/2 inch to 1 ft.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with Woodwork Institute Manual of Millwork, Custom grade.

B. Factory-mark each piece of lumber and plywood with type, grade, mill and grading agency identification; except omit marking from surfaces to receive transparent finish.

C. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Wood: Store indoors, in well ventilated area at maximum relative humidity of 60 percent and in accordance with WIC technical bulletin 419-R.

B. Protect work from moisture damage.

1.07 PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

B. Coordinate the work with plumbing rough-in, electrical rough-in, installation of associated and adjacent components, and interior finishes.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in Section 01 6116.

2.02 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

2.03 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.04 LUMBER MATERIALS

A. Exterior wood: Dry; with moisture content up to 15 percent, unless otherwise indicated.
   1. Exterior Trim and Fascias, opaque finish: Redwood Inspection Service Paragraph 107 - "Grade B". RIS Paragraph 109 "Select" for material thinner than 2 inch, and Paragraph 117 "Select" for 2 inch and thicker; S4S; smooth surfaced.

B. Interior wood: Dry; with moisture content between 6 and 12 percent, unless otherwise indicated. Finger joints not permitted. WI manual, Section 3 and Section 4; "Custom Grade"
   1. Softwoods:
      a. Opaque Finish: Clear; western softwood.

2.05 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Rough Hardware and fasteners: Provide nails, screws, anchor bolts, machine bolts, expansion sleeves, lag screws, powder driven fasteners, joist hangers, straps, and other framing anchors of the size and type required to securely attach finish carpentry to substrates.
   1. Nails:
      a. Exterior Trim Exposed: Nichols-Homeshield, Independent Nail and Packing,
   2. Other Exterior Work: Hot-dip galvanized steel.
   3. Interior Work: Steel, typical unless otherwise indicated.
   4. Screws, Bolts, Washers:
      a. Exterior Work: Hot-dip galvanized steel, ASTM A153.
      b. Interior Work: Cadmium plated steel, ASTM A165.
   5. Framing Devices:
      a. Exterior Work: Hot-dip galvanized steel, ASTM A153.
      b. Interior Work: Plated, ASTM A165; or painted steel.

C. Concealed Joint Fasteners: Threaded steel.

2.06 ACCESSORIES

A. Adhesive and Tape
   1. 1. Wood Adhesive: Essex Chemical "Webtex 588", Inmont "Presstite 220", 3M "Scotch-Grip 4314" or equal.

B. Building Paper: #15 imperforate asphalt saturated organic felt, ASTM D226, Type I.

C. Lumber for Shimming and Blocking: Softwood lumber of western species.

D. Primer: as specified in Section 09 90 00 for finish type indicated.

E. Wood Filler: Solvent base, VOC Compliant, tinted to match surface finish color. Duratite "Wood Dough", Boyle-Midway "Plastic Wood" or equal.

2.07 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Mill and fabricate units and pieces as long as practical.

C. Finish and assemble at shop to greatest extent possible.

D. Finish to specified standards of Architectural Woodwork Standards (AWS) Manual.
   1. Opaque finish, unless otherwise indicated.

E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location of blocking, adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 PREPARATION

A. Separate units and condition wood materials for a minimum of 72 hours. Allow wood to achieve prevailing humidity conditions in installation areas prior to installing.

B. Backprime lumber, including side and ends, before installation at all conditions.

3.03 INSTALLATION

A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Trim and bases: Install with minimum number of joints possible. Use full-length pieces from maximum lengths of lumber available.
   1. Stagger joints in adjacent and related members.
   2. Cope at returns and miter at corners. Produce tight fitting joints with full surface contact throughout length of joint.
   3. Joints: End-to-end
      a. Wood: Scarf.
   4. Locate wood bases above subfloor by the thickness of finish flooring.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

E. Building paper: Install under exterior wood; without holes or tears.

F. Lap flashings to weather to the exterior.

1. Lap horizontal edges 3-inches minimum and vertical edges 6-inches minimum
2. Lap sheet metal flashings; double layer at corners by extending 6-inches around corner from each side.

G. Anchorage: Drill pilot holes for nails where necessary to preclude splitting or chipping of material .
1. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners.

H. Blind nail where possible and use fine finishing nails for exposed nailings, countersunk and filled flush with finished surface.

I. At exterior locations drive nails flush.

3.04 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth. Prepare in accordance with level of finish specified in Section 09 9000.

B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 TOLERANCES

A. Tolerances
1. Install the work plumb, level, true and straight with no distortions. Conceal shims.
   a. 1/16-inch maximum offset in flush adjoining surfaces.
   b. 1/8-inch maximum offset in revealed adjoining surfaces.
2. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

B. Maximum Variation from True Position: 1/16 inch.

3.06 ADJUSTMENT AND FINISHING

A. Ease salient corners and edges and sand all exposed surfaces of smooth finish wood.

B. Repair damaged and defective finish carpentry work wherever possible to eliminate functional and visual defects. Chipped or split materials is considered a defect.

C. Replace where repair is not possible.

D. Adjust joinery for uniform appearance.

END OF SECTION

SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Laminated Plastic Casework

B. Cabinet Hardware

C. Preparation for installing utilities.

1.02 RELATED SECTIONS

A. Section 01 50 13 - Construction Waste Management and Disposal

B. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.

C. Section 06 20 00 - Finish Carpentry

D. Section 12 36 00 - Countertops.

E. Division 09: pertinent sections specifying finishes adjacent to cabinets.

F. Section 10 11 16 - Visual Display Boards: Sliding markerboards integrated into custom cabinets.

G. Pertinent sections specifying lighting and/or electrical equipment interfacing cabinets.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.

B. AWI (QCP) - Quality Certification Program.

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0.

D. NEMA LD 3 - High-Pressure Decorative Laminates.

E. WI (CCP) - Certified Compliance Program (CCP).

F. WI (MCP) - Monitored Compliance Program (MCP).

G. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

H. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

I. Architectural Woodwork Standards (AWS) latest edition, published jointly by the Woodwork Institute, Architectural Woodwork Institute, and the Architectural Woodwork Manufacturer's Association of Canada.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories, hardware location and schedule of finishes.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

3. Include certification program label indicating that drawings fully meet the requirements of the AWS Millwork Grade specified.

C. Product Data: Provide data for specified products, including hardware accessories. Demonstrate compliance with specified attributes.

D. CAL-GREEN Submittals:
1. Product Data - VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section..
2. Composite Wood Formaldehyde Limits: Provide certification that all products meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood. Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.
3. Product Data - Low/No-VOC Paints and Coatings. Provide certification that all primers and coatings meet VOC emission limits specified in related section. List manufacturer, brand, application, type (flat or non-flat), number of gallon, and the VOC emissions in grams/liter. Include MSDS and product data sheet indicating VOC limits for each product provided.

E. Samples:
1. Full range of plastic laminates and edge tapes available from the specified group, of the specified manufacturer.
2. Submit two samples of each hardware item to be provided, illustrating hardware finish .
3. Three 12" x 12" finished samples of each veneer species and finish to be used and three 6" x 12" finished samples of each lumber lumber species and finish.

F. Closeout Submittals: AWS certificates of compliance indicating that installation fully meets requirements of AWS Millwork Grade specified.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
2. Provide designated labels on shop drawings as required by certification program.
3. Provide designated labels on installed products as required by certification program.
4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
5. Arrange and pay for inspections required for certification.
   a. All fees for their Certified Compliance program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.
6. Replace, repair, or rework all work for which certification is refused.

C. Single Source Responsibility: A single manufacturer shall provide and install the work described in this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

B. Do not deliver woodwork, until the area of operation is enclosed, painting, wet work, grinding, overhead work and similar operations which could damage, soil or deteriorate woodwork are complete and the area is broom clean.

C. If woodwork is stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

D. Do not install woodwork until required temperature and relative humidity are stable and will be maintained in installation areas.

1.07 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces in the range recommended by the Architectural Woodwork Standards for the location of the project.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.

2.02 CABINETS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Grades as indicated. Refer to SCHEDULES article

B. Plastic Laminate Faced Cabinets:
   1. Exposed Interior Surfaces: Low Pressure Melamine in a pattern or color compatible with the exposed surfaces unless otherwise noted.
   2. Semi-Exposed Surfaces: White melamine.

C. Cabinets :
   1. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
      a. Door and drawer fronts shall be 3/4 inch thick.
   2. Backs shall be full 3/4 inch thick.
   3. Casework Construction Type: Type A - Frameless.
   4. Interface Style for Cabinet and Door: Style 1 - Overlay; reveal overlay.
      a. Where doors are notched for hinges seal exposed edges of core with paint to match adjacent panel surface.
   5. Cabinet Design Series: As indicated on drawings.
      a. Fabricate cabinets with openings and mortises precut, to receive hardware, appliances, plumbing, fixtures, electrical work and similar items.
      b. Smooth edges of cutoffs and, where located in countertops and similar exposures, seal edges of cutouts with a water resistant coating.
   6. Adjustable Shelf Loading: 50 lbs. per sq. ft..
      a. Deflection: L/144.
      b. Shelves over 36 inch in length, fixed or adjustable, shall be 1 inch thick.
   7. Cabinet Doors and Drawer Fronts: Flush style.
   8. Drawer Side Construction: Multiple-dovetailed.

2.03 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.04 LUMBER MATERIALS

A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.

B. Softwood Lumber: NIST PS 20; Graded in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, , Grade III/Economy; average moisture content of 4-9 percent; species and grade as follows:

2.05 PANEL MATERIALS

A. Acceptable Medium Density Fiberboard Manufacturers:
   1. SierraPine Limited; Roseville, CA, 800-676-3339; info@sierrapine.com.
   2. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

B. Medium Density Fiberboard (MDF) Panels: ANSI A208.2, Grade 155. No added formaldehyde. SierraPine Medite II MDF as follows;
   1. Faces not required to be HPDL or wood veneer may be melamine, polyester or high-pressure laminate at fabricator's option. Color selected by Architect from full range of manufacturer's options, minimum of three choices.
   2. Composition: Lignocellulosic fibers and formaldehyde-free synthetic resin.
   3. Density: 44 to 49 lb/cu ft.
   4. Thickness: 1/4 to 1-1/4 inches, as indicated on drawings or as required by referenced standard for conditions indicated or necessary.
   5. Formaldehyde Content: Certified by Scientific Certification Systems to be made without use of phenol formaldehyde and to contain not more than 0.05 ppm formaldehyde.
   6. Force to Withdraw Screws at Panel Face: 225 pounds minimum, No.10 sheet metal screw.
   7. Force to Withdraw Screws at Panel Edge: 200 pounds minimum, No.10 sheet metal screw.
   8. Recycled Wood Content: Certified by Scientific Certification Systems for pre-consumer recycled wood fiber content

C. Medium Density Fiberboard (MDF) Panels - Moisture Resistant Types, Provide at Sinks and Interior High Moisture Areas: ANSI A208.2, Grade 155. No added formaldehyde, SierraPine Medex MDF as follows;
   1. Meet all requirements specified above for Medium Density Fiberboard (MDF) Panels and the following:
      a. Moisture-Resistant Panels: Withstanding the Accelerated Aging Tests specified in ASTM D 1037 without adverse effects.

2.06 LAMINATE MATERIALS

A. Manufacturers:
   1. Formica Corporation : www.formica.com.
   2. Wilsonart International, Inc: www.wilsonart.com.
   3. Panolam Industries International, Inc: www.nevamar.com.
   4. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

C. Provide specific types as follows:

1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness , through color , colors as scheduled , finish as scheduled.
2. Vertical Surfaces: VGS, 0.028 inch nominal thickness , through color , colors as scheduled , finish as scheduled.
3. Post-Formed Horizontal Surfaces: HGP, 0.039 inch nominal thickness , through color , colors as scheduled , finish as scheduled.
4. Post-Formed Vertical Surfaces: VGP, 0.028 inch nominal thickness , through color , colors as scheduled , finish as scheduled.
5. Flame Retardant Surfaces: HGF, 0.048 inch nominal thickness , through color , colors as scheduled , finish as scheduled.
6. Cabinet Liner: CLS, 0.020 inch nominal thickness , through color , colors as scheduled , finish as scheduled.
7. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

D. Colors, Patterns, and Finishes: As selected by Architect for manufacturer's full range of standard and premium colors and patterns, and as follows:
   1. Allow for different patterns/colors of base cabinet, upper cabinet and countertops.

2.07 COUNTERTOPS

A. General: Types specified in Section 12 36 00. Provide in accordance with WI Manual Sections cited to match quality grade(s) for cabinets indicated in this Section.

2.08 ACCESSORIES

A. Adhesive: Type recommended by WI to suit application, urea formaldehyde-free.
   1. Wood Glue: Waterproof types as recommended by WI standards for the particular application. VOC content of not more than 30 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24.
   2. Adhesive for Bonding Plastic Laminate: Contact cement, for general use and for postforming. Use unpigmented product with through-color laminate.

B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness. 3 mm thick, minimum.
   1. Color: As selected by Architect from manufacturer's full range.
      a. Provide minimum of seventy-five color selections coordinated with plastic laminate selections, including patterns and woodgrains.

C. Fasteners: Size and type to suit application.

D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

E. Concealed Joint Fasteners: Threaded steel.

F. Grommets: plastic material for cut-outs, 2 inch diameter minimum, color as selected.

2.09 HARDWARE

A. General: Meet or exceed specified requirements of AWI/AWMAC/WI - Architectural Woodwork Standards (AWS) and BHMA Grade 1; US 26D finish or as selected by Architect from manufacturer's standards.

B. Shelf Support Clips: Plated steel, with support pin for drilled hole in cabinet standard and shelf, with pre-drilled hole for seismic fastener to shelf. Hettich Sekura #1 or equal. Plastic clips will be rejected.

C. Door and Drawer Pulls: Provide at all doors and drawers, brushed stainless steel, 116 x 28 mm loop pull; Hafele, San Francisco, CA "Model 115.60.601", or equal .

D. Cabinet Locks: Provide at all cabinets and drawers except sink cabinets. Locks to be keyed cylinder, two keys per lock, master keyed, steel with chrome finish.

E. Catches: Magnetic.

F. Drawer Slides:
   1. Type: Extension types as scheduled.
   2. Static Load Capacity: Heavy Duty grade and minimum capacity ratings as follows;
      a. File Drawers: Extra Heavy Duty grade 125 pounds.
      b. Lateral File Drawers: Extra Heavy Duty grade 150 pounds.
      c. Lateral File Drawers More Than 30" Wide: Extra Heavy Duty grade 200 pounds.
      d. Drawers in excess of 36 inches wide: Extra Heavy Duty grade 150 pounds.
      e. Pencil Drawers (less than 4 inches inside height): 50 pounds.
      f. All other drawers: 75 pounds.
   3. Mounting: Side mounted.
   4. Stops: Integral type.
   5. Features: Provide self closing/stay closed type.
   6. Manufacturers:
      a. Accuride International, Inc : www.accuride.com.
      b. Grass America Inc : www.grassusa.com.
      c. Hettich America, LP : www.hettich.com/sle.
      d. Knape & Vogt Manufacturing Company : www.knapeandvogt.com.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

G. Hinges: Stainless steel, five knuckle ANSI / BHMA Grade 1, non-removable pins, attached with screws that are inaccessible when closed, capable of 270 degree swing. Finish as selected by Architect. European style concealed hinges will be rejected.
   1. Manufacturer: Rockford Process Control "No. 376" or equal.
   2. Substitutions: See Section 01 25 13 - Product Options and Substitutions

H. Latches: Finger-release type; Locate release not exceeding 40 inches above finish floor elevation, on either leaf of pair doors, to suit configurations shown.

I. Grommets and covers: 2 inch diameter, ABS plastic; color as selected.

J. File frames and followers: Pendaflex type at each drawer indicated as file drawer.

K. Other Hardware: per referenced standard.

2.10 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
   1. Cap exposed plastic laminate countertop finish ends and edges with material of same finish and pattern. Cap semi-exposed ends and edges with materials permitted by the Referenced Standard. Plastic Tee banding is not acceptable.

2. Plastic Laminate Faced Cabinet Edge Band: 3mm PVC at doors, drawer fronts, false fronts, and at all other edges requiring banding.
3. Wood Faced Cabinet Edge Band: 3mm wood edge band at doors, drawer fronts and false fronts, all other edges per the AWS.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.

2.11 FABRICATION - COUNTERTOPS

A. Fabricate countertops as specified in Section 12 36 00 and to match quality grade standards specified in this section. In the event of conflict, the higher standard prevails.

2.12 SOURCE QUALITY CONTROL

A. Labels: Certification of compliance, affixed by WI Inspector at the place of fabrication prior to shipment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location of blocking, adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure casework in place; rigid, plumb, and level, free of distortions. Shim as required; use concealed shims.

B. Use fixture attachments in concealed locations wherever possible for wall mounted components. Exposed fasteners at semi-exposed surfaces and exposed interior surfaces are acceptable when required to provide a seismic compliant installation.
1. Exception: Exposed fastening permitted at access panels.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other work, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets to floors and walls using appropriate angles and anchorages.

F. Shelves: Install adjustable shelves evenly spaced, with specified hardware. Securely attach shelves to earthquake clips.

G. Countertops: Anchor securely to base units and other support systems and as specified in Section 12 36 00.

H. Connection of sinks to plumbing systems as specified in pertinent related sections.

3.03 TOLERANCES.

A. Site Tolerances: 1/8 inch in 8 feet for plumb and level; adjoining surfaces flush, without offset.

B. Cabinet Tolerances: As specified in the referenced standard.

3.04 ADJUSTING

A. Adjust installed work.
   1. Adjust and lubricate moving or operating parts to function smoothly and correctly.
   2. Adjust hardware to center doors and drawers in openings and to provide smooth operation.

B. Touch-up shop-applied finishes to restore damaged or soiled areas.

C. Repair damaged and defective woodwork and eliminate defects functionally and visually. Where repair is not possible replace woodwork. Adjust joinery for uniform appearance.

3.05 FIELD QUALITY CONTROL

A. If Architect questions that installation quality may not conform to the specified AWS Quality Grade, Architect may order a final inspection by a WI Inspector.

3.06 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

3.07 PROTECTION OF FINISHED WORK

A. Do not permit finished casework to be exposed to continued construction activity.

B. Do not store materials or products on countertops. Do not stand or walk on countertops or use for construction access to building elements above floor level.

C. Protect countertops with durable panel materials secured in place using methods which will not damage surfaces or finishes. Do not remove until Owner acceptance following move-in.

3.08 SCHEDULES

A. All Locations:
   1. Quality: WI Custom Grade.
   2. Cabinet Construction: Plastic laminate faced.
   3. Countertops: Plastic laminate.

END OF SECTION

SECTION 07 01 50.91
ROOFING REPAIR

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide all labor, equipment, and materials to maintain and protect the existing roof system..

1.02 RELATED SECTIONS

A. Section 07 62 00- Sheet Metal Flashing and Trim: Sheet metal flashing and trim.

B. Section 06 10 00 Rough Carpentry: Framing connectors and Hold Downs.

1.03 SYSTEM DESCRIPTION

A. Maintenance roofing work including but not limited to:
   1. Flashing Installation at new penetrations.
   2. All flashings to consist of one ply of Polyester-Fiberglass-Polyester base sheet set in mastic covered by an additional layer of modified bitumen membrane.

1.04 PERFORMANCE REQUIREMENTS

A. Conform to Class A fire-resistive, FM Class 1 (including FM I-90), and UL class A standards.

B. Make roof weathertight and watertight. All drainage to flow off roof, do not permit standing water.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets documenting conformance with existing roof membrane.

C. Installers Qualifications List from manufacturer listing not less than three roofs installed of equal size and degree of difficulty, which have been in place for a period of five years and have been performing sucessfully for that period of time. List shall include all manufacturer's related system components.

D. Certificates: Certify that products of this section meet or exceed specified requirements.

E. Manufacturer's Field Reports: Indicate deviations or deficiencies observed during site visits, record method of resolution.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and approved by manufacturer.
   1. Installer's Field Supervision: Require Installer to maintain a full-time Supervisor/Foreman on job site during all phases of bituminous sheet roofing work and at any time roofing work is in progress, proper supervision of workmen shall be maintained. A copy of the specification shall be in the possession of the Supervisor/Foremen and on the roof at all times.

2. WIthin 50 miles of South San Francisco, provision of not less than three roofs installed of equal size and degree of difficulty, which have been in place for a period of five years and have been performing sucessfully for that period of time.

C. Respond immediately to correction of roof leakage during construction. If the contractor does not respond within 24 hours, the Owner has the right to hire a qualified contractor and backcharge the original contractor.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.

B. Store and handle roofing materials in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).

C. Do not leave unused rolled goods on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.

D. Contractor shall secure all material and equipment on the job site. If material or equipment is stored on the roof, the contractor shall ensure that the integrity of the deck is not compromised at any time. Damage to the deck caused by the contractor will be the sole responsibility of the contractor and will be repaired or replaced at his expense.

E. All manufacturer's system components, including roll goods, mastics, primers, asphalt, sheet metal and adhesives must carry that manufacturer's label.

1.08 PROJECT CONDITIONS

A. Coordinate roof repair installation with size, location and installation of roof mounted work.

B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Weather Condition Limitations: Do not apply materials during inclement weather or when a 40% chance of precipitation is expected.

B. Materials shall be stored at room temperature until immediately prior to application when the ambient temperature is 40°F or below. Discontinue the application if the material can not be stored at a temperature which permits even distribution during application.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.10 WARRANTY

A. Correct defective Work within a one year period after Date of Substantial Completion.

B. Provide one year manufacturer warranty for roof repair.

C. Provide certificate from existing roofing manufacturer indicating that all work performed will sustain existing roof warrantees.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide products conforming to existing Bituminous roofing membrane. Existing roofing manufacturer is Garland Company.
   1. Local representative: Jay Mulligan 415 479 1328.

B. Substitutions: See Section 01 25 13 - Product Options and Substitutions

2.02 MATERIALS

A. Modified Flashing Ply: ASTM D-6162 Type III Grade G , 135 mil SIS and SB (Styrene-Isoprene-Styrene and Styrene-Butadiene-Styrene) mineral surfaced rubber modified roofing membrane reinforced with a dual fiberglass scrim and polyester mat.
   1. " STRESSPLY "E" MINERAL" manufactured by The Garland Company.

B. Asphalt Primer: V.O.C. compliant, ASTM D-41.
   1. "Garla Prime" manufactured by The Garland Company.

C. Asphalt Roofing Mastic: V.O.C. compliant, ASTM D-2822, Type II.
   1. "Flashing Bond" manufactured by The Garland Company.

D. Reinforcing Fabric: Fiberglass Mesh.

E. Base Flashing Ply: ASTM D-4601 Type II, one ply of Polyester-Fiberglass-Polyester, as recommended and furnished by the membrane manufacturer.

F. Deck Sheathing: Perlite board, ASTM C 728; 1/2 inch thick, as manufactured by Manville, Celotex.

2.03 ACCESSORIES

A. Nails and Fasteners: Galvanized steel except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel.

B. Metal Discs: Flat discs or caps of zinc-coated sheet metal not lighter than 28 gauge an not less than 1-inch in diameter. Discs shall be formed to prevent dishing. Bent or cup-shaped caps are not acceptable.

C. Accessory Materials: Other materials not specifically indicated but required to achieve the results specified; commercial quality. Types recommended by manufacturer to suit conditions.

D. Sealant: Compatible material of types specified in Section 07 9005.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrate surfaces to receive roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing repairs until unsatisfactory conditions have been corrected in a manner acceptable to Roof System Manufacturer and Installer.

B. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof repairs.

C. Verify deck surfaces are dry and free of snow or ice.

3.02 WOOD DECK PREPARATION

A. Verify flatness and tightness of joints of wood decking. Fill knot holes with latex filler.

B. Seal joints of plywood with tape.

C. Confirm dry deck by moisture meter with 12 percent moisture maximum.

3.03 INSTALLATION

A. Prepare all penetrations to be flashed and where shown on the drawings.

B. All plies will be adhered with the following:
   1. With mastic. The base flashing and the modified membrane will be used as the flashing and nailed off 8" O.C. at all vertical surfaces.

C. The entire sheet of the base flashing and the flashing membrane must be solidly adhered to the substrate. All base flashings shall be set in mastic and covered by an additional layer of modified bitumen membrane.

D. Seal all vertical laps of flashing membrane with a three-course application of Flashing Bond and fiberglass mesh and aluminize.

E. Seal junction of flashing membrane and roof with a three-course application of Flashing Bond and mesh.

F. Install all work in accordance with manufacturer's instructions.

3.04 INTERFACE WITH OTHER WORK

A. Coordinate with roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices to be coordinated with the roofing work as specified in other sections to avoid conflict or omission in waterproofing systems and to provide watertight installation.

3.05 FIELD QUALITY CONTROL

A. At completion of roofing installation and associated work, meet with Installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.

B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each parting attending.

C. Repair or replace (as required) deteriorated or defective work found at time above inspection to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

D. The Contractor is to notify the Owner upon completion of corrections.

E. Following the final inspection, acceptance will be made in writing by the material manufacturer.

3.06 CLEANING and PROTECTION

A. Clean roof and surrounding surfaces. Remove bituminous markings from finished surfaces.

B. In areas where finished surfaces are soiled by bitumen or other source of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or damaged finishes caused by work of this section.

D. Protect installed work from subsequent construction operations.

E. Do not permit traffic over unprotected roof surface.

END OF SECTION

SECTION 07 11 13
BITUMINOUS DAMPPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Bituminous dampproofing at exterior retaining walls.

B. Protection boards.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Division 31 and 33 : Pertinent sections specifying earthwork, drainage, trenching and backfill.

1.03 REFERENCE STANDARDS

A. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

B. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free.

C. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

1.04 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: Provide properties of primer, bitumen, and mastics.

D. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.05 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

PART 2 PRODUCTS

2.01 DAMPPROOFING PRODUCTS

A. Bituminous Dampproofing: Cold-applied, spray-grade; asphalt base, volatile petroleum solvents, and other content, suitable for application by spray, brush, roller, or squeegee; asbestos-free; suitable for application on vertical and horizontal surfaces.
   1. Composition: ASTM D4479/D4479M Type I, minimum, asbestos free.
   2. VOC Content: Not more than permitted by local, State, and federal regulations.
   3. Applied Thickness: 1/16 inch, minimum, wet film.
   4. Manufacturers:
      a. W.R. Meadows, Inc ; Sealmastic Spray-Mastic: www.wrmeadows.com/sle.

b. Substitutions: See Section 01 23 13 - Product Options and Substitutions.

B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

2.02 COLD ASPHALTIC MATERIALS

A. Asphalt Primer: ASTM D41/D41M, compatible with substrate.

2.03 ACCESSORIES

A. Protection Board: 1/8 inch thick bitumen impregnated glass fiberboard.
1. Product: "Protection Course" PC-2 Standard Duty manufactured by W. R. Meadows, Inc..

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

C. Verify that items that penetrate surfaces to receive dampproofing are securely installed.

3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

3.03 APPLICATION

A. Prime surfaces in accordance with manufacturer's instructions.

B. Apply bitumen with roller or other method approved by manufacturer.

C. Apply bitumen in 3/16 inchtwo coats, continuous and uniform, at an approximate rate rate of 3 gal/100 sq ft per coat to a final thickness of 1.59 mm.
1. Allow 12 hours minimum between coats.

D. Apply from 2 inches below finish grade elevation down to top of footings.

E. Seal items projecting through dampproofing surface with mastic. Seal watertight.

F. Place protection board directly over dampproofing, butt joints, and adhere to tacky dampproofing.

G. Scribe and cut boards around projections, penetrations, and interruptions.

H. Adhere protection board to substrate with mastic

3.04 SCHEDULE

A. Site Planter Walls: Two coatings of asphalt dampproofing.

B. Site Retaining Walls not adjacent to conditioned spaces: Two coatings of asphalt dampproofing.

END OF SECTION

SECTION 07 21 00
BOARD AND BATT BUILDING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt insulation in interior and exterior wall, ceiling, and roof construction.

B. Insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

A. Section 01 41 00 - Regulatory Requirements

B. Section 07 84 00 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.

C. Division 23 - Mechanical, Duct and Pipe Insulation.

1.03 REFERENCE STANDARDS

A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C.

D. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

E. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

F. Manufacturer's recommendations.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. CAL-GREEN Submittals:
   1. Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Certify compliance with 2016 California Referenced Standards Code as referenced in Article PERFORMANCE REQUIREMENTS.

D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

E. Schedule of installation methods for each and every system and condition.

F. Samples of mechanical supports and fasteners.

1.05 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.06 SEQUENCING

A. Sequence work to ensure fireproofing and firestop materials are in place before beginning work of this section.

1.07 DELIVERY, STORAGE AND HANDLING

A. Mark materials on face of package, with manufacturer's name, thickness, and insulation "R " value.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Insulating Material Standards: All insulation materials must comply with the 2016 California Referenced Standards Code, California Code of Regulations, Title 24, Part 12 / Chapter 12-13 Standards for Insulating Material.

C. Roof and wall insulation to provide a complete insulation envelope surrounding all conditioned spaces, as indicated elsewhere in the Contract Documents, and as listed below.

2.02 APPLICATIONS

A. Insulation in Wood Framed Exterior Walls: Batt insulation with integral vapor retarder.
   1. Wood Framed Wall Insulation: Minimum R-19 fiberglass batts with vapor retarder facing, fastened to wood studs, and greater thicknesses as required to fill framing cavity with insulation batt equal to full depth of framing member.

B. Insulation in Interior Framed Walls: Unfaced Batt Insulation with no vapor retarder to full depth of framing member, at all wall locations.

C. Wood Framed Roof Insulation: Minimum R-19 fiberglass batt insulation with integral vapor barrier, stapled and taped to underside of ceiling joists and greater thicknesses as required to fill framing cavity with insulation batts equal to full depth of framing member, less ventilation space for ventilated cavities.

2.03 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: ASTM C 665; flexible preformed glass fiber batt; friction fit, sized to fit between framing elements, conforming to the following:
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. Combustibility: Non-combustible, when tested in accordance with ASTM E136 , except for facing, if any.
   4. Formaldehyde Content: Zero.
   5. Thermal Resistance: R value as indicated.
   6. CHPS 01350 compliant.
   7. Facing: FSK (Foil-Scrim Kraft), one side. Exception: Paper facing may be provided in locations where the insulation is in "substantial contact" with the wall finish as described in exceptions noted in CBC 719.2.1.
   8. Maximum 0.50 perm rating, ASTM E 96.
   9. Manufacturers:
      a. Johns Manville International, Inc: www.jm.com.
      b. CertainTeed Corporation: www.certainteed.com.
      c. Owens Corning Corp: www.owenscorning.com.

d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Acoustic Batt (Sound Retardant) Insulation:
1. Same as Batt Insulation, unfaced.

2.04 OTHER INSULATION

A. Foamed-in-place Plastic Insulation: Polyurethane Foam Sealant, Flame Spread 20 / Smoke Developed 20, when tested in accordance with ASTM E 84.
1. Manufacturers:
a. Dow Chemical Co.; Great Stuff: www.itsgreatstuff.dow.com. UL Listed R 13655.
b. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 ACCESSORIES

A. Attachment clips as recommended by the manufacturer in writing.

B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.

C. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

D. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

E. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation .

B. Verify that all framing inspections are complete and that required corrections have been made before installing insulation.

3.02 INSTALLATION - GENERAL

A. Install insulation in accordance with manufacturer's instructions.

B. Install in walls, roof and ceiling spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.

D. Small gaps and voids which are not otherwise insulatable:
1. Either sprayed foam type plastic insulation or mineral wool, as recommended by the Contractor and approved by the Architect.
2. Provide bond breaking material between foam and adjacent materials whereever possible.

E. Install with factory applied vapor retarder membrane facing warm side of building spaces.

3.03 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall, roof, and ceiling spaces without gaps or voids. Do not compress insulation.

C. Install in acoustic batt insulation in all interior walls without gaps or voids. Do not compress insulation.

D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

E. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

F. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.

G. Secure vapor barrier facing to framing along edges and at ends of batt at all applications. At horizontal applications additionally provide guy wire or netting to support insulation without sags.

H. Batts: Attach by either method.
   1. Install as a single length between structural members or fold vapor barriers together and staple or tape at intermediate end joints.
   2. Staple or nail facing flanges in place at maximum 6 inches on center.

I. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

J. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over member face.

K. Tape seal tears or cuts in vapor retarder.

L. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

M. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

3.04 PROTECTION

A. Repair holes or tears with adhesive tape immediately before application of finish.

B. Do not permit installed insulation to become wet or damaged prior to its concealment.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vapor Retarders: Materials to make exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and under slabs-on-grade water vapor resistant and air tight.

B. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and utility penetrations.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 07 21 00 - BOARD AND BATT BUILDING INSULATION: Vapor retarder installed in conjunction with batt insulation.

1.03 DEFINITIONS

A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.

B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.

C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
   1. Water Vapor Permeance: For purposes of conversion, 57.2 ng/(Pa s sq m) = 1 perm.

D. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.04 REFERENCE STANDARDS

A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

B. ASTM E 154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

C. Manufacturer's recommendations and specifications.

D. ASTM D 1709 - Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

F. ASTM E1643 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

G. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

H. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.

I. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

J. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide data on material characteristics, performance criteria, and limitations.

C. CAL-GREEN VOC Submittals: For adhesives sealants, fillers, coatings and primers, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Below Grade Vapor Retarder Test Data: Submit independent third party test data for all listed performance values to show compliance with this specification. All test data for review shall be as published and released for publication by the authors without restriction of distribution.
   1. Summary of test results as described in ASTM E 1745.
      a. Certify that all mandatory ASTM E1745 testing has been performed on a single production roll per ASTM E1745 Section 8.1. Test reports must specifically state that sampling and testing of materials are in strict accordance with the requirements of the standard.
   2. Manufacturer's samples and literature.
   3. Manufacturer's installation instructions for placement, seaming and penetration repair instructions.

E. Shop Drawings: For air-barrier and weather-resistive barrier assemblies; provide drawings of special joint conditions.
   1. Show locations and extent of air barrier and weather-resistive barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   2. Include details of interfaces with other materials that form part of air barrier and weather-resistive barrier including related cladding, sealants and flashings.
   3. Provide project-specific details customized to this project's conditions. Manufacturer's standard details alone are not acceptable.

F. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

G. Qualification Data: For Installer, Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
   1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

B. Preinstallation Conference: Conduct conference at Project site after approval of complete submittal to comply with requirements in Division 1 Section "Project Management and Coordination." Review requirements for air barrier, including surface preparation specified under other Sections, substrate condition and pretreatment, temporary weather protection, forecasted weather conditions, special

details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives sealants, fillers and primers. Comply with limits specified by Code and in Section 01 41 00.

B. General: The air barrier assembly shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to adjacent waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

C. Air-Barrier Assembly Air Leakage: Less than 0.0008 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.004 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.

D. Building Envelope shall be constructed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:
   1. Continuous, with all joints made airtight.
   2. Capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
   3. Durable or maintainable.
   4. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
      a. Foundation and walls.
      b. Walls and windows or doors.
      c. Different wall construction and cladding assemblies.
      d. Wall and roof.
      e. Wall and roof over unconditioned space.
      f. Walls, floor and roof across construction, control and expansion joints.
      g. Walls, floors and roof to utility, pipe and duct penetrations.
   5. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

a. Dryvit Systems, Inc.; Backstop NT: www.dryvit.com.

A. Air Barrier Accessories:

1. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material. Provide accessory materials by the same manufacturer as the primary air-barrier.
2. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid for details and terminations, trowel grade.
   a. W.R Grace & Co.; Bituthene® Liquid Membrane: www.graceconstruction.com.
   b. Equivalent Products by Dryvit and Henry.
   c. Substitutions: Section 01 6000.
3. Termination Sealant: Air-barrier manufacturer's alternate product for details and terminations, one-part neutral curing, ultra low modulus silicone sealant.
   a. W.R Grace & Co.; Basis of Design: S100 Sealant: www.graceconstruction.com.
   b. Equivalent Products by Dryvit and Henry.
   c. Substitutions: Section 01 6000.
4. Transition Strips: Self-adhering elastomeric flashing strips comprised of rubberized asphalt backed by a layer of cross-laminated, high-density polyethylene. Membrane shall be interleaved with disposable plastic release liner until installed.
   a. Dryvit Systems, Inc.; Aqua-Flash Detail Membrane: www.dryvit.com.
   b. Henry Co, Inc.; Blueskin: www.henry.com.
   c. W.R Grace & Co.; Perm-A-Barrier® Detail Membrane: www.graceconstruction.com
   d. Substitutions: Section 01 6000.
5. Through Wall Flashing: Self-adhering elastomeric flashing tape comprised of rubberized asphalt backed by a layer of cross-laminated, high-density polyethylene. Membrane shall be interleaved with disposable plastic release liner until installed.
   a. W.R Grace & Co.; Perm-A-Barrier® Wall Flashing: www.graceconstruction.com
   b. Equivalent Products by Dryvit and Henry.
   c. Substitutions: Section 01 6000.
6. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 07 9005 "Joint Sealers."

2.03 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)

A. Under-Slab Vapor Retarder/Barrier Sheet: 15 mil, single ply extruded polyolefin, ASTM E 1745, performance classification A, B, and C;
   1. Water vapor permeance, ASTM E 154 or E 96 procedure B: 0.009 perm maximum.
   2. Tensile strength ASTM D 882 or ASTM E154, sec. 9; 45 lb/in.
   3. 0.01 or less perm vapor performance per ASTM E 154 Section 8, 11, 12 and 13; 0.0054 WVTR water vapor permeance per ASTM F 1249;
   4. Minimum puncture resistance, ASTM D 1709, Method B: 2200 grams.
   5. Products:
      a. Epro Waterproofing Systems; ECOSHIELD-E15, 15-mil thick Sheet Membrane Vapor Retarder: www.eproserv.com.
      b. Stego Industries, LLC, San Diego, CA; Stego Wrap Vapor Barrier, 15 mils: www.stegoindustries.com.
      c. W.R Meadows, PERMINATOR, 15-mil thick, www.meadows.com.
      d. REEF Industries, Inc., Griffolyn® Reinforced Vapor Protection, VAPORGUARD®, www.reefindustries.com.
      e. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

B. Adhesives, sealants and plastic cement: Types recommended by manufacturer to suit application and for compliance with referenced standards.

C. Sealing Tape: Two-sided tape; 4 inch wide black seaming tape with release liner, perm rating not less than vapor retarder, complying with ASTM E 1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs; types recommended by manufacturer to suit application.

D. Detail Tape and/or patch membrane for Concrete Adhesion:
   1. Type recommended by manufacturer tape and/or membrane detail strip and/or membrane to mechanically lock vapor retarder to concrete.
   2. Permeance: Comply with ASTM F1249.
   3. Peel Adhesion: Comply with PSTC 101
   4. Tensile Strength: Comply with ASTM E 154, Sec. 9
   5. Puncture Resistance: Comply with ASTM D 1709
   6. Product: Stego; Crete Claw Tape; www.stego.com.

E. Vapor Retarder Stakes:
   1. Product: Vaporstake, LLC; Polyvinyl Black VaporStake™: www.vaporstake.com.
      a. Solid Plastic construction: ASTM E1643-11 (sec. 8.4 & 8.6) and ACI 302.2R-06
      b. Use with Vapor Retarders: ASTM E 1745-09
      c. Recycled content: 100%
      d. Size: Length for application and diameter recommended by manufacturer for application.

2.04 SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT, complying with requirements of related Section 07 92 00. Type as recommended by wall finish manufacturer for conditions indicated, and as required to maintain single-source warranty continuity.
   1. Color: As selected by Architect from manufacturer's standards.

2.05 ACCESSORIES

A. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
   1. Products: By same manufacturer as air barrier coating, as recommended by manufacturer for specific application.
      a. Dryvit Systems, Inc.; Aqua-Flash Detail Membrane: www.dryvit.com.
      b. Grace Construction Products; Perma-Barrier Detail Membrane, Perma-Barrier Wall Flashing: www.grace.com.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

B. Thinners and Cleaners: As recommended by material manufacturer, meeting VOC requirements specified.

C. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials, meeting VOC requirements specified.

D. Pre-molded Opening Corners: Size as required for snug fit at opening corners, resilient material compatible with related flexible flashings and air barriers, as recommended and manufactured by sheet material manufacturer.
   1. Grace Construction Products; "VYCORners" (pre-molded corners): www.na.graceconstruction.com,

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive sealants and fluid-applied membranes and self-adhered flashings in accordance with manufacturer's instructions.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Vapor Retarders: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

D. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.

E. Flexible Flashing: Install in at opening flashings, at locations indicated and underlying horizontal and sloped areas of plaster cladding, in inset wall opening sills and similar locations; in accordance with the manufacturer's recommendations and as follows;
   1. Substrate Preparation:
      a. Smooth, clean, dry and free of voids, spalled areas, loose substrate, loose nails, sharp protrusions or other matter that will hinder the adhesion or regularity of installation.
      b. Clean loose dust or dirt by wiping with a clean dry cloth or brush. Prime substrate with compatible primer in conditions recommended by flashing manufacturer.
   2. Flashing Application:
      a. Coordinate installation with other paper and metal flashings, interleave as required to weather all laps to drain, directing water to exterior.
      b. Coordinate installation with window and insert opening frames.
      c. Peel release paper from roll to expose adhesive surface and position flashing to center over joint location before application. Ensure flashing is centered over joint opening. Avoid fishmouths.
      d. Press flashing firmly into place and hand-roll with resilient roller. Ensure full, continuous and intimate contact with the substrate. Cut out wrinkles or other affected areas and replace with smooth flat membrane.
      e. Flashing shall be continuously supported by the substrate without spanning or bridging joints, gaps or voids in excess of 1/4 inch. Minimum End Laps 2 inch.
   3. Leave flexible flashing in condition to receive installation of metal lath at locations to receive plaster cladding.
   4. Preformed Resilient Corners: Provide at all lower corner openings of windows unless metal sill pan flashings are shown on the drawings.

F. Openings and Penetrations in Exterior Weather Barriers:
   1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
   2. Lap sheets shingle-fashion to shed water and seal laps air tight.

3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that all laps are firmly adhered with no gaps or fishmouths.
4. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
5. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
6. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
7. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
8. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 INSTALLATION- VAPOR RETARDER UNDER CONCRETE SLAB-ON-GRADE

A. Install materials in accordance with manufacturer's instructions and ASTM E 1643-98.
   1. Unroll Vapor Retarder membrane with the longest dimension parallel with the direction of the concrete pour.
   2. Extend vapor barrier over footings and grade beams to a distance acceptable to the structural engineer or stop at impediments such as dowels and waterstops.
   3. Seal vapor barrier to footing/grade beam with double sided tape, termination bar, or both.
   4. Lay-out sheets to minimize quantity of joints.
      a. Lap edge 6 -inches minimum and end joints 12 -inches minimum and continuously seal with joint tape.
   5. Apply tape to a clean and dry vapor retarder membrane.
   6. Terminate vapor retarder membrane per manufacturer's recommendations along perimeter; at footers, vertical walls, and against penetrations.
      a. Seal perimeter with continuous mastic bead along foundation walls.
      b. Seal barrier joints with tape.

B. No penetration of the Vapor Retarder membrane is allowed except for reinforcing steel and permanent utilities.
   1. Seal all penetrations (including pipes) with field-assembled boots per manufacturer's instructions.
   2. Where forms are used, provide Vapor Stakes to hold forms in place.
      a. Penetrate vapor Retarder with stake.
      b. Treat stake as pipe penetration.
      c. Leave stake permanently in concrete.
      d. Using a power saw, cut the stake off above the seal, but below the concrete finished surface not higher than elevation of horizontal reinforcing.
      e. The lower portion of the vapor stake remains in place, permanently plugging the penetration.

C. Refer to Section 03 30 00 "Cast-in-Place Concrete" for installation coordination requirements.

D. Repair damaged areas by cutting patches of Vapor Barrier/Retarder, overlapping damaged area 6 -inches and taping all four sides with tape.
   1. Do not use concrete adhesion tape to repair penetrations.

E. Where differential settlement is possible, adhere the vapor retarder at building perimeter and in a grid pattern every 4 -feet on-center with integrally bonded detail tape for concrete adhesion.

3.05 PROTECTION

A. Protect under-slab vapor retarder sheets from puncture during installation. Patch punctures before proceeding with subsequent construction.
   1. NOTE: SCREEDING STAKES DRIVEN THROUGH RETARDER must be repaired per membrane manufacturer's recommendation.

B. Install runway planks in construction traffic lanes until slabs are poured.

3.06 FIELD QUALITY CONTROL

A. See Section 01 45 00 - Quality Control, for additional requirements.

B. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

C. Under-slab Vapor Retarder Membrane: Conduct a visual inspection, in the presence of the Architect/Engineer, of the entire Retarder installation the day before pouring concrete. Make all necessary corrections prior to placing concrete.

D. Take digital photographs of each portion of the installation prior to covering up.

3.07 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

SECTION 07 26 33
WATER VAPOR EMISSION CONTROL COATING

PART 1 GENERAL

1.01 SUMMARY

A. Epoxy type, environmentally safe, 100 percent solids, water vapor emission and alkalinity control coating. A Moisture Mitigation and Alkalinity Control System as defined in ASTM F3010.

B. Cementitious leveling underlayment applied over moisture mitigation coating as required by specific flooring adhesive to be used at each finish flooring condition.
   1. Coordinate all flooring manufacturers adhesive requirements for submitted flooring materials in each area to determine requirements for flooring adhesive underlayments.

1.02 RELATED REQUIREMENTS

A. Section 01 45 00 "Quality Control" for product manfacturer's independent laboratory qualifications.

B. Section 01 41 00 "VOC Restrictions".

C. Section 03 30 00 "Cast-in-Place Concrete" for Concrete slab substrate.

D. Division 09 Section specifying concrete floor surface preparation.

E. Division 09 Section specifying floor moisture and pH testing.

F. Division 09 Floor Covering Sections, for installation requirements and to verify compatibility with the floor covering manufacturer's adhesives.

1.03 REFERENCED STANDARDS

A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

C. American Concrete Institute:
   1. ACI 318 – Building Code Requirements for Structural Concrete.

D. ASTM International:
   1. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).
   2. ASTM D1308 – Standard Test Method for Effort of Household Chemicals on Clear and Pigmented Organic Finishes.
   3. ASTM D1653-03(2008) Standard Test Methods for Water Vapor Transmission of Organic Coating Films
   4. ASTM D7234-12 – Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
   5. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
   6. ASTM E1155 Standard Test Method for Determining FF Floor Flatness and Fl Floor Levelness Numbers
   7. ASTM F2170-09 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
   8. ASTM F3010 - 13 Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.

E. International Concrete Repair Institute (ICRI) Guideline No. 03732- Selecting and Specifying Concrete; Surface Preparation for Sealers, Coatings and Polymer Overlays.

F. EPA Method 24 VOC Content Testing.

1.04 DEFINITIONS

A. Water Vapor Emission Control Coating (Moisture Mitigation Control System): A sequence of products applied on a concrete floor to isolate moisture and high pH in the concrete from adhesive and finish floor covering.

B. Water Vapor Emission Control Barrier: Coating applied on concrete floor that acts as the primary barrier to moisture movement.

C. Underlayment: Trowelable or pourable cementititous patching/leveling compounds to which the finish floor covering is adhered. Underlayment is installed on top of the Water Vapor Emission Control Barrier.

1.05 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.
1. Include detailed installation requirements, spread rates, joint and crack treatment and final barrier surfaces for floor coverings.
2. ASTM Reports: Certified laboratory reports for specified ASTM performance.
3. Extended Warranty Certificate: Manufacturers standard 15 year warranty for manufacturing defects and on site material performance. Warranty shall not list ACI-318 compliance exclusions.
4. Pail Labels: Collect and submit each original pail label of Water Vapor Emission Control Coating installed. Copies are not acceptable. If pail labels are not removable, provide pails.

D. Quality Control Post-Testing: Tensile pull-off testing results per ASTM D7234 performed by Owner's Testing Agency prior to floor covering installation.

E. CAL-GREEN Submittals: Product Data - VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

F. Shop Drawings: Floor Plans, indicating areas of installation, sequencing, and total area of installation in square feet.

G. Manufacturer Certification: Provide letterhead documentation of complete review of concrete mix designs, admixtures, sub-slab vapor retarder installation and curing methods with written acceptance prior to installation.

H. Installer Proof of Qualification: Factory licensed, approved or certified applicator certificate signed by the manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have not less than five years experience in manufacturing floor moisture mitigation systems. The products shall be specifically formulated and marketed to reduce concrete floor moisture vapor interaction with resilient floor coverings and for pH control.

B. Installer Qualifications: Installer shall have not less than five years experience installing the selected fluid based coating systems, shall be trained by the manufacturer, experienced in surface preparation and application of the material and shall be subject to inspection and control by the manufacturer.

C. Pre-installation Testing:
   1. Document floor and building conditions are within acceptable limits of temperature, relative humidity, and concrete condition before proceeding with product application.
   2. File a pre-installation checklist with the manufacturer and receive written confirmation of approval to proceed to support manufacturer's 10-year warranty.

D. Product Performance:
   1. Manufacturer shall provide independent laboratory test reports documenting the following:
      a. Water vapor transmission by ASTM E96 (water method) or ASTM D1653 indicating a maximum 0.1 perms net for coating on concrete.
      b. Warrant no loss in moisture-resistance properties for a period of ten years of exposure to continuous water contact and pH greater than 10 after final cure.

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and moisture mitigation system application workmanship.
   1. Mockup area of at least 200 sq ft in location approved by Architect / Owner.
   2. Do not proceed with work until mockup workmanship and underlayment surface appearance are approved by manufacturer's representative and Owner's representative.
   3. Mockup bond tests: Owner's Testing Agency will perform tensile bond tests in triplicate on mockup, no sooner than 72 hours after installation is completed, according to ASTM D7234 through entire Water Vapor Emission Control Coating into concrete substrate. Comply with the following:
      a. No cohesive failure of leveling underlayment with at least 200 psi, or tensile failure in concrete substrate with no inter-layer or intra-layer failure of Water Vapor Emission Control Coating.
      b. If failure occurs, determine cause and method(s) to avoid further unacceptable work. Remove and re-apply mock-up area as required to produce acceptable work. Do not proceed with installation of Water Vapor Emission Control Coating until bond test results meet requirements above and are acceptable to Water Vapor Emission Control Coating manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the job site in their original unopened containers, clearly labeled with the manufacturer's name and brand designation.

B. Store products in an approved ventilated dry area; protect from dampness, freezing, and direct sun light. Do not store in areas with temperatures in excess of manufacturer's written instructions.

C. Handle product in a manner that will prevent breakage or leakage of containers and damage to products.

D. Use products before manufacturer's expiration dates.

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits required by moisture mitigation system manufacturer. Do not install products under environmental conditions outside manufacturer's limits.

B. Do not apply Water Vapor Emission Control Coating to unprotected surfaces or when moisture is present on the surface of the concrete.

C. Do not apply Water Vapor Emission Control Coating when air or floor temperature is lower than 50 degrees F (10 degrees C) or expected to fall below this temperature within 24 hours from time of application.

D. Install Water Vapor Emission Control Coating only when concrete floor surface temperature is a least 5 degrees Fahrenheit above the dewpoint temperature of the air over the floor. Maintain and document coated floor surface temperature at least 5 degrees Fahrenheit above air dewpoint temperature for at least 24 hours after application.

E. Provide continuous ventilation and air movement at all times during application and curing process of the moisture mitigation system.

F. Protect work to prevent damage that will affect performance and the finished underlayment surface.

1.09 WARRANTY

A. Extended Warranty: Warranty shall provide, at Owner's option, repair or replacement of the Water Vapor Emission Control Coating and flooring damaged due to failure of the Water Vapor Emission Control Coating during the warranty period. Warranty definition of damage shall include at least the following:
   1. Distress of flooring caused by moisture including but not limited to
      a. Adhesive deterioration resulting in loss of flooring bond to the floor;
      b. Formation of bubbles, mole trails, lumps, bumps, seam separation, or other significant displacement that interferes with the intended use of the flooring;
   2. Distress of the Water Vapor Emission Control Coating including but not limited to
      a. Deformation of patching/leveling compounds installed under the Water Vapor Emission Control Coating;
      b. Adhesive or cohesive failure of Water Vapor Emission Control Coating components;
      c. Distress of underlayment above the Water Vapor Emission Control Coating such as delamination, disbanding, expansion, chemical reaction, or other deformation or displacement that interferes with the intended use of the flooring.

B. Water Vapor Emission Control Coating Warranty coverage shall commence on the date of completion of flooring installation.

C. Warranty shall include the replacement of Water Vapor Emission Control Coating, flooring system, patching compounds, installation accessories flooring materials and labor costs.
   1. Warranty shall not exclude or become void due to non-conformance to ACI-318 parameters, dew-point, concrete salts, admixtures, resin and silicate surface treatments or cohesive substrate failure in the concrete surface due to normal concrete movement. Installation of Water Vapor Emission Control Coating indicates acceptance of site conditions.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Comply with product requirements of ASTM F3010: Non-corrosive, low viscosity, high gloss, microbial resistant, moisture-alkaline resistant coating to suppress, control and mechanically restrict water emission and pH level of concrete substrates for compliance with subsequent floor coverings or coating materials.

B. Coating product must contain 100% epoxy resin solids. Products based on silicate chemistry, potassium, sodium, lithium, and similar formulations, water-based acrylics, or resin formulations containing or mixed with water, are not acceptable and will be rejected.

C. Barrier Coating Requirements: It is the intent of this section and the drawings to require a complete barrier system. Any items not specifically noted but necessary for a complete barrier system shall be provided under this section.
   1. Coating shall be compatible with all types of floor covering products, no system failures due to improper installations and contain no water/alkaline soluble compounds.
   2. Coating shall have a sufficient density to reduce water vapor transmission, avoid water vapor damage to other adhered systems and resistant to most commonly encountered acids/solvents in case of topical exposure (spills).
   3. Coating shall be resistant to mold, mildew and biological growth when applied to prepared substrates

2.02 PERFORMANCE REQUIREMENTS

A. Moisture and Alkalinity: Barrier shall remain tolerant to alkalinity of 14 pH per ASTM D1308 and to 100% relative humidity per ASTM F2170.

B. Water Vapor Transmission:
   1. Manufacturer shall provide independent laboratory test reports documenting the following:
      a. Water vapor transmission by ASTM E96 (water method) or ASTM D1653 indicating a maximum 0.1 perms net for coating on concrete.
      b. Warrant no loss in moisture-resistance properties for a period of fifteen years of exposure to continuous water contact and pH greater than 8 after final cure.

2.03 WATER VAPOR EMISSION CONTROL COATING

A. Source Limitations: Provide materials approved by one Water Vapor Emission Control Coating manufacturer including moisture-resistant concrete patching and leveling compounds for use under Water Vapor Emission Control Coating, primers, coatings, sand, and underlayment leveling/patching compounds.

B. Basis of Design: VAP I 2000 Zero VOC family of products by Koster Waterproofing Systems. Subject to compliance with requirements specified in this section, provide one of the following products:
   1. VAP I 2000 Zero VOC family of products by Koster Waterproofing Systems, www.kosterusa.com.
      a. VAP I 2000 Zero VOC, twelve hour cure time to final flooring.
      b. VAP I 2000 FS (Fast Set); four hour cure time to final flooring.
      c. VAP I 2000 UFS (Ultra Fast Set); two hour cure time to final flooring.
   2. A C Tech ® 2170 FC ZERO System: by Allied Construction Technologies, Inc. www.actamerican.net, www.combimix.com..
   3. VaporTight SG3 by Aquafin, www.aquafin.net.
   4. MC ™ RAPID by Ardex, www.ardexamericas.com.
   5. Substitutions: See Section 01 6000.

C. Single Coat System: 2-component, VOC Compliant, 100% solids epoxy formulated as a vapor barrier against high moisture and alkalinity in concrete substrates. Apply at manufacturer's recommended rate, minimum average 15-mils (0.015-in.), to provide maximum 0.1 net perms (grains/hr/sq ft/in. Hg) water vapor transmission.
   1. Floor preparation in compliance with coating manufacturers written requirements and meeting warranty criteria.
   2. Manufacturer's approved bonding agent/primer

3. Moisture Mitigation System Control Coating: Apply a single coat at manufacturer's recommended and tested coverage rate, minimum average to provide maximum 0.1 net perms (grains/hr/sq ft/per 1-inch Hg) water vapor transmission.
4. Cementitious Leveling Underlayment: Manufacturer's approved.

D. Water Vapor Emission Control Coating: Epoxy resins and other chemical compounds; 100 % solids, specifically formulated chemicals and resins to provide the following properties. Coating product must contain 100% epoxy resin solids.
1. Solid Content: 100%.
2. VOC, mixed: 0 g/L.
3. Flash Point: 200° F.
4. Perm Rating, ASTM E96: Not to exceed 0.1 grains/ sq.ft. /hour in Hg.
5. ASTM E 96, Water Vapor Transmission (wet methods) Performance shall be documented by an independent testing laboratory at a minimum 97% for water vapor transmission reduction compared to untreated concrete.
6. ASTM D 1308; Insensitivity to alkaline environment up to, and including, pH 14 in a 14 day bath test.
7. Certify acceptance and exposure to continuous topical water exposure after final cure.
8. System must be able to perform as required with ASTM F2170 RH Probe readings of 100%.

E. Expansion Joint Treatment: By Coating manufacturer or approved by coating manufacturer and type recommended to suit site conditions.
1. Basis of Design for KOSTER system: KOSTER Joint Sealant FS-H.

F. Non-Moving Crack Treatment: By Coating manufacturer or approved by coating manufacturer and type recommended to suit conditions indicated.
1. Basis of Design for KOSTER system: KOSTER TA mixed with KOSTER VAP I 2000.

G. Self-Leveling Primer: By Coating manufacturer or approved by coating manufacturer and type recommended to suit site conditions.
1. Basis of Design for KOSTER system: KOSTER VAP I® 06 Primer.
2. Application: Applied over Moisture Mitigation System Coating Control System coating prior to installation of Underlayment.

H. Patching / Leveling Compounds: Formulated primarily of calcium aluminate or portland hydraulic cements, minimum compressive strength 3,000 psi at 28 days when tested in accordance with ASTM C109. Patching / Leveling compounds that rely primarily on gypsum for their cementing properties shall not be used.
1. By Coating manufacturer or approved by coating manufacturer and type recommended to suit site conditions.
2. Basis of Design for KOSTER system: KOSTER SL, Cementitious Underlayment.

I. Surface treatment for concrete contaminated with Soluble Silicates: By Coating manufacturer or approved by coating manufacturer and type recommended to suit conditions indicated.
1. Basis of Design for KOSTER system: KOSTER IB.
2. Application: Apply to contaminated concrete prior to Moisture Mitigation System Coating Control System Sealer application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Verification: Verify substrate conditions are acceptable for a warranted system.

B. Verify new concrete floors have cured minimum 28 days.

C. Verify concrete cleaned by shot blasting or other mechanical abrasion as specified in related section to an ICRI CSP-3 to CSP-4 profile and is not excessively rough for sealing at specified moisture mitigation coating application rates.
   1. Verify removal of dirt, oils, films, and other materials detrimental to sealer application.

D. Examine substrates, with Installer present, for compliance with requirements for surface contamination, damage, and other conditions affecting performance of the Work.

E. Examine substrate to determine repairs required to restore substrate surface to be within tolerances required for floor finishes specified in other sections, prior to completing Work of this section.

F. Examine substrate to verify surfaces prepared in accordance with this section will be suitable for application of finishes specified in other sections.

G. Prepare written report, endorsed by Installer, listing conditions detrimental to performance with recommendations for methods and materials required to correct conditions before proceeding with work of this section.

H. Proceed with surface preparation only after unsatisfactory conditions have been corrected.
   1. Proceeding with surface preparations indicates acceptance and of surfaces and conditions of substrate.

I. Verify items which penetrate concrete substrate to receive coating are securely installed and coating installation will not affect proper installation and warranty requirements.

J. Surfaces shall be free of water, rain, snow and frost.

3.02 PREINSTALLATION TESTING

A. Moisture and pH Testing: As specified in related Section 09 05 12.

B. Verify relative humidity testing in accordance with ASTM F2170 and alkalinity-pH testing is completed using methods specified and acceptable results obtained.

3.03 PREPARATION

A. Surface Preparation: As specified in related Section 09 05 11.

B. Protection: Mask and protect walls, equipment from adjacent work and finishes during installation process.

C. Concrete Fiber Reinforcement, if present after shot blasting, shall be burned off, scraped and vacuumed, leaving no fibers protruding from the concrete surface.

D. Cleaning: Broom-sweep and vacuum slab surfaces to remove contaminants.

E. Do not acid etch surface. Do not apply water to surface.

F. Joints and Cracks: Fill cracks, construction joints, sawcut control joints, and surface irregularities with crack repair compound.
   1. Route cracks with 4 to 6-inch diameter x 0.060-inch diamond abrasive wheel to not more than 1-1/8 to 1-1/4-inch depth. Clean by vacuum to remove dust and residue.
   2. Mix and apply crack repair compound according to manufacturer's instructions using gravity feed.
   3. Fill cracks to within 1/8-inch. of surface, add sand and apply additional crack repair compound to saturate sand and slightly overfill crack.
   4. Scrape or lightly grind flush after curing to provide a level surface for Water Vapor Emission Control Coating.

5. Fill cracks completely to stabilize against concrete movement and to provide moisture barrier.

3.04 INSTALLATION

A. Apply Water Vapor Emission Control Coating where relative humidity and alkalinity tests do not meet flooring manufacturers requirements for floor finishes:

B. Apply Water Vapor Emission Control Coating based on relative humidity and alkalinity test results in strict compliance with the manufacturer's written instructions.

C. Water Vapor Emission Control Coating System Application:
   1. Coverage rates are dependent on the surface texture and porosity of the substrate.
   2. Apply sufficient coating to achieve the manufacturer's recommended minimum film thickness using manufacturer's recommended squeegee or roller. Periodically check application rate and wet film thickness. Follow manufacturer's recommended curing times.
   3. Two-coat system: Apply sand broadcast to rejection into second coat according to manufacturer's written instructions. After curing, remove excess sand by sweeping and vacuuming.

D. Cementitious Underlayment System:
   1. Self-Leveling Cementitious Underlayment:
      a. One-coat Water Vapor Emission Control Coating without sand broadcast, apply primer to coating. Do not exceed manufacturer's recommended application rate and film thickness. Thicker primer can lead to cracking of underlayment. Allow manufacturer's specified cure time. Do not exceed manufacturer's specified open time. Mix and pour the underlayment product on the floor and disperse with the approved spreader, followed by smoothing the material with the approved smoother. Wear cleated shoes to avoid leaving marks.
      b. Do not exceed maximum application thickness specified by underlayment manufacturer. Provide a smooth, uninterrupted, level finish without bumps, clumps, depressions, or other defects that would reflect through flooring.
      c. Floor finish shall be flat to within 1/8-inch. in 10 ft, and as measured by ASTM E1155. Provide Ff of 50 and Fl of 30.
   2. Inspect and Repair defects:
      a. Inspect hardened underlayment for flatness.
      b. Lightly sand flat any bumps in the underlayment. Unhydrated or partially hydrated clumps of underlayment cement shall be removed by carefully chiseling and patching with compatible trowel-applied patching compound recommended by underlayment manufacturer. Do not penetrate the moisture mitigation coating.
      c. Fill low spots with compatible trowel-applied patching compound recommended by underlayment manufacturer. Sand smooth to remove trowel marks.

E. Allow surfaces to cure and re-apply additional coats as required to form a uniform control layer.

3.05 FIELD QUALITY CONTROL

A. Manufacturer and installer to guarantee installed Water Vapor Emission Control Coating is compatible with all specified floor coverings.

B. Post-Installation Testing: Owner's Testing Agency to perform the following testing:
   1. Tensile bond tests: Perform tensile bond tests in triplicate, at the same rate as Relative Humidity testing specified in related section, no sooner than 72 hours after installation is completed, according to ASTM D7234 through entire Water Vapor Emission Control Coating into concrete substrate. Comply with the following:

a. No cohesive failure of leveling underlayment with at least 200 psi, or tensile failure in concrete substrate with no inter-layer or intra-layer failure of Water Vapor Emission Control Coating.

2. Repair failed test locations at no cost to Owner and re-test to demonstrate compliance.

3.06 PROTECTION

A. Protect each coat from damage due to traffic, topical water and contaminants during required cure period until acceptance by related floor covering section.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, and other items indicated in Schedule and as follows:
   1. Edge strip and flashing.
   2. Counterflashings for roof accessories, roof mounted equipment, vent stacks and similar items.

B. Sealants for joints within sheet metal fabrications.

C. Foam Sealer tape for sheet metal and flashing applications.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood curbs and nailers.

B. Section 07 01 50.91 - Roofing Repair.

C. Section 07 71 00 - Roof Specialties: Copings and Preformed flashings .

D. Section 07 72 00 - Roof Accessories: Manufactured metal roof curbs.

E. Section 07 90 00 - Joint Sealers.

1.03 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

B. ASTM A792 Steel Sheet, Aluminum-Zinc Alloy-Coated, by the Hot-Dip Process

C. ASTM B32 - Standard Specification for Solder Metal.

D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric].

F. ASTM B486 Paste Solder

G. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

H. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

I. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

J. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free.

K. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

L. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code

M. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

N. FS QQ-L-201 Specification for Lead Sheet

O. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association.

P. WH Warnock Hersey International, Inc. Middleton, WI.

Q. FM Loss Prevention Data Sheet.

R. NRCA National Roofing Contractors Association - Roofing Manual.

S. Manufacturer's recommendations and specifications.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
   1. Indicate type, gauge and finish of metal.

C. Product data: Provide manufacturer's specification data sheets for each product. Demonstrate compliance with specified attributes:
   1. Submit color chart for prefinished materials.
   2. Metal material characteristics and installation recommendations.

D. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. Certification:
   1. Submit certification that metal and fastening system furnished is Tested and Approved by Factory Mutual for 1-90 Wind Up-Lift Requirements.

F. Provide approval letters from metal manufacturer for use of their metal within this particular roofing system type.

G. Proof of fabricator and installer qualifications.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements , except as otherwise indicated.
   1. Factory Mutual Approval Standard 4435.

B. Contractor's Warranty: The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be water-tight and secure for a period of five years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop, and make good any damage to other work or equipment caused by such leaks or the repairs thereof.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.

B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.02 SHEET MATERIALS

A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M) ; 0.040 inch thick; Kynar 500 finish shop pre-coated with fluoropolymer coating.
   1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
   2. Color: As selected by Architect from manufacturer's standard colors.

2.03 UTILITY WALL PENETRATION FLASHINGS

A. Prefabricated Facility Services Utility Penetration Flashings, sizes and profiles required to suit conditions.

B. Manufacturer: Quickflash Weatherproofing Products, Inc., 4129 Wagon Trail Avenue, Las Vegas, Nevada 89118. Phone (702) 614-6100. Fax (702) 614-4090. Website www.quickflashproducts.com.

C. Plumbing Flashing Panels:
   1. Materials:
      a. Panel: Combination of high-density polyethylene (HDPE) and low-density polyethylene (LDPE).
         1) HDPE, Specific Gravity, ASTM D 1505: 0.953 g/cm3.
         2) HDPE, Tensile Strength at Yield, ASTM D 638: 3,100 psi.
         3) LDPE, Specific Gravity, ASTM D 792: 0.917 g/cm3.
         4) LDPE, Tensile Strength at Yield, ASTM D 638: 1,300 psi.
      b. Weatherproof Seal: Thermoplastic elastomer.
         1) Hardness, ASTM D 2240, Shore A, 10 Seconds: 46.
         2) Specific Gravity, ASTM D 792: 1.05 g/cm3.
         3) Tensile Strength, ASTM D 412: 490 psi.

D. Electrical Flashing Panels:
   1. Material: Thermoplastic elastomer.
      a. Hardness, ASTM D 2240, Shore A, 10 Seconds: 93.
      b. Specific Gravity, ASTM D 792: 1.05 g/cm3.
      c. Tensile Strength, ASTM D 412: 1,300 psi.

2.04 ACCESSORIES

A. Reinforcement Metals:
   1. Typical: Stainless steel or extruded aluminum.
   2. For copper work: Copper or Stainless Steel.

B. Fasteners:
   1. Corrosion resistant screw fastener as recommended by metal manufacturer. Finish exposed fasteners same as flashing metal.
   2. Fastening shall conform to Factory Mutual 1-90 requirements or as stated on section details, whichever is more stringent.
   3. Screws, bolts, washers, drive-ins.

C. Underlayment: ASTM D226/D226M, organic roofing felt, Type II ("No. 30").

D. Primer: Zinc chromate type.
1. Product: Rust-Oleum 7400 System, Modified Alkyd Zinc Primer, <340 g/l VOC: www.rustoleum.com.
2. Substitutions: Section 01 25 13.

E. Protective Backing Paint: FS TT-C-494, BituminousAsphaltic mastic, ASTM D 4479 Type I.

F. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

G. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

H. Flexible Flashing: 25 mil (0.64 mm), cold applied, self-adhering membrane consisting of a 3 mil (0.07 mm) high density, cross-laminated polyethylene film coated on one side with a 22 mil (0.56 mm) layer of rubberized asphalt adhesive; W. R. Grace "Vycor Plus".

I. Sealer Tape: Medium Density Closed Cell EPDM or rubber blend tape single-coated with acrylic adhesive, for use in sheet metal and flashing applications.
1. Width and Thickness: As required for snug fit under low compression to exclude moisture.
2. Tensile Strength, ASTM D 412: 65 PSI.
3. Pres-On; P9100, www.pres-on.com.
4. 3M
5. Argent; www.argent-international.
6. Substitutions: See Section 01 60 00 - Product Requirements.

J. Sealant: Silicone, Type [recommended by flashing manufacturer or as] specified in Section 07 90 05.

K. Plastic Cement: ASTM D4586/D4586M, Type I.

L. Flux: FS O-F-506.

M. Solder: ASTM B 32; Alloy Grade 50A.

2.05 FABRICATION - GENERAL

A. Fabricate in accordance with referenced standards. Form sections true to shape, accurate in size, square, and free from distortion or defects. Form pieces as recommended by SMACNA standard for conditions required.
1. Provide reinforcements and supports as required for secure anchorage.
2. Make joints rigid. Seams mechanically strong and soldered or sealed to make watertight
3. Fabricate corners in one piece with legs extending 30-inches each way to field joint. Lap, rivet, and solder or seal corner seams watertight.
4. Turn up "end dam" flanges at ends of opening sill flashing pieces, lap with wall flashing and membranes to shed water.
5. Fabricate cleats of same material as sheet, minimum 3/4 inches wide, interlockable with sheet.
6. Hem exposed edges on underside 1/2 inch; miter and seam corners.
7. Solvent clean all sheet metal. Coat surfaces to be in contact with roofing or otherwise concealed with specified asphaltic paint; 0.015-inch minimum uniform thickness.

B. Fabricate cleats of same material as sheet, 1 gauge heavier, minimum 2 inches wide, interlocking with sheet.

C. Form pieces in longest possible lengths.

D. Machine-roll flashing elements and joinery required to be curved or radiused. Do not field bend or "walk-down". Provide true curves and joinery utilizing "Pittsburgh lock" construction, minimizing joints. Segmented fabrication is not acceptable unless specifically noted and dimensioned on drawings.

E. Hem exposed edges on underside 1/2 inch; miter and seam corners.

F. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

G. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.06 ROOF-RELATED SHEET METAL AND FLASHINGS

A. Roof-Related Sheet Metal and Flashings: As indicated, as specified in related sections, as required by roofing material manufacturers and referenced standards. Coordinate work of this section with related sections. Provide complete systems without conflict or omission.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

C. Beginning of installation means acceptance of existing conditions.

D. Field measure site conditions prior to fabricating work.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.
   1. Anchor units of work securely in place by methods indicated, providing for thermal expansion of units; conceal fasteners where possible, and set units true to line and level in locations indicated.
   2. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install work watertight, without waves, warps, buckles, fastening stress, or distortion, allowing for expansion and contraction. Conform to referenced standards. Make metal joints watertight.

C. Fastening of metal to walls and wood blocking shall comply with SMACNA Architectural Sheet Metal Manual, Factory Mutual 1-90 wind uplift specifications and/or manufacturer's recommendations whichever is of the highest standard.

D. Underlayment: Where sheet metal installation occurs on cementitious or wood substrates, install roofing felt covered with slip sheet direct to substrate, do not allow sheet metal installation directly to concrete or wood.

E. Coordinate sheet metal installation with roofing underlayment and air barrier and water-resistive barriers specified in related sections.

F.

G. All accessories or other items essential to the completeness of sheet metal installation and water tight envelope of the building, whether specifically indicated or not, shall be provided.

H. Flashing: Joints at 10-foot maximum spacing and at 2-1/2-feet from corners. Butt joints with 3/16-inch space centered over matching 8-inch long backing plate with sealer tape in laps.

I. Flanged flashings and roof accessories: Set on continuous sealer tape. Nail flanges through sealer tape and at 3-inch maximum spacing.

J. Isolate metal from dissimilar metal with 2 coats of specified asphaltic paint, sealer tape or other approved coating, specifically made to stop electrolytic action. Use only stainless steel fasteners to connect isolated dissimilar metals.

K. Joints, fastenings, reinforcements and supports: Sized and located as required to preclude distortion or displacement due to thermal expansion and contraction. Conceal fastenings wherever possible.

L. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

M. Flexible Flashing Installation: Install at closure flanges, under metal copings, caps and platforms; fully adhered, freeof voids, blisters and buckling.
   1. Prime substrates as recommended by flexible flashing manufacturer, allow to dry.
   2. Install flexible flashings in maximum feasible lengths to minimize lap joints.
   3. Peel release paper from roll to expose rubberized asphalt and position flashing to center over joint location before applying. Move along opening or joint, being careful to put flashing as evenly as possible over the opening. Avoid fishmouths.
   4. Press flashing firmly into place and roll using resilient roller with heavy hand pressure . Ensure continuous and intimate contact with substrate.
   5. If wrinkles develop, carefully cut out affected area and replace as outlined above.
   6. Minimize exposure time to that period recommended by the manufacturer.

N. Apply plastic cement compound between metal flashings and felt flashings.

O. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

P. Seal prefinished metal joints watertight.

Q. Solder other metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

3.04 OPENING FLASHING

A. Flash all wall openings as follows.
   1. Install opening flashings after completion of air barriers.
   2. Install opening flashings (pre-molded corners and flexible flashings) in accordance with flexible flashing manufacturer's recommendations.
   3. Install premolded corner flashings at opening sill corners with nails or screws over layer of flexible flashing extended over face of sheathing and sill opening.
   4. Install flexible flashing across face of wall under opening, install additional layer as sill pan with ends turned up 3 inches, coordinate with weather-resistive barrier and jamb flashings to form water-shedding laps. Direct all water flow to exterior of building.

5. Install flexible flashing at head and jamb under weather resistive barrier along opening header, coordinate to lap over sill pan described above, install flexible flashing across head of opening, extended past jamb flashings by 3 inches and secure with nails or screws to wall, fold weather resistive barrier down over head flashing and seal with tape.
6. Flanged Fixtures (Window, Door, Louver, etc.): Set flanges of Head and Jamb in beads of sealant. Do not flash over bottom nailing flange. Do not seal bottom flange.

3.05 UTILITY WALL PENETRATION FLASHING INSTALLATION

A. Select prefabricated facility services utility penetration flashing sizes and profiles required to suit conditions.

B. Install in accordance with manufacturer's recommendations, properly lapped with weather resistive barrier and related flashing and finishes to shed water to the building exterior.

3.06 FIELD QUALITY CONTROL

A. See Section 01 45 00 - Quality Control, for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

C. Tolerances
1. Exposed surfaces: Free of dents, scratches, abrasions, or other visible defects; clean, ready for painting.
2. Set flashings and sheet metal to straight, true lines with exposed faces aligned in plane as indicated.

3.07 SHOP FABRICATED SHEET METAL

A. Installer shall be responsible for determining if the sheet metal systems are in general conformance with roof manufacturer's recommendations.

B. Metal work shall be shop fabricated to configurations and forms in accordance with recognized sheet metal practices.

C. Install sheet metal to comply with Architectural Sheet Metal manual, Sheet Metal and Air Conditioning Contractor's National Associations, Inc.
1. Hem exposed edges.
2. Angle bottom edges of exposed vertical surfaces to form drip.
3. Lap all corners with adjoining pieces, fasten and set in sealant.

D. Form Joints for continuous strip flashings with a 1/4 inch opening between sections. Cover opening with a cover plate or back with an internal drainage plate formed to the profile of flashing piece. Embed cover plate in mastic, fastened through the opening between the sections and loose locked to the drip edges.

3.08 MANUFACTURED SHEET METAL SYSTEMS

A. Types specified in Section 07 71 00. Coordinate with related work for complete watertight and weatherproof assemblies.

3.09 REPAIR AND RESTORATION

A. Water Test Existing Gutters:
1. Plug existing downspouts, fill existing gutters with water by hose.
2. Allow filled gutters to rest for a period of 24 hours and observe for leaks.

3. Mark all leaking locations for repair as specified below.
4. For purposes of bidding, assume minimum one leak per thirty lineal feet of existing gutter.

B. Prepare Existing Substrate(s): Scarify metal surfaces. Remove unbonded materials, sealants, and rust.

C. Seal Leaks and Joints: Set 4 inch wide sheet metal cover plate, of same material and gauge as existing gutter, over inside of joint. Set cover plate in 4 beads of urethane sealant, two beads on each side of joint.

3.10 SCHEDULE

A. Abbreviations:
1. BUR = SBS Modified Membrane Roofing, type(s) specified in related section(s).

B. 0.040: Aluminum with Kynar 500 finish:
1. Continuous Cleats/Hook Strips
2. Securement Clips
3. BUR Counterflashings
4. BUR, PVC Sleeper Covers
5. BUR, PVC Curb Covers
6. BUR Transition Flashings
7. BUR Scuppers
8. BUR, PVC, AS, RT Gutters and Gutter Expansion Joints
9. BUR, PVC, AS, RT Downspout/Rainwater leader Inlets

C. Stainless Steel:
1. Flashing in contact with aluminum items.
2. Inlet sleeves at rainwater leaders to prevent contact with gutters of dissimilar metals.
3. Sill pans at door and window openings.

D. Zinc Flashing:
1. BUR Interior Drain Flashings, Vent Pipe and Conduit Penetrations,0.027".

E. Schedule 40 Steel Pipe:
1. Rainwater leaders, types specified in Section 05 50 00.

F. Types not otherwise scheduled: As recommended by referenced standards for application or condition indicated.

END OF SECTION

SECTION 07 71 00
ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured roof specialties, including vents and roof edge flashings, including reglets.

B. Attic Vents.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Pertinent Sections specifying Roofing and roof substrates.

C. Section 07 72 00 - Roof Accessories: Manufactured curbs, roof hatches, and snow guards.

D. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

C. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

D. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association.

E. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes, demonstrate compliance with specified attributes. Provide data on shape of components, materials and finishes, anchor types and locations.

D. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work. Include isometric details of corner and transition condition.
   1. Coping Layout Drawings: Dimension coping in maximum lengths recommended by manufacturer. Indicate butt joints or splices evenly spaced for each run of parapet wall. Balance

joints and spaces visually in each run. Dimension equal legs on mitered corner pieces (interior and exterior corners). Request Architect approval of layout in writing on shop drawing.

F. Samples: Submit two sample, 12 inch in length, illustrating component shape, finish, and color. Submit samples of factory fabricated transitions and intersections.

G. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

H. Warranty: Special warranty specified in this Section.

I. Informational Submittals:
   1. Delegated-Design Submittal: For copings and roof edge flashings indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   2. Professional Engineer Qualifications: Demonstrate compliance with specified requirements.

1.05 QUALITY ASSURANCE

A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of roof specialties that are similar to those indicated for this Project in material, design, and extent.

B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Perform work in accordance with SMACNA (ASMM) details.

D. Installer Qualifications: Company specializing in performing the work of this section on projects of similar size and scope and approved by manufacturer. WIthin 50 miles of South San Francisco, provision of not less than three roofs installed of equal size and degree of difficulty, which have been in place for a period of five years and have been performing sucessfully for that period of time.

1.06 COORDINATION

A. Coordinate installation of manufactured roof specialties with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

1.07 WARRANTY

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives sealants, fillers, primers and coatings. Comply with limits specified in related section.

B. General: Manufacture and install manufactured roof specialties to resist thermally induced movement and exposure to weather without failing, rattling, leaking, or fastener disengagement.

C. Edge Securement: Comply with CBC 1504.5 "Edge Securement for Low-Slope Roofs". Provide products tested for wind resistance in accordance with ANSI/SPRI ES-1, as required by the California Building Code, Chapter 15.

D. Thermal Movements: Provide manufactured roof specialties that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Water Infiltration: Provide manufactured roof specialties that do not allow water infiltration to building interior.

2.02 COMPONENTS

A. Counterflashings and Reglets:
   1. Counterflashings: Manufactured units in lengths not exceeding 12 feet (3.6 m) designed to snap into reglets and compress against base flashings with joints lapped, from the following exposed metal in thickness indicated:
      a. Aluminum: 0.040 inch thick.
   2. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated with factory-mitered and -welded corners and junctions. Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashings indicated, from the following exposed metal in thickness indicated:
      a. Aluminum: 0.040 inch thick.
      b. For concrete application with temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
   3. Accessories:
      a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
      b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
   4. Products:
      a. Cheney Flashing Company, Inc.: www.cheneyflashing.com.
      b. Fry Reglet Corporation: www.fryreglet.com.
      c. Hickman, W. P. Company: www.wph.com.
      d. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

B. Attic vents: Dome type gravity ventilators, heavy gauge spun aluminum, formed edge, removable covers, windband, birdscreen and internal members combined for rigid support, one-piece curb mounting. Curb cap or flashing flange as recommended by manufacturer to suit application.
   1. Sizes as shown on Drawings, if no size is shown, provide 24 inch x 24 inch minimum.
   2. Finish: Mill.
   3. Product:
      a. Greenheck Corp.; Model GRS: www.greenheck.com.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

A. Fasteners, separators, sealants, and other miscellaneous items as recommended by required to complete manufactured roof specialty systems.

B. Sealants: Silicone types as specified in Section 07 90 00.

C. Roof Cement and related materials as required for installation with products specified in related sections.

2.04 FINISHES

A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

A. Anchor manufactured roof specialties securely in place and capable of resisting forces specified in performance requirements. Use fasteners, separators, sealants, and other miscellaneous items as required to complete manufactured roof specialty systems.
   1. Install manufactured roof specialties with provisions for thermal and structural movement.
   2. Torch cutting of manufactured roof specialties is not permitted.

B. Install components in accordance with manufacturer's instructions.

C. Conform to SMACNA (ASMM) drawing details as noted:

D. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
   1. Coat concealed side of manufactured roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing exposed-to-view components of manufactured roof specialties directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.

E. Coordinate installation of components of this section with installation of roofing membrane and base flashings.

F. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

G. Install manufactured roof specialties level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil-canning, buckling, or tool marks.

H. Install manufactured roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.

I. Coordinate installation of flashing flanges into reglets .

J. Align work plumb and level , flush with adjacent surfaces.

K. Rigidly anchor to substrate to prevent misalignment.

3.03 COUNTERFLASHING AND REGLET INSTALLATION

A. Counterflashings: Coordinate installation of counterflashings with installation of base flashings. Insert counterflashings in reglets or receivers and fit tightly to base flashings. Extend counterflashings 4 inches over base flashings. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.

3.04 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films as manufactured roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

B. Replace manufactured roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured curbs, equipment rails, and pedestals.

B. Rooftop support devices for pipes, conduits and ducts.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 06 10 00 - Rough Carpentry: Wood curbs at deck penetrations.

C. Pertinent Sections specifying Roofing and roof substrates.

D. Section 07 62 00 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.

E. Section 07 71 00 - Roof Specialties: Other manufactured roof items.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

E. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

F. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

1.04 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

D. CAL-GREEN Submittals: Product Data - VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. Shop Drawings: Submit detailed layout developed for this project. Show dimensioned location and number for each type of roof accessory.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

1.06 WARRANTY

A. Provide Manufacturer's full system material warranty necessary to cover all cost of repairs and/or replacement of all components of the system against defects in manufacturing for the same period and duration as specified in Division 7 roofing warranty. Warranty will not include Acts of God, vandalism, neglect, or improper spacing or installation of equipment.

1.07 PROJECT CONDITIONS

A. Verify that other trades with related work are complete before installing roof accessories. Coordinate installation with roof membrane and roof insulation manufacturer's instructions.

B. Mounting surfaces shall be straight and secure; substrates shall be of proper width.

C. Coordinate layout and installation of roof accessories with interfacing and adjoining construction to provide a leak-proof, weather-tight, secure, and non-corrosive installation.
   1. With Architect's written approval, adjust location of roof accessories that would interrupt roof drainage routes.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives sealants, fillers, primers and coatings. Comply with limits specified in related section.

B. NO WOOD SLEEPERS will be allowed. Pipe supports in this Section shall be used where ever wood blocking/sleepers are indicated or where piping supports are required by code.

2.02 MANUFACTURED CURBS

A. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies:

B. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies: Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.
   1. Sheet Metal: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33 ; G60 coating designation; 18 gage, 0.048 inch thick.
   2. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing insulation; 1:1 slope; minimum cant height 4 inches.
   3. Manufacture curb bottom and mounting flanges for installation directly on roof deck, not on insulation; match slope and configuration of roof deck.
   4. Provide the layouts and configurations shown on the drawings.

C. Curbs Adjacent to Roof Openings: Provide curb on all sides of opening, with top of curb horizontal for equipment mounting.
   1. Provide preservative treated wood nailers along top of curb.
   2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
   3. Height Above Finished Roof Surface: 6 inches, minimum.

4. Height Above Roof Deck: 14 inches, minimum.

D. Equipment Rails: Two-sided curbs in straight lengths, with top horizontal for equipment mounting.
   1. Provide preservative treated wood nailers along top of rails.
   2. Height Above Finished Roof Surface: 6 inches, minimum.
   3. Height Above Roof Deck: 14 inches, minimum.

2.03 NON-PENETRATING ROOFTOP ASSEMBLIES

A. Manufacturers - Non-Penetrating Rooftop Assemblies:
   1. RoofTop Accessories: www.keycurb.com.
   2. PHP Systems/Design : www.phpsd.com.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Non-Penetrating Rooftop Assemblies: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly.
   1. Design Loadings and Configurations: As required by applicable codes.
   2. Height: Provide minimum clearance of 12 inches under supported items to top of roofing.
   3. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
   4. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
   5. Resilient Components: Molded 100 percent recycled rubber or HDPE plastic.
   6. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.
   7. Rollers: Non Binding Heavy Duty Plastic.

C. Pipe Supports: Provide resilient base pipe curb attachment fixtures complying with MSS SP-58 and as indicated. If no supports are shown, provide types necessary to support items indicated, in compliance with referenced standard, to suit conditions shown.
   1. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
   2. Provide vibration isolation and cushioning with minimum shock transmission to the substrate, allowing free movement, free of pipe tension or binding.
   3. See relevant piping system specification section for additional requirements.

D. Conduit and Cable Tray Supports:
   1. Type: KeyCurb Strut, Model (KS) Curb with a framing channel for strut clamps .
   2. Type: KeyCurb Strut Adjustable, Model (KSA) Curb with a framing channel and adjustable threaded rods for strut clamps.

E. Non-Penetrating Pedestals: Steel pedestals with square, round, or rectangular bases.
   1. Bases: High density polypropylene or recycled rubber.
   2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
   3. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
   4. Resilient Components: Molded 100 percent recycled rubber or HDPE plastic.

2.04 ACCESSORIES

A. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.

1. Where removing exterior exposed fasteners affords access to building, provide nonremovable fastener heads.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.

B. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.

C. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roofing or roof flashing (as counter-flashing). Seal overlap with thick bead of mastic sealant approved for application by roof manufacturer.

D. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.

3.04 PIPE SUPPORTS

A. Provide support for pipe routing as laid out in field.

B. Set bases and support framing in locations specified or as required by site conditions but not to exceed 10'-0" spacing. Apply slip sheet or pad if required by roofing manufacturer.

C. Adjust all frame structures to required height and weight, assemble framing, supports, and hangers to configuration indicated.

D. Adjust each required hanger, roller or clamp to its desired height, check each support for equal weight dispersal.

3.05 CLEANING

A. Clean installed work to like-new condition.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Self-leveling pourable joint sealants.

B. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 41 00 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

B. Pertinent Sections specifying sealants or referencing this Section for sealant products and execution requirements.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.

B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants.

E. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness.

F. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

G. Manufacturer's recommendations and specifications.

H. SWRI (VAL) - SWR Institute Validated Products Directory.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Substrates for which laboratory adhesion and/or compatibility testing is required.
   7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   8. Sample product warranty.
   9. Certification by manufacturer indicating that product complies with specification requirements.
   10. SWRI Validation: Provide currently available sealant product validations as listed by SWRI (VAL) for specified sealants.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
   1. Manufacturer's Installation Instructions: Indicate limitations, special procedures, surface preparation, and perimeter conditions requiring special attention.
   2. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

D. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant colors (multiple colors will be required).

E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

G. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

H. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation as specified in Section 01 41 00.

I. Manufacturer Qualifications. Demonstrate compliance with specified requirements.

J. Installer Qualifications. Demonstrate compliance with specified requirements.

K. Installation Plan: Submit at least four weeks prior to start of installation.

L. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

M. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

N. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

O. Installation Log: Submit filled out log for each length or instance of sealant installed.

P. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience .

C. Manufacturer of sealant and caulking material to certify that cleaners, joint filler or bond breakers, and primers, for a particular application, are compatible with sealant.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 01 60 00.

B. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

C. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.07 FIELD CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
   2. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

D. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.09 WARRANTY

A. See Section 01 77 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Performance Requirements:
   1. Building envelope:
      a. Make watertight and weathertight without causing staining or deterioration of joint substrates.
      b. Exterior work that does not remain watertight and all work which does not retain all properties inherent in the product as stipulated by the manufacturer will be considered faulty.

B. Building Exterior and Interior:
   1. Seal the following joints with joint sealer:
      a. Expansion and control joints in exterior walls, copings, parapets.

b. Expansion and control joints in interior concrete slab floors.
c. Joints between metal panels.
d. Joints between door and window frames and adjacent materials.
e. Joints between cabinets and countertops and walls.
f. Control joints in interior partitions, including portion above ceilings.
g. Expansion and control joints in solid exterior soffits.
h. Control joints in interior ceilings and soffits.

2. Apply continuous bead of joint sealer in the following locations during installation of materials specified elsewhere:
   a. In lap joints of sheet metal construction.
   b. Roofing panels and roof-related sheet metal and flashing.
   c. Between partition floor and ceiling tracks and adjacent construction.
   d. Between end stud of partition and adjacent construction.
   e. Under door sills.
3. Acoustic Sealants at acoustic separations shall make assembly airtight.
   a. Seal perimeter and intersections of finish.
   b. Seal around electrical boxes and other penetrations of finish; seal holes within electrical boxes; seal conduit ends.
   c. Seal pipes which penetrate acoustic separations.
4. Joints not specifically mentioned above which require sealants to meet the performance criteria cited in this section.

2.02 MATERIALS

A. Sealants and Primers - General: Provide products having volatile organic compound (VOC) content as specified in Section 01 41 00.

B. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

F. Colors: Provide color of exposed joint sealants to comply with the following:
   1. Provide colors matching selections made by Architect from manufacturer's full range of colors for products of type indicated. Colors may be listed in schedule at the end of this section or on the drawings. Request color selection for all products listed without a preselected color.

2.03 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Wall expansion and control joints.

b. Joints between door, window, and other frames and adjacent construction.
c. Joints between different exposed materials.
d. Openings below ledge angles in masonry.
e. Other joints indicated below.

2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
   a. Joints between door, window, and other frames and adjacent construction.
   b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
   c. Other joints indicated below.
3. Do not seal the following types of joints.
   a. Intentional weepholes in masonry.
   b. Intentional weepholes in window assemblies and head flashings.
   c. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
   d. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
   e. Joints where installation of sealant is specified in another section.
   f. Joints between suspended panel ceilings/grid and walls.

B. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.04 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 61 16.

B. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 41 00.

C. Colors: As indicated on the drawings. If no colors are indicated, request colors before preparation of schedule submittals and include on all schedule submittals.

2.05 SELF-LEVELING SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Color at colored concrete: Custom-mixed colors matching colored concrete floors or paving.
   5. Service Temperature Range: Minus 40 to 180 degrees F.
   6. Manufacturers:
      a. BASF Construction Chemicals-Building Systems ; Sonneborn SL-2 Slope Grade or Self Leveling Sealant: www.buildingsystems.basf.com.
      b. Sika Corporation ; Sikaflex-2c SL: www.usa-sika.com.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

B. Concrete Paving Joint Sealant: Polyurethane, pourable self-leveling; ASTM C920, Class 25, Uses T, I, M and A; multi- component.
   1. Color: Custom mixed color matching colored concrete.
   2. Products:

a. BASF Construction Chemicals-Building Systems ; Sonneborn SL-2: www.buildingsystems.basf.com.
b. Pecora Corporation ; Dyna-Trol II-SG: www.pecora.com.
c. Sika Corporation, Construction Products Division; Sikaflex 2C-SL.
d. Substitutions: See Section 01 60 00 - Product Requirements.

C. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Meet requirements of American Concrete Institute 302.1 R-04 "Guide for Concrete Floor and Slab Construction" and American Concrete Institute 360 R10 "Guide to Design of Slabs-on-Ground" for industrial floor joint fillers
2. Composition: Multi-component, 100 percent solids by weight.
3. Hardness: Minimum of 85 (Shore A) or 35 (Shore D), when tested in accordance with ASTM D2240 after 7 days.
4. Color: To be selected by Architect from manufacturer's standard colors.
5. Joint Width, Minimum: 1/8 inch.
6. Joint Width, Maximum: 1/4 inch.
7. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
8. Manufacturers:
a. Euco 700 by The Euclid Chemical Company.
b. MM-80 by Metzger-McGuire.
c. W.R. Meadows, Inc ; Rezi-Weld Flex: www.wrmeadows.com/sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.

2.06 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer , except where specific dimensions are indicated.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

I. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
   1. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
   2. Provide concave joint configuration per Figure 8A in ASTM C 1193, unless otherwise indicated.
   3. Provide flush joint configuration, per Figure 8B in ASTM C 1193, where indicated.
   4. Provide recessed joint configuration, per Figure 8C in ASTM C 1193, of recess depth and at locations indicated.
      a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

J. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.

C. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet, notify Architect immediately.

D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

E. Repair destructive test location damage immediately after evaluation and recording of results.

3.05 FINISHING

A. Work that is exposed to view: Uniform surface with neat, straight edges and no excess material on adjacent surface.

3.06 CLEANING

A. Clean adjacent soiled surfaces.

3.07 PROTECTION

A. Protect sealants until cured. Replace damaged work with repairs indistinguishable from original work.

3.08 SCHEDULE

A. Architect will provide color selections and locations for each sealant type and for Contractor's use. Not all locations will have the same color.

B. Exterior Locations:
   1. Joints which are bordered by glass: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
   2. Joints which are bordered by plastic: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
   3. Horizontal joints in sidewalks, decks, concrete floors, and driveways: Exterior or Interior Horizontal Expansion Joint Sealant - Polyurethane, self-leveling; ASTM C 920, Grade P, Class 25, Uses T, M and A;single component.
      a. At walk expansion joints.
      b. Where walks abut structural slabs or stoops.
      c. Where walks abut exterior wall of buildings.
      d. Where exposed interior concrete slabs abut vertical surfaces.
      e. Where sealant is shown on the Drawings for concrete slabs.
   4. Locations requiring adhesion to low energy surfaces common in sheet or peel-and-stick flexible flashings and air/weather barriers: ASTM C920, Type S, Grade NS, Class 25, single component, neutral curing, non-sagging, non-staining, non-bleeding, RTV silicone.
   5. Membrane Roofing Sealants: Types recommended by roofing manufacturer and complying with requirements of this section.
   6. Steep Slope Roofing Sealants: Types recommended by roofing manufacturer and complying with requirements of this section.
   7. Sheet Metal and Roof Accessory Sealants: Types recommended by roofing manufacturer and complying with requirements of this section.
   8. All other exterior joints including around perimeters of frames where door, window and louver frames abut concrete, masonry or other building materials (interior and exterior), Sills and thresholds, and at miscellaneous locations where sealant is shown on Drawings, exterior joints where no other sealant is indicated:
      a. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT, M, A and O; capable of 50% extension and compression movement.
      b. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

9. Masonry at dissimilar material or at dissimilar masonry and Expansion and control joints in masonry walls (interior and exterior)
   a. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT..
10. Exterior Sheet Metal Lap Joints: Types recommended by manufacturer and complying with requirements of this section.

C. Interior Locations:
   1. Expansion and control joints, around perimeters of frames where door, window and louver frames abut concrete, masonry or other building materials, sills and thresholds, and at miscellaneous locations where sealant is shown on Drawings:
      a. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT, M, A and O; capable of 50% extension and compression movement.
      b. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
   2. Interior Concrete Slabs on Grade:
      a. General Locations: Exterior or Interior Horizontal Expansion Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Grade P, Class 25, Uses T, M and A; single component.
   3. Interior wet areas, around plumbing fixtures, countertops abutting walls, food service applications: Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT, A and O.
   4. Interior static dry joints as required to dress appearance, Other interior joints for which no other type of sealant is indicated.: Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
   5. Where required for sound control: Acoustical Sealant, ASTM C-834.
   6. Where required for sound control with limited flame spread: Acoustical Sealant, ASTM C-834, fire-rated type.

D. General:
   1. Joints in construction between interior and exterior spaces and other designated or required locations to provide effective barrier against passage of elements, Other joints for which no other type of sealant is indicated.:
      a. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT, M, A and O; capable of 50% extension and compression movement.
      b. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
   2. Specialty perimeters where required for appearance or weathertightness:
      a. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT, M, A and O; capable of 50% extension and compression movement.
      b. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

3.09 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at the low temperature in the thermal cycle. Report failures immediately and repair.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall and ceiling access door and frame units.

B. Access door and frame units, non-fire-rated, in wall and ceiling locations wherever required for access to enclosed spaces or equipment.

1.02 RELATED REQUIREMENTS

A. Section 09 91 13 - Exterior Painting: Field paint finish.

B. Section 09 91 23 - Interior Painting: Field paint finish.

C. Division 23 - Mechanical: Mechanical and plumbing components requiring access.

D. Division 26 - Electrical: Electrical components requiring access.

1.03 REFERENCE STANDARDS

A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

C. ITS (DIR) - Directory of Listed Products.

D. Manufacturer's recommendations and specifications.

E. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc..

1.04 DESIGN REQUIREMENTS

A. Design Requirements: Provide door seals for access doors located in sound isolating walls or ceilings.

B. Performance Requirements: Provide door covered access into all attic spaces and at all portions of the work to which access is necessary for periodic inspection, adjustments, or maintenance, and which is enclosed behind finish materials, including, but not limited to, valves, water hammer arrestors, mechanical units, electrical panels and outlets, equipment and systems.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Schedule: Tabular listing of access doors and panels, indicating location, size, materials, fire rating, device or purpose for access.

C. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

D. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. Shop Drawings: Indicate exact position of each access door and/or panel unit.

F. Manufacturer's Installation Instructions: Indicate installation requirements for fire rated units.

G. Project Record Documents: Record actual locations of each access unit.

1.06 REGULATORY REQUIREMENTS

A. Conform to Title 24, Part 2, California Building Code for fire rated access doors.
   1. Provide access doors of fire rating equivalent to the fire rated assembly in which they are to be installed.

B. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.

1.07 PROJECT CONDITIONS

A. Coordinate the work with other work requiring access doors.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.02 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units:
   1. Material: Steel.
   2. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
   3. Interior Locations: Tool-operated spring or cam lock; no handle.
   4. Exterior Locations: Key operated lock; no handle.
   5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.

B. Walls in Wet Areas, including Rest Rooms:
   1. Material: Stainless steel, Type 304.
   2. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
   3. Key operated lock; no handle.
   4. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.

C. Ceiling-Mounted Units:
   1. Material: Steel.
   2. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
   3. Exterior Locations: Key operated lock; no handle.
   4. Interior Locations: Tool-operated spring or cam lock; no handle.

2.03 WALL & CEILING-MOUNTED UNITS

A. Manufacturers:
   1. JL. Industries, www.activarcpg.com/jl-industries.
   2. Karp Associates, Inc : www.karpinc.com.
   3. Milcor by Commercial Products Group of Hart & Cooley, Inc : www.milcorinc.com.
   4. Williams Brothers Corporation of America : www.wbdoors.com.
   5. Nystrom, Inc ; _____: www.nystrom.com.
   6. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESS DOOR UNITS - WALLS AND CEILINGS

A. Door sizes: Unless otherwise specifically noted on drawings; smallest standard size which will permit ready access and removal of working parts requiring maintenance.

B. Door and Frame Units: Formed steel and stainless steel where noted.
   1. Door panels: 0.070 inch single thickness steel sheet.
   2. Hardware:
      a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
      b. Hinge: 175 degree stainless steel piano hinge with pin.
      c. Interior Locations: Latch/Lock: Screw driver slot for quarter turn cam latch.
      d. Exterior Locations and Rest Rooms: Latch/Lock: Cylinder lock operated cam latch, two keys for each unit.
   3. Stainless steel finish at exterior or wet locations.

2.05 FABRICATION

A. Weld, fill, and grind joints to ensure flush and square unit.

2.06 FINISHES

A. General: Provide doors and/or panels of the following finishes as scheduled.
   1. Galvanized, hot dipped finish.
   2. Prime coat with alkyd primer.
   3. Stainless Steel Finish: No. 4 finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Investigate conditions requiring access, select panels of suitable type and configuration for conditions indicated.

B. For conditions requiring access and for which panels or doors are not otherwise shown, recommend panel or door type and size for Architect's review.

C. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to the concealed work requiring access. Avoid conflict with other building elements.

3.03 SCHEDULE

A. Exterior Doors and Panels: Galvanized for site finishing specified in related section.

B. Interior Doors and Panels in Restrooms and in ceramic tile surfaced walls wherever located: Stainless steel construction, No. 4 finish.

C. Interior Doors and Panels in all other locations: Primed for site finishing specified in related section.

END OF SECTION

SECTION 08 43 13
ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Perimeter sealant.

C. Section also includes Contractor's responsibility to assume role of "Responsible Party" for NFRC label testing and inspection "Certified Project Option", to obtain Fenestration Acceptance Requirements certification required for occupancy permit. Refer to California Energy Code Section 110.6.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Rough openings.

B. Section 07 25 00 - WEATHER BARRIERS: Sealing framing to weather barrier installed on adjacent construction.

C. Section 07 90 00 - Joint Sealers: Perimeter sealant and back-up materials.

D. Section 08 5113 - Aluminum Windows: Operable windows within storefront assembly.

E. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site.

C. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage.

D. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.

E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

F. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

G. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

H. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

I. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

J. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric].

M. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

N. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

O. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

P. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

Q. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green", current edition.

R. California Energy Code "Building Energy Efficiency Standards", 2016.

S. California Energy Code "Reference Nonresidential Appendix NA7", 2016.

T. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments, current edition.

U. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic").

V. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting two weeks before starting work of this section; require attendance by all affected installers.
   1. Meet at Project site with Installer, installer of each component of associated work, installers of substrate construction to receive this work, installers of other work that must precede or follow storefront work (including mechanical work if any), Architect/Owner, storefront system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, test agencies, and governing authorities. Objectives to include:
      a. Review preparation and installation procedures and coordinating and scheduling required with related work.
      b. Review methods and procedures related to storefront and glazing work.
      c. Review structural loading limitations of new storefront.
      d. Review storefront systems requirements (drawings, specifications, and other contract documents).
      e. Review required submittals, both completed and yet to be completed, including deferred approvals, if any.
      f. Review and finalize construction schedule related to storefront work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      g. Review required inspection, testing, certifying, and material usage accounting procedures.
      h. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including provision of temporary enclosure of partially completed or occupied spaces.

i. Record discussion of conference, including decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
j. Review notification procedures for weather or non-working days.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Provide submittals coordinated with submittals for related sections referenced in this Section for simultaneous review.

C. Division of the State Architect Deferred Approval Submittal Requirements:
1. This section specifies work that is a Division of the State Architect (DSA) deferred approval item. All Engineering calculations and Shop Drawings require review and approval by the Division of the State Architect prior to fabrication or installation. Deferred Approval review provisions of Section 01 33 00 apply to the submittals of this section.
2. Submit items for deferred approval complete with all structural calculations, test data and information as specified or as subsequently required by the reviewing agency, including engineering stamps and signatures as required. Architect shall submit to DSA only following Architect/Engineer review.
   a. The Architect will not approve deferred approval submittals until they are approved by DSA.
3. No work or fabrication shall begin until DSA approved submittals are distributed to the Contractor.
4. Contractor is notified that significant lead time is required for deferred approval review by DSA and shall schedule submittals accordingly. No extension of Contract Time will be allowed for delays incurred by deferred approval review.
   a. The Architect is not responsible for DSA delays in deferred approval review.
5. Submit Certification of Compliance and all other documentation as required by Division of the State Architect.
6. Make all changes and revisions required by Division of State Architect to obtain approval at no additional costs or extension of time.

D. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details .

E. VOC Submittals:
1. Product Data - VOC Limits: For adhesives sealants, fillers and primers, documentation including printed statement of VOC contents, demonstrate compliance with limits specified in Section 01 41 00.

F. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
1. Shop drawings shall include project-specific integrations to surrounding cladding and waterproofing components, including items specified in other sections.
2. Provide installation instructions and isometric details indicating how system components will be installed and sealed watertight.

G. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

H. Deferred Approval - Structural Calculations: Substantiating system performance, structural capacity, anchorages and fasteners sizes and spacings per specified criteria, stamped and signed by Professional

Structural Engineer experienced in design of this Work and licensed in California. Provide minimum of two copies with original stamps and signature.

I. Samples: Submit two samples 12x12 inches in size illustrating finished aluminum surface, glass, glazing materials.

J. Operable Window Sample: Provide working window with specified glazing and all specified hardware for review and approval prior to any installation

K. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

L. Report of field testing for water leakage.

M. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 INFORMATIONAL SUBMITTALS

A. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, substantiating system performance, structural capacity, anchorages and fasteners sizes and spacings per specified criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
   1. Detail fabrication and assembly of aluminum-framed systems.
   2. Include design calculations.
   3. Assume role of "Responsible Party" for NFRC label testing and inspection "Certified Project Option". Make all arrangements necessary to perform required testing of site-built assembly and obtain NFRC label as described in NFRC 100.5.6.

B. Qualification Data: For qualified Installer and testing agency.

C. Certificate of Acceptance: Refer to California Energy Code Section 110.6.
   1. Submit Certificate of Acceptance certifying that the fenestration product meets the required acceptance requirements, completed, signed and submitted to the enforcement agency, with copies to Owner and Architect.

D. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

E. Welding certificates.

F. Preconstruction Test Reports: For sealant.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements. For each system provide test reports with shop drawings

H. Source quality-control reports.
   1. Field quality-control reports.

I. NFRC 100 Label Certificate: Submit proof of testing of site-built assembly and compliance with NFRC 100. Manufacturer certificates or factory tests are not acceptable for this requirement.

J. Warranties: Sample of special warranties.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

B. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

C. NFRC Compliance: Completed site-built assembly shall conform to NFRC 100 requirements and be tested and labeled in accordance with that standard.

D. Testing Agency Qualifications: AAMA certified and qualified according to ASTM E 699 for testing indicated.

E. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
   1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

1.08 MOCKUPS

A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of one full width of classroom enclosure. Include adjacent wall construction with cladding, air barriers and related components. Demonstrate sequencing and integration of opening flashings, perimeter seals and air barrier continuity.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.10 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating glazed aluminum curtain-wall systems correspond to established dimensions.

C. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY

A. See Section 01 77 00 - Contract Closeout, for additional warranty requirements.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Deterioration of metals and other materials beyond normal weathering.
      d. Adhesive or cohesive sealant failures.
      e. Water leakage through fixed glazing and framing areas.
      f. Failure of operating components.

C. Manufacture and installation warranty to correct defective Work within a [ten] year period after Date of Substantial Completion. Defective work includes occurance of any water leakage.

D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 DESIGN REQUIREMENTS

A. VOC Limits for adhesives sealants, fillers, coatings and primers. Comply with limits established by State of California and all jurisdictions of applicable authority.

B. Assume role of "Responsible Party" for NFRC label testing and inspection "Certified Project Option". Make all arrangements necessary to perform required testing of site-built assembly and obtain NFRC label as described in NFRC 100.5.6. Contractor is responsible to obtain, including payment of all required fees, a label certificate for the site built fenestration system meeting requirements of California Energy Code 2016 Section 10-111(a)2 as described in California Energy Code Section 110.6.

C. Thermally Broken: All components, to be thermally broken with continuous resilient elastomeric extrusions.

D. Weather Resistance:
   1. Design shall provide waterproofing and an air-vapor retarder that is continuous at all penetrations, transitions, and other conditions. System shall integrate with the building's waterproofing and air-vapor-retarder system to provide a weathertight transition. System shall not allow the movement of the interior or exterior air to flow vertically within the assembly. Methods employed to prevent internal air movement shall not restrict water flow channels or prevent thermal movement of the frames.
   2. Water penetration into the system is acceptable only if all of the following conditions are satisfied; any other water penetration is considered water leakage and is unacceptable:
      a. Water is immediately contained and drained to the exterior.
      b. There is no wetting of a surface that could be damaged by moisture or that would be visible to building occupants.
      c. There would be no staining or other damage to completed building or its furnishings.
      d. This definition of water leakage governs over the other definitions that may appear in referenced documents.
   3. Provide internal gutters and weep systems to collect and drain water leakage and condensation to the exterior at the sill of each opening. Glazing assemblies shall have on isolated gutter cavity at each glass perimeter so the leakage is confined to and wept from the opening of origin. Glazing

assemblies shall have continuous spliced gutters at mullions splices, with sealed and caps at termination conditions. Systems shall not direct water to contact edges of insulating glass units. Prevent water infiltration at weeps. Coordinate gutter and weep systems with other sections.

E. Sound Transmission Class (STC): Rated for not less than 30 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
   1. Locations per Drawings, coordinate with Section 08 80 00 for IGU selection, values as scheduled or as shown on Drawings:

2.02 MANUFACTURERS

A. Aluminum-Framed Storefront and Doors:
   1. EFCO Corporation : www.efcocorp.com/sle.
   2. Kawneer North America; Trifab VG 451T: www.kawneer.com.
   3. Oldcastle Building Envelope; Series 3000 Thermal MultiPlane: www.oldcastlebe.com.
   4. Wausau Window and Wall Systems : www.wausauwindow.com.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Position: Center-Set.
   2. Water Leakage Test Pressure Differential: 10 lbf/sq ft.
   3. Air Infiltration Test Pressure Differential: 6.24 psf.
   4. Finish: Class II natural anodized.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
   5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
   9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
   10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   11. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.

B. Performance Requirements:
   1. Structural Loads:
      a. Wind Loads: As indicated on the Drawings.
      b. Seismic Loads: As indicated on the Drawings.
      c. Other Design Loads: As indicated on Drawings.

2. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
   a. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
3. Water Penetration Resistance: No uncontrolled water as described in paragraph "Weather Resistance" above, when tested in accordance with ASTM E331 at pressure differential of 12 lbf/sq ft.
4. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.
5. Thermally Broken: All components, including doors, to be thermally broken with continuous resilient elastomeric extrusions.
6. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
7. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at specified differential pressure across assembly in accordance with ASTM E283.
8. Failure defined to include any of the following:
   a. Deflection exceeding specified limits.
   b. Water penetration, including condensation, in excess of that specified in this section.
   c. Thermal stresses transferring to building structure.
   d. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
   e. Noise or vibration created by wind and by thermal and structural movements.
   f. Loosening or weakening of fasteners, attachments, and other components.
   g. Sealant failure.
   h. Failure of operating units.

2.04 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections , drainage holes and internal weep drainage system.
   1. Glazing Stops: Flush.
   2. Cross-Section: As indicated on drawings.

2.05 GLAZING

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

2.06 VENTING WINDOWS

A. Aluminum Windows: Manufacturer's standard units, complying with AAMA/WDMA/CSA 101/I.S.2/A440, with self-flashing mounting fins, and as follows:
   1. AA 900 ISO WEB. Compatible with storefront perimeter frame.
   2. Window Type: As indicated on Drawings.
   3. Minimum Performance Class: Match criteria specified for Storefront, and of same storefront manufacturer.

4. Minimum Performance Grade: Match criteria specified for Storefront, and of same storefront manufacturer
5. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 0.125-inch (3.175-mm) thickness at any location for main frame and sash members.
   a. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
6. Mullions: Between adjacent windows where occuring, fabricated of extruded aluminum matching finish of window units.
7. Fasteners, Anchors, and Clips: Nonmagnetic stainless steel, aluminum, or other noncorrosive material, compatible with aluminum window members, trim, hardware, anchors, and other components of window units. Fasteners shall not be exposed, except for attaching hardware.
   a. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.128 inch (3.26 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, spline grommet nuts.
8. Hardware: Manufacturer's standard; of stainless steel, or bronze; including the following:
   a. Cam-action sweep sash lock and keeper at meeting rails.
   b. Pole-operated, cam-action locking device on meeting rail where rail is more than 72 inches (1830 mm) above floor.
   c. Operator Pole: Provide one pole for each room having window operators more than 72 inches (1830 mm) above floor.
   d. Steel or bronze operating arms.
   e. Concealed lock operable with hex key at locations indicated in drawings to be lockable.
9. Weather Stripping: Woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric; complying with AAMA 701/702.

2.07 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M). 6063 alloy, T5 temper.

B. Fasteners: Stainless steel.

C. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.
   1. Break shapes as indicated, as recommended by manufacturer, and as required to fully enclosed and seal system.

D. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.

E. Sealant for Setting Thresholds: Non-curing butyl type.

F. Concealed Flashings: 0.018 inch thick stainless steel, dead soft, as selected by manufacturer for compatibility with other components.

G. Perimeter Sealant: Silicone, as specified in Section 07 92 00.

H. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

I. Glazing Accessories: As specified in Section 08 80 00.

J. Shop and Touch-Up Primer for Steel Components: SSPC-Paint 25, zinc oxide, alkyd, linseed oil primer.

K. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

L. Protective Backing Paint: Bituminous type, emulsified asphalt, ASTM D1187.

2.08 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride (PVDF) system.

B. Color: As selected by Architect from manufacturer's standard range.

C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.09 FABRICATION

A. General: Fabricate aluminum entrance and storefront components to designs, sizes and thickness indicated, and to comply with specified standards. Sizes and profile requirements are indicated on the drawings.

B. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site. Disassemble components only where necessary for shipment and installation.
   1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.
   2. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
   4. Physical and thermal isolation of glazing from framing members.
   5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
   7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members. Fabricate curved members to true shapes as shown on drawings, segmented or faceted curves are not acceptable.Fabricate components with minimum clearances and shim spacing around perimeter of assembly, while enabling installation and dynamic movement of perimeter seal.

E. Accurately fit and secure joints and corners. Make joints flush, hairline , and weatherproof.

F. Prepare components to receive anchor devices. Fabricate anchors.

G. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish.
   1. Welding behind finished surfaces shall be performed to minimize distortion and discoloration on the finished surface.

H. Reinforcing: Install reinforcing as required for hardware, performance requirements, sag resistance and rigidity.

I. Dissimilar Metals: Separate dissimilar metals and concealed metal surfaces that will be in contact with cementitious materials with bituminous paint, suitable sealant, elastomeric tape, or gasket between the surfaces. Do not use coatings containing lead.

J. Reinforce components internally for door hardware and door operators.

K. Reinforce framing members for imposed loads.

L. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

M. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 OPERABLE UNIT FABRICATION

A. Operable Window Frames: Reinforce as required to support loads imposed by window operation and for installing window hardware.
   1. Provide compression weather stripping at fixed stops.

2.11 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to evaluate structural-sealant-glazed systems.

B. Structural-Sealant-Glazed Systems: Perform quality-control procedures complying with ASTM C 1401 recommendations, including, but not limited to, system material-qualification procedures, sealant testing, and system fabrication reviews and checks.

C. See Division 01 Section "Quality Requirements" for retesting and reinspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.

D. Structural-sealant-glazed system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify, with installer present, dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Remove old sash only with new windows are on-site, verified to fit and ready to be installed.

B. Install wall system in accordance with manufacturer's instructions.
   1. Do not install damaged components.

C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

D. Provide alignment attachments and shims to permanently fasten system to building structure.

E. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances , aligning with adjacent work.

F. Provide thermal isolation where components penetrate or disrupt building insulation.

G. Install sill and perimeter flashings. Turn up ends and edges; seal to adjacent work to form water tight dam at all corners of pan flashing and compensation channels.

H. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

I. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

J. Coordinate attachment and seal of perimeter air and vapor barrier materials.

K. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

L. All windows installed in compensation channels shall be bedded in sealant upon installation in to compensation channel framing. Follow manufacturer's written instructions.

M. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.

N. Install perimeter sealant in accordance with Section 07 92 00.

O. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

A. See Section 01 45 00 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.

B. Test installed storefront for water leakage in accordance with AAMA 501.2 hose test.

C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections. Should failure occur, Contractor shall test one additional are for each failed location

F. Prepare test and inspection reports.

G. Test installed windows for compliance with performance requirements for water penetration, in accordance with ASTM E1105 using uniform pressure and the same pressure difference as specified for laboratory testing.
   1. Test mock-up installation location for window test before proceeding with remainder of window installation job.

2. Test further, after successful completion of 50% and 90% of work completion.
3. If any window fails, test additional windows at Contractor's expense.
4. No uncontrolled water, penetrating the glazing of the framing system, is to appear on normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by the flashing and gutters that is drained to the exterior an water that cannot damage adjacent materials or finishes.
5. Not water intrustion allowed at 80% of design load.

H. Fenestration Acceptance Requirements: Refer to California Energy Code Section 110.6.
1. Before an occupancy permit is granted, site-built fenestration products in other than low-rise residential buildings shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified in the Reference Nonresidential Appendix NA7 to ensure that site-built fenestration meet Standards requirements, including a matching label certificate for product(s) installed and be readily accessible at the project location.
2. Contractor is responsible to prepare and obtain a Certificate of Acceptance certifying that the fenestration product meets the acceptance requirements, completed, signed and submitted to the enforcement agency, including payment of all fees, with copies to Owner and Architect.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Remove excess sealant by method acceptable to sealant manufacturer.

3.06 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Touch-up minor damage to factory applied finish, no exposed unfinished aluminum allowed in finish work; replace components that cannot be satisfactorily repaired.

END OF SECTION

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum windows with fixed sash and operating sash.

B. Factory glazing.

C. Operating hardware.

D. Insect screens.

E. Section also includes Contractor's responsibility to assume role of "Responsible Party" for NFRC label testing and inspection "Certified Project Option", to obtain Fenestration Acceptance Requirements certification required for occupancy permit. Refer to California Energy Code Section 110.6.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 07 25 00 - WEATHER BARRIERS: Sealing frame to weather barrier installed on adjacent construction.

C. Section 07 92 00 - Joint Sealants: Sealing joints between window frames and adjacent construction.

D. Section 08 43 13 - Aluminum Storefronts: Operable sash within aluminum storefront framing system.

E. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

A. AA DAF-45 - Designation System for Aluminum Finishes Ninth Edition; 2003.

B. AAMAAmerican Architectural Manufacturers Association, Certified Products Directory.

C. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; American Architectural Manufacturers Association/Window and Door Manufacturers Association/Canadian Standards Association.

D. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site.

E. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document).

F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

G. AAMA 2400-02 - Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction.

H. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers.

I. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

J. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric].

M. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

N. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

O. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

P. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

Q. ASTM E1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation.

R. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

S. National Fenestration Ratings Council, Certified Products Directory. http://cpd.nfrc.org/.

T. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting two weeks before starting work of this section, but not before approval of all required submittals; require attendance by all affected installers.
   1. Meet at Project site with Installer, installer of each component of associated work, installers of substrate construction to receive this work, installers of other work that must precede or follow window work (including mechanical work if any), Architect/Owner, window manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, test agencies, and governing authorities. Objectives to include:
      a. Review preparation and installation procedures and coordinating and scheduling required with related work.
      b. Review methods and procedures related to window and glazing work.
      c. Review structural loading limitations of new windows.
      d. Review window requirements (drawings, specifications, and other contract documents).
      e. Review required submittals, including deferred approvals, if any.
      f. Review and finalize construction schedule related to windows and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
      g. Review required inspection, testing, certifying, and material usage accounting procedures.
      h. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including provision of temporary enclosure of partially completed or occupied spaces.

i. Record discussion of conference, including decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
j. Review notification procedures for weather or non-working days.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Provide submittals coordinated with submittals for related sections referenced in this Section for simultaneous review.

C. Division of the State Architect Deferred Approval Submittal Requirements:
1. This section specifies work that is a Division of the State Architect (DSA) deferred approval item. All Engineering calculations and Shop Drawings require review and approval by the Division of the State Architect prior to fabrication or installation. Deferred Approval review provisions of Section 01 33 00 apply to the submittals of this section.
2. Submit items for deferred approval complete with all structural calculations, test data and information as specified or as subsequently required by the reviewing agency, including engineering stamps and signatures as required. Architect shall submit to DSA only following Architect/Engineer review.
   a. The Architect will not approve deferred approval submittals until they are approved by DSA.
3. No work or fabrication shall begin until DSA approved submittals are distributed to the Contractor.
4. Contractor is notified that significant lead time is required for deferred approval review by DSA and shall schedule submittals accordingly. No extension of Contract Time will be allowed for delays incurred by deferred approval review.
   a. The Architect is not responsible for DSA delays in deferred approval review.
5. Submit Certification of Compliance and all other documentation as required by Division of the State Architect.
6. Make all changes and revisions required by Division of State Architect to obtain approval at no additional costs or extension of time.

D. Deferred Approval - Structural Calculations: Substantiating system performance, structural capacity, anchorages and fasteners sizes and spacings per specified criteria, stamped and signed by Professional Structural Engineer experienced in design of this Work and licensed in California. Provide minimum of two copies with original stamps and signature.

E. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, descriptions of hardware and accessories, and information on exterior finishes. Demonstrate compliance with specified attributes.

F. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

G. Shop Drawings: Indicate opening dimensions , elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations , and installation requirements.

H. Samples: Submit two samples, 12 by 12 inch in size illustrating typical corner construction, accessories, and finishes.

I. Operable Window Sample: Provide working window with specified glazing and all specified hardware for review and approval prior to any installation

J. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements in excess of those prescribed by specified grade.

K. Certificates: Certify that windows meet or exceed specified requirements.

L. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

M. Spare Parts: Provide spare part amounting to 10% of the window components.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience, and of same manufacturer as storefront.

1.07 MOCKUPS

A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of one full width of classroom enclosure. Include adjacent wall construction with cladding, air barriers and related components. Demonstrate sequencing and integration of opening flashings, perimeter seals and air barrier continuity.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of AAMA CW-10.

B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.09 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.10 WARRANTY

A. See Section 01 77 00 - Closeout Submittals, for additional warranty requirements.

B. Manufacture and installation warranty to correct defective Work within a ten year period after Date of Substantial Completion. Defective work includes occurrence of any water leakage.

C. Provide ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aluminum Windows:
   1. Provide Aluminum Windows from the same manufacturer as Aluminum Entrances and Storefront specified in Section 08 41 13.
   2. Kawneer North America; 8225TL Isolock: www.kawneer.com.
   3. Oldcastle Building Envelope; Signature PL: www.oldcastlebe.com.
   4. EFCO, a Pella Company: www.efcocorp.com/sle.
   5. Wausau Window and Wall Systems: www.wausauwindow.com.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
   1. Frame Depth: 2-1/4 inches.
   2. Operable Units: Double weatherstripped.
   3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
   4. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   5. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
   6. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   7. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly.
   8. Thermal Movement: Design to accommodate thermal movement caused by 180 degrees F surface temperature without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.

B. Performance Requirements: Provide products that comply with the following:
   1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 Class CW Performance Grade 40.
   2. NFRC Certification: Listed on National Fenestration Ratings Council Certified Products Directory for types, materials and operation as indicated.
   3. Wind Loads: As indicated on the Drawings.
   4. Member Deflection: Limit member deflection to 1/175 in any direction, with full recovery of glazing materials.
   5. Air Leakage: Maximum of 0.1 cu ft/min sq ft per unit area of outside frame dimension, with 6.27 psf differential pressure when tested in accordance with ASTM E283.
   6. Condensation Resistance Factor of Frame: 27, measured in accordance with AAMA 1503.
   7. Overall U-value, Including Glazing: 0.35, maximum, measured on the window size required for this project.
   8. Solar Heat Gain Coefficient: 0.55.
   9. Visible Transmittance: 0.53.
   10. Forced Entry Resistance: Tested to comply with ASTM F588 or CMBSO requirements for performance level 10 or equivalent for specific window style required .
   11. Acoustical Performance: 30 STC, when tested in accordance with ASTM E90 and ASTM E1332.

C. In-swinging Hopper Type:
   1. Construction: Thermally broken.
   2. Provide screens.
   3. Screens: Aluminum.
   4. Exterior Finish: Superior performing organic coatings, AMA 2605 multiple coat, thermally cured polyviynlidene fluoride (PVDF) system.
   5. Interior Finish: Superior performing organic coatings, AMA 2605 multiple coat, thermally cured polyviynlidene fluoride (PVDF) system.

2.03 COMPONENTS

A. Frames: Thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on or screw-down type.

B. Glazing: As specified in Section 08 80 00.

C. Sills: Extruded aluminum; sloped for positive wash; fit under sash leg to 1/2 inch beyond wall face; one piece full width of opening jamb angles to terminate sill end.

D. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use o. tools.
   1. Hardware: Spring loaded steel pins; four per screen unit.
   2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
   3. Frame Finish: Same as frame and sash.

E. Operable Sash Weatherstripping: Nylon pile; permanently resilient, profiled to achieve effective weather seal.

F. Glazing Materials: As specified in Section 08 80 00.

G. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

H. Sealant and Backing Materials: As specified in Section 07 92 00.
   1. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M) , 6063 alloy, T6 temper.

B. Flashing Material: Self-adhered, flexible type specified in Section 07 2500, compatible with air and water barriers specified in related section.

C. Concealed Steel Items: Profiled to suit mullion sections; galvanized in accordance with ASTM A123/A123M.

2.05 HARDWARE

A. Locks, operators, sash arms, rollers: Manufacturer's standard for operating types indicated.

B. Cam-action sweep sash lock and keeper at meeting rails.

C. Pole-operated, cam-action locking device on meeting rail where rail is more than 72 inches (1830 mm) above floor.
   1. Pole Operated Handles: Bronze Craft Series #164-001-4504

D. Operator Pole: Provide one pole for each room having window operators more than 72 inches (1830 mm) above floor. Pole Operated Handles: Bronze Craft #164-001-4504
   1. Pole hook assembly to be aluminum tube with rubber end: Bronze Craft Series #234-007-4504
   2. Pole hanger: Bronze Craft Series #231-002-4504
   3. Pole tip: Bronze Craft Series #232-004-4504. Pole tip attached to pole with screws and epoxy.

E. Limit Stops: Resilient rubber.

2.06 FABRICATION

A. Fabricate components with smallest possible clearances and shim spacing around perimeter of assembly that will enable window installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices.

D. Arrange fasteners and attachments to ensure concealment from view.

E. Prepare components with internal reinforcement for operating hardware.

F. Provide steel internal reinforcement in mullions as required to meet loading requirements.

G. Provide internal drainage of glazing spaces to exterior through weep holes.

H. Assemble insect screen frames with mitered and reinforced corners. Secure wire mesh tautly in frame. Fit frame with four, spring loaded steel pin retainers.

2.07 FINISHES

A. Comply with AA DAF-45 for aluminum finishes required.

B. Operator and Exposed Hardware: Enameled to color as selected from manufacturer's standard line.

C. Apply 1 coat of bituminous coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

D. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.08 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to evaluate structural-sealant-glazed systems and all components.

B. Structural-Sealant-Glazed Systems: Perform quality-control procedures complying with ASTM C 1401 recommendations, including, but not limited to, system material-qualification procedures, sealant testing, and system fabrication reviews and checks as specified in this sections as well as section 08 43 13 Aluminum Entrances and Storefronts, of which this section is a component.

C. See Division 01 Section "Quality Requirements" for retesting and reinspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.

D. Structural-sealant-glazed system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

A. Remove old sash only with new windows are on-site, verified to fit and ready to be installed.

B. Install windows in accordance with manufacturer's instructions and the referenced standards.
   1. Screw framing members in place using backing, anchor plugs, or straps as required to make secure when subjected to imposed loads. Where moldings are jointed, accurately cut and fit to provide a tightly closed joint.
   2. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
   3. Install so that weather-stripping makes continuous positive contact when window is in closed position.

C. Install window assembly in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

D. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

E. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

F. Install sill and sill end angles.

G. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

H. Install opening flashings coordinated with air and water resistive barriers specified in related sections, in accordance with AAMA 2400-02 - Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction. Ensure water entering wall assemblies is directed to the exterior.

I. Install operating hardware not pre-installed by manufacturer.

J. Align and adjust vents for optimum weathering contact to the frame and ease of operation.

K. Install glass and infill panels in accordance with requirements specified in Section 08 80 00.

L. Maintain attachment and seal of perimeter air barrier and vapor retarder materials.

M. Install perimeter sealant in accordance with requirements specified in Section 07 92 00.
   1. Seal joints between window assembly and other building components. No unfinished aluminum visible.
   2. Install with bead of sealant under head fin, 6-inch strips of flashing felt under jamb and sill fins, and 6-inch strip of felt over head fin.
   3. Do not block weep holes.

3.03 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

A. Test installed windows for compliance with performance requirements for water penetration, in accordance with ASTM E1105 using uniform pressure and the same pressure difference as specified for laboratory testing.
   1. Test mock-up installation location for window test before proceeding with remainder of window installation job.
   2. Test further, after successful completion of 50% and 90% of work completion.
   3. If any window fails, test additional windows at Contractor's expense.
   4. No uncontrolled water, penetrating the glazing of the framing system, is to appear on normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by the flashing and gutters that is drained to the exterior an water that cannot damage adjacent materials or finishes.
   5. Not water intrustion allowed at 80% of design load.

B. Fenestration Acceptance Requirements: Refer to California Energy Code Section 110.6.
   1. Before an occupancy permit is granted, site-built fenestration products in other than low-rise residential buildings shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified in the Reference Nonresidential Appendix NA7 to ensure that site-built fenestration meet Standards requirements, including a matching label certificate for product(s) installed and be readily accessible at the project location.
   2. Contractor is responsible to prepare and obtain a Certificate of Acceptance certifying that the fenestration product meets the acceptance requirements, completed, signed and submitted to the enforcement agency, including payment of all fees, with copies to Owner and Architect.

C. Replace windows that have failed field testing and retest until performance is satisfactory.

D. Prepare test and inspection reports.

3.05 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

D. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

E. Touch-up factory finishes; no raw metal visible.

F. After installation check and adjust primary and secondary locks to assure proper function.

G. Protect finished work including finishes from subsequent construction.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide all finish hardware required to complete the work as indicated and as specified.

B. Furnish all trim, attachments and fastenings specified or required for proper and complete installation.

C. Include all hardware under this section of the specifications that is not specified in other sections, whether or not such hardware is specified herein.

D. Hardware for wood and hollow metal doors.

E. Thresholds.

F. Weatherstripping, seals and door gaskets.

1.02 RELATED REQUIREMENTS

A. Section 06 20 00 - Finish Carpentry.

B. Section 08 11 13 - Hollow Metal Doors and Frames.

C. Section 08 43 13 - ALUMINUM ENTRANCES and STOREFRONTS: Hardware for same except cylinders; installation of cylinders.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.

B. CSFM California State Fire Marshal.

C. BHMA A156.1 - American National Standard for Butts and Hinges; Builders Hardware Manufacturers Association, Inc. ; 2013 (ANSI/BHMA A156.1).

D. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches; Builders Hardware Manufacturers Association ; 2011 (ANSI/BHMA A156.2).

E. BHMA A156.3 - American National Standard for Exit Devices.

F. BHMA A156.4 - American National Standard for Door Controls - Closers.

G. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks.

H. BHMA A156.6 - American National Standard for Architectural Door Trim.

I. BHMA A156.7 - American National Standard for Template Hinge Dimensions; Builders Hardware Manufacturers Association ; 2014 (ANSI/BHMA A156.7).

J. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders; Builders Hardware Manufacturers Association, Inc. ; 2010 (ANSI/BHMA A156.8).

K. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000.

L. BHMA A156.14 - American National Standard for Sliding & Folding Door Hardware; Builders Hardware Manufacturers Association ; 2013 (ANSI/BHMA A156.14).

M. BHMA A156.15 - American National Standard for Release Devices - Closer Holder, Electromagnetic and Electromechanical; Builders Hardware Manufacturers Association ; 2011 (ANSI/BHMA A156.15).

N. BHMA A156.16 - American National Standard for Auxiliary Hardware; Builders Hardware Manufacturers Association ; 2013 (ANSI/BHMA A156.16).

O. BHMA A156.17 - American National Standard for Self Closing Hinges & Pivots.

P. BHMA A156.18 - American National Standard for Materials and Finishes.

Q. BHMA A156.20 - American National Standard for Strap and Tee Hinges, and Hasps; Builders Hardware Manufacturers Association ; 2006 (Reaffirmed 2012) (ANSI/BHMA A156.20).

R. BHMA A156.21 - American National Standard for Thresholds; Builders Hardware Manufacturers Association ; 2014 (ANSI/BHMA A156.21).

S. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames.

T. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames.

U. DHI-02 Installation guide for doors and hardware.

V. DHI-03 Keying systems and nomenclature.

W. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute.

X. DHI A115W Series - Specifications for Wood Door and Frame Preparation for Hardware; Door and Hardware Institute.

Y. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.

Z. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; Door and Hardware Institute.

AA. DHI "Keying Systems and Nomenclature", latest edition.

AB. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

AC. NFPA 101 - Life Safety Code; National Fire Protection Association.

AD. NFPA 105 - Smoke control door assemblies.

AE. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials.

AF. SDI Steel Door Institute.

AG. UL (DIR) - Online Certifications Directory; Underwriters Laboratories Inc..

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products that door hardware will be installed upon.

B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

C. Convey Owner's keying requirements to manufacturers.

1.05 DEFINITIONS

A. Graphic Conventions: Graphic representations of door swings of 90 degrees or less shall not be construed to limit the swing of the operating leaf. Provide all finish hardware as necessary to allow fully operating swing.

1.06 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Submit a full and complete schedule of hardware, indicating the quantity, part number, installation location and finish of each necessary item. Include an index of Doors and Heading for ease of finding each opening requirement .
   1. List each hardware item scheduled by quantity, type, manufacturer's model number, size/handing as applicable, screws/fasteners, finish, manufacturer and any additional information required for proper installation/operation.
   2. List hardware for each door in groups, referencing the same group numbers and numerical group sequence as specified in the schedule following this section.
   3. Include in each hardware group/heading, the door number/location, door and frame types, material, size, thickness, fire rating and all additional door and frame information required for proper installation/operation of hardware.
   4. Review and approval of the hardware schedule by the Architect does not absolve Contractor of responsibility for missing and/or incorrect items.
   5. Provide on request copies of purchase orders showing the date of placing order.

D. Product Data Sheets: Submit catalog sheets for each hardware item containing specified manufacturer's drawings or information on all hardware items at the same time hardware schedule is submitted.

E. Provide installation instruction sheets, parts list and maintenance manual (if any) for each product at the same time hardware schedule is submitted.

F. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.
   1. Indicate the quantity, part number, installation location and finish of each necessary item. Include an index of Doors and Heading for ease of finding each opening requirement .
   2. List each hardware item scheduled by quantity, type, manufacturer's model number, size, handing as applicable, screws or fasteners, finish, manufacturer and any additional information required for proper installation and operation.
   3. List hardware for each door in groups, referencing the same group numbers and numerical group sequence as specified in the schedule following this section.
   4. Include in each hardware group, heading, the door number, location, door and frame types, material, size, thickness, fire rating and all additional door and frame information required for proper installation/operation of hardware.
   5. Review and approval of the hardware schedule by the Architect does not relieve Contractor of responsibility for missing or incorrect items.
   6. Provide on request copies of purchase orders showing the date of placing order.

G. Keying Schedule: Submit for approval of Owner.

1. Keying Conference: Within ten (10) days after approval of the hardware submittal, Contractor shall have a keying conference with the Owner and Architect to determine the specific keying requirements of the project. Prepare formal keying schedule based upon decisions taken at the meeting and forward as a submittal.
2. Provide final keying charts for Owner's use.

H. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention .

I. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

J. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Hardware Supplier Qualifications: Company specializing in supplying institutional door hardware with ten years of documented experience. Supplier shall be an authorized factory distributor of the keying system specified.

C. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this section. This person shall be available to provide certifications as specified herein.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

B. Hardware shall be stored in a dry, secure storage room. A final approved copy of the hardware schedule/submittal shall accompany all shipments to the jobsite. All hardware shall be marked in coordination with the final approved copy of the hardware schedule. Delivery receipt constitutes acceptance of responsibility for the material delivered.

1.09 COORDINATION

A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
1. Provide hardware items of proper design for use on doors and frames of the thickness', profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the contract documents.
2. Tag each item or package separately, with identification related to the final hardware schedule, and include basic installation instructions in the package.
3. Deliver individually packed hardware items at the time and location for each installation.

B. Furnish templates for door and frame preparation.
1. Check submittals to confirm that adequate provisions are made for the proper installation of hardware.

C. Inspection: Inspect all hardware furnished within 10 days of completion for certification of installation.

D. Coordinate Owner's keying requirements during the course of the Work.

1.10 WARRANTY

A. See Section 01 78 23 - Operation and Maintenance Data, for additional warranty requirements.

B. Warranty: Correct defects in materials and workmanship during the warranty period to the satisfaction of the Architect and Owner. Provide Owner with written warranty as follows:
   1. All hardware for a two (2) year period and not less than specific manufacturer minimum.
   2. Door closers for a (10) year period.

1.11 JOB CONDITIONS

A. Site inspections: Carefully inspect project for the location and the extent of builders' hardware required to complete the work.

1.12 MAINTENANCE PRODUCTS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Where finished shape or size of members taking hardware is such as to prevent or make unsuitable the use of the exact types specified, recommend for Architect's approval and provide suitable types having as nearly as practicable the same operation and quality as the type specified.

B. Proper kind and type: The hardware shall be the proper kind for its required use and shall fit its intended location perfectly. Should any hardware, as specified, fail to meet the intended requirements or require any modifications to suit the intended location, this matter, or any other necessary advance information, request Architect for correction or advice in ample time to avoid delay in the manufacture and delivery of the hardware.

C. In order to insure proper placement and fit, all hardware in connection with metal door or metal frames shall be made to template. Provide templates or physical hardware items to fabricators sufficiently in advance to avoid delay in the work.

D. Warranty: Warrant all hardware for a period of one year from date of substantial completion or additionally per the provisions of Division 01. Defects in materials and workmanship occurring during the warranty period shall be corrected to the complete satisfaction of the Architect.

2.02 SOURCE LIMITATIONS

A. Provide only one manufacturer for each type of hardware specified.

B. Substitutions: Approved equal manufacturers are as listed in this section. See Section 01 23 13 - Product Options and Substitutions - for procedures for products of manufacturers not included in this Section.

2.03 DOOR HARDWARE - GENERAL

A. Provide hardware listed in the schedule following this section, and as described in this section.

B. Provide hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.

C. Provide items of a single type of the same model by the same manufacturer.

D. Provide products that comply with the following:

1. Applicable provisions of federal, state, and local codes.
2. Accessibility: California Building Code Chapter 11B and DSA Interpretations of Regulations (IR).
3. Applicable provisions of NFPA 101, Life Safety Code.
4. Fire-Rated Doors: NFPA 80.
5. Hardware on Fire-Rated Doors , Except Hinges: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
6. Auxiliary Hardware: BHMA A156.16.
7. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
8. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
9. Hardware for Smoke and Draft Control Doors : Provide hardware that enables door assembly to comply with air leakage requirements of the applicable code.

E. Function: Lock and latch function numbers and descriptions of manufactures series as listed in hardware schedule.

F. General Requirements for Locksets: Provide minimum 16 gauge steel, bronze, or brass box strikes and curved lips at all locks
1. Hand Operated Trim: All locksets and latchsets shall be lever trim, thumbturns shall be long handled accessible type conforming to CBC Chapter 11B. Lever handle returns shall extend to within 1/2 inch of the door face.
2. All locks shall have box strikes and curved lips long enough to protect the trim and facilitate correct installation and application. All locks to have ¾" throw where required.
3. All locks shall have a "free-wheeling" lever when the outside lever is in the locked position. Lever rose shall have built-in mechanical stop to reduce vandalism.
4. Minimum 3/4" throw. Deadbolts shall have minimum 1" throw.
5. When locked, all hardware shall be operable from inside by use of the lever and without the use of a key or special knowledge.

G. Finishes: Provide door hardware of the same finish unless otherwise indicated.
1. Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
2. Finish Definitions: BHMA A156.18.
3. Exceptions:
   a. Where base metal is specified to be different, provide finish that is an appearance equivalent according to BHMA A156.18.
   b. Hinges for Fire-Rated Doors: Steel base metal with painted finish.
   c. Door Closer Covers and Arms: Color to be selected by Architect from manufacturer's standard colors.
   d. Aluminum Surface Trim and Gasket Housings: Anodized to match door, not to match other hardware. Where aluminum doors are painted finish, request selection from Architect.
   e. Hardware for Aluminum Storefront Doors: Finished to match door, except hand contact surfaces to be satin stainless steel.

H. Fasteners:
1. Install all hardware only with screws and fasteners provided with hardware or as recommended by the manufacturer.
2. Where a hardware item is packed by the manufacturer "screws and fasteners by others", provide manufacturer's recommended type of matching finish.
3. Mineral Core Wood Doors: Sex bolts.
4. Concrete and Masonry Substrates: Stainless steel machine screws and lead expansion shields.

2.04 LOCKS AND LATCHES

A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.

1. Hardware Sets indicate locking functions required for each door.
2. If no hardware set is indicated for a swinging door provide an office lockset.
3. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
4. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.
5. In door sections, where a lock cylinder referenced to this Section is specified, furnish and install a mortise lock cylinder keyed to the building keying system.

B. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
1. Provide cams and/or tailpieces as required for locking devices required.

C. Keying: Grand master keyed at the factory. Advise factory in advance of final keying.
1. Include construction keying.
2. Supply keys in the following quantities:
   a. One (1) bitting list.
   b. 2 construction keys.
   c. 2 change keys for each lock.
3. When providing keying information, comply with DHI Handbook "Keying systems and nomenclature".
4. Stamp all keys "DO NOT DUPLICATE".

D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.05 HINGES

A. Hinges: Provide hinges on every swinging door.
1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
2. Provide ball-bearing hinges at all doors.
3. Provide hinges in the quantities indicated.
4. Provide non-removable pins on outswinging doors.
5. At locations specified to be stainless steel, provide only products manufactured of type 316L stainless steel.
6. Interior doors: Wrought steel, polished and plated to match specified finish of other hardware on laminate plastic, natural or stained doors. Hinges provided for painted hollow metal doors shall be painted to match the door.
7. Exterior doors: Non-ferrous hinges with stainless steel pins.
8. Fire rated hinges: At all fire rated openings.
9. Where electrified hardware is mounted in door leaf, provide power transfer hinges.

B. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7; heavy weight, unless otherwise indicated.
1. Provide hinge width required to clear surrounding trim and allow 180 degree swing.

C. Quantity of Hinges Per Door:
1. Provide 5 x 4.5 size hinges for doors 42 inches and wider.
2. Doors up to 60 inches High: Two hinges.
3. Doors From 60 inches High up to 90 inches High: Three hinges.
4. Doors 90 inches High up to 120 inches High: Four hinges.
5. Doors over 120 inches High: One additional hinge per each additional 30 inches in height.

D. Manufacturers - Hinges:
1. Hager Companies : www.hagerco.com.

2. Stanley Black & Decker : www.stanleyblackanddecker.com.
3. Ives Hinges: www.iveshinges.com.
4. Substitutions: See Section 01 60 00 - Product Requirements.
5. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

2.06 DEADBOLTS

A. Cylinders: Provide appropriate cylinders for all hardware, including exit devices. Thumbturns shall be long handled accessible type conforming to CBC Chapter 11B.

B. Manufacturers - Auxiliary Locks (Deadbolts):
1. Schlage, an Allegion brand: www.allegion.com/us.
2. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

2.07 STOPS AND HOLDERS

A. Stops: Complying with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.
1. Provide wall stops, unless otherwise indicated.
2. If wall stops are not practical, due to configuration of room or furnishings, provide overhead stop.
3. Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop unless specifically so stated.
4. Place door stops in such a position that they permit maximum door swing but do not present an obstruction hazard to adjacent traffic.
5. Provide stops of proper height to engage doors or levers. Provide carpet risers where required.

B. Manufacturers - Wall and Floor Stops/Holders:
1. Assa Abloy Brands, McKinney ; _____: www.assaabloydss.com.
2. Hager Companies : www.hagerco.com.
3. Ives, an Allegion Brand: www.iveshinges.com
4. Trimco Hardware : www.trimcohardware.com.
5. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

2.08 GASKETING AND THRESHOLDS

A. Weather Seal: Provide jamb seals at exterior doors. Maintain specified resistance to exterior air infiltration as required by referenced standards and prevailing codes.

B. Silencers:
1. Provide rubber silencers or mutes on all non-rated doors not otherwise provided with seals: Three per door and one at head of each leaf of double doors.

C. Thresholds: Complying with BHMA A156.21.
1. Field cut threshold to frame for tight fit.
2. Conform to requirements of Title 24 Part 2, CBC Chapter 11B as follows; Floor or landing shall not be more than 1/2 inch lower than the threshold of the doorway. Change in level between 1/4 and 1/2 shall be beveled with a slope no greater than one unit vertical to 2 units horizontal (50% slope). Change in level greater that 1/2 inch shall be by means of a ramp.
3. Provide thresholds of profile and size scheduled, except coordinate width of threshold provided to be flush with depth of door frame so that adjacent flooring material does not extend into the frame depth.
4. Where saddle thresholds are specified at offset conditions, include threshold elevators of size and profile required to conform to CBC requirements noted above.

5. Materials: Manufacturer's standard aluminum alloy of scheduled finish or standard bronze (brass) alloy as scheduled.

D. Fasteners At Exterior Locations: Non-corroding, stainless steel.

E. Manufacturers - Gasketing and Thresholds:
1. National Guard Products, Inc : www.ngpinc.com.
2. Pemko Manufacturing Co : www.pemko.com.
3. Reese Enterprises: www.reeseusa.com.
4. Zero International, Inc : www.zerointernational.com.
5. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.

B. Verify that conditions are satisfactory to accept work. Correct unsatisfactory conditions prior to commencement. Notify Architect of deviation from Contract Documents. Commencement of work indicates acceptance of substrates.

C. Employ installers with minimum 4000 hours experience in door and hardware installation. Follow templates and installation instructions precisely. Use only manufacturer's fasteners and recommendations.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.
1. Provide owner with one (1) set of installation instructions for each separate type of hardware installed.

B. Use templates provided by hardware item manufacturer.

C. Do not install surface mounted items until finishes applied to substrate are complete.

D. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.

E. Mounting heights for hardware from finished floor to center line of hardware item.
1. All mounting heights shall be coordinated with local, state and federal codes unless otherwise indicated. Lever, exit device or pull mounting heights shall not exceed 44" AFF. Exit devices shall be installed in the centerline of the lock rail unless noted otherwise.
2. For steel doors and frames: Comply with DHI (LOCS) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames".
3. For Wood Doors: Comply with DHI WDHS.3 "Recommended Locations for Architectural Hardware for Flush Wood Doors".

F. Set exterior door thresholds with full-width bead of elastomeric sealant on each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

G. Notch jamb seals around hardware items (closer arms, strikes, etc.).

H. Thresholds: Set in full bed of butyl rubber sealant, secure to concrete with flat head machine screws and expansion anchors, flat, rigid, free of movement under load.
1. Coordinate threshold installation with door frame dimensions. All threshold ends extend to outside edges of door frames and cope to meet wall base. No gaps allowed between flooring finish and wall. Fill exterior open ends of thresholds with sealant, where occurs.

3.03 FIELD QUALITY CONTROL

A. Provide an Architectural Hardware Consultant to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.
   1. Perform periodic inspection by finish hardware supplier during hardware installation ,
   2. Improperly installed hardware shall be removed and reinstalled at contractor's expense.
   3. Perform final inspection by finish hardware supplier at the completion of the work. Submit certification that work is complete, correctly installed and adjusted, free of defects which would affect warranty coverage. Submittal of final certification is a condition precedent to final payment.
   4. Certify Compliance of each and every closer operation, pressure and swing speed in accordance with specified codes and referenced standards.

3.04 ADJUSTING

A. Adjust work under provisions of Section 01 70 00 - Execution and Closeout Requirements.

B. Adjust hardware for smooth operation and proper closing force. Allow for effects of pressurization of rooms by mechanical systems.

C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.05 CLEANING

A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.06 PROTECTION

A. Protect finished Work under provisions of Section 01 70 00 - Execution and Closeout Requirements.

B. Do not permit adjacent work to damage hardware or finish.

3.07 SCHEDULE - ATTACHED

END OF SECTION

Group Name	Group	Drawing Sched Door	Door Sched Door Type	Description	Finish	Manuf.	Model Number	Quant.	Type
Classroom	1	see sched	A	Weather Seals	BLK	Pemko	S88	1	SET
				Door Stop	AL	Ives	FS40	1	EA
				Threshold	AL	NGP	Per Details	1	EA
Toilet Room	2	111A and 112A	A	Door Stop	AL	Ives	FS40	1	EA
				Threshold	AL	NGP	Per Details	2	EA
				Door Silencers	BLK	Ives	SR66	1	SET
				Threshold	Marble	-	-	1	EA
Plumb Chase	3	113C	A	Deadbolt	626	Schlage	B700	1	EA

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 25 00 - WEATHER BARRIERS.

B. Section 08 43 13 - ALUMINUM ENTRANCES and STOREFRONTS: Glazing furnished as part of storefront assembly.

C. Section 08 51 13 - Aluminum Windows: Glazing furnished by window manufacturer.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.

C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

F. ASTM C1036 - Standard Specification for Flat Glass.

G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

H. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.

I. ASTM C1193 - Standard Guide for Use of Joint Sealants.

J. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.

K. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.

L. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.

M. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

N. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California Amendments.

O. GANA (GM) - GANA Glazing Manual.

P. GANA (SM) - GANA Sealant Manual.

Q. GANA (LGRM) - Laminated Glazing Reference Manual.

R. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use.

S. NFRC 100 - Procedure for Determining Fenestration Product U-factors.

T. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.

U. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.

1.04 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

G. Glazing Units Surfaces:
   1. Insulated units:
      a. Side 1 - Exterior surface of outer pane.
      b. Side 2 - Interior surface of outer pane.
      c. Side 3 - Interior surface of inner pane.
      d. Side 4 - Exterior surface of inner pane
   2. Laminated units:
      a. Side 1 - Top surface of top outer pane in horizontal orientation.
      b. Interlayer: PVB material between two pieces of monolithic glass
      c. Side 2 - Underside of bottom outer pane in horizontal orientation.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative requirements for submittal procedures.

B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. CAL-GREEN Submittals:
   1. Product Data - VOC Limits: For adhesives sealants, fillers and primers, documentation including printed statement of VOC contents, comply with limits specified by Code.

E. Samples: Submit two samples 8 by 8 inch in size of glass units.

F. Samples: Submit 3 inch long bead of glazing sealant, color as selected.

G. Certificate: Certify that products of this section meet or exceed specified requirements.

H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

C. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
   1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

D. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
   1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
   2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

E. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 .
   1. Provide safety glazing products permanently marked with certification label of the Safety Glazing Certification Council (SGCC) <http://www.sgcc.org/> or another certification agency acceptable to authorities having jurisdiction.
   2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites, provide glazing products that comply with Category II materials only.

F. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
   1. Insulating Glass Certification Council.
   2. Associated Laboratories, Inc.

G. Source Limitations for Glass: Provide materials produced by a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.

H. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

1.07 MOCK-UPS

A. See Section 01 45 00 - Quality Control, for additional mock-up requirements.

B. Provide mock-up of storefront assembly including glass and air barrier and vapor retarder seal.

C. Locate where directed.

D. Mock-ups may remain as part of the Work.

1.08 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY

A. See Section 01 78 23 - Operation and Maintenance Data, for additional warranty requirements.

B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

C. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including replacement of failed units.

D. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
   1. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Float Glass Manufacturers:
   1. Guardian Industries Corp: www.sunguardglass.com.
   2. Pilkington North America Inc: www.pilkington.com/na.
   3. PPG Industries, Inc: www.ppgideascapes.com.
   4. Viracon, Architectural Glass segment of Apogee Enterprises, Inc: www.viracon.com.
   5. Substitutions: Refer to Section 01 45 00 - Product Options and Submittals.

B. Laminated Glass Manufacturers:
   1. Guardian Industries Corp: www.sunguardglass.com.
   2. Pilkington North America Inc: www.pilkington.com/na.
   3. PPG Industries, Inc: www.ppgideascapes.com.
   4. Viracon, Architectural Glass segment of Apogee Enterprises, Inc: www.viracon.com.
   5. Substitutions: Refer to Section 01 45 00 - Product Options and Submittals.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. VOC Limits for all adhesives sealants, fillers, primers and coatings: Comply with limits established by State of California and all agencies having applicable jurisdiction.

C. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria.

D. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Specified Design Wind Loads: As indicated on structural drawings, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   3. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
      a. Load Duration: 3 seconds.
   4. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
   5. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   6. Glass thicknesses listed are minimum.

E. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.
      a. Refer to Section 07 25 00.
   2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.
   3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.

F. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

G. Thermal and Optical Performance: Provide glass products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
   1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   3. Solar Optical Properties: Comply with NFRC 300 test method.

H. Provide Kind FT (fully tempered) glass lites or laminated glass in all locations.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless noted otherwise.

1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT.
3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria.
4. Tinted Type: ASTM C1036, Class 2 - Tinted , Quality-Q3, color and performance characteristics as indicated.
5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 test requirements for Category II.
2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.

C. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.
1. Approved Manufacturers:
   a. "Solarban 70XL Solar Control Low-E Glass"; PPG Industries <http://corporateportal.ppg.com>(800-377-5267)
   b. "Comfort Ti-AC-40"; AGC Flat Glass North America <http://www.afgglass.com> (800-251-0441)
   c. "Sunguard SN-68"; Guardian Industries <http://www.guardian.com> (248-340-1800)
   d. "Solarscreen 2000 - VE1-2M"; Viracon, Inc. <http://www.viracon.com/index.php> (800-533-2080)

2.04 INSULATING GLASS UNITS

A. Manufacturers:
1. Any of the manufacturers specified for float glass.
2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
3. Guardian Industries Corp: www.sunguardglass.com.
4. Pilkington North America Inc: www.pilkington.com/na.
5. PPG Industries, Inc: www.ppgideascapes.com.
6. Viracon, Architectural Glass segment of Apogee Enterprises, Inc: www.viracon.com.
7. Substitutions: Refer to Section 01 60 00 - Product Requirements.

B. Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. Metal Edge Spacers: Aluminum, bent and soldered corners.
4. Spacer Color: Black.
5. Edge Seal:
6. Color: Black.
7. Purge interpane space with dry air, hermetically sealed.

C. Type Clear - Sealed Insulating Glass Units: Vision glazing, low-E.
1. Application: All exterior glazing unless otherwise indicated.
2. Substitutions: Refer to Section 01 60 00 - Product Requirements.

a. Other products of the basis of design manufacturer and products of other manufacturers will be considered provided the overall performance is within the specified range(s) and the overall appearance is not significantly different from that of the specified product.
b. Architect's decision on substitutions is final.

3. Between-lite space filled with air.
4. Thermal Resistance (U-Value): 0.45 , maximum.
5. Total Solar Heat Gain Coefficient: 0.30 , maximum.
6. Total Visible Light Transmittance: 0.50 percent , minimum.
7. Basis of Design: PPG Industries, Inc: www.ppgideascapes.com.
8. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
   a. Exterior Laminate Coating: PPG Solarban 70XL on #2 surface, no coating on #3 surface.
   b. Interior Laminate Coating: no coating.
   c. Tint: None (clear).
9. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
   a. Tint: None (clear).
10. Total Thickness: 1 inch.

2.05 GLAZING UNITS

A. Security Glazing (toilet room entry door side-lite): Laminated glass, 2-Ply.
   1. Applications: glazed side lites to doors
   2. Tint: Obscure.
   3. Thickness: 7/32 inch.
   4. Outer Lite: Tempered glass.
   5. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
   6. Inside Lite: Tempered glass.

2.06 GLAZING COMPOUNDS

A. Butyl Sealant: Single component ; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining ; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; black color.

2.07 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness ; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness ; ASTM C864 Option II. Continuous x one half the height of the glazing stop x thickness to suit application , self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
   1. Width: As required for application.
   2. Thickness: As required for application.
   3. Spacer Rod Diameter: As required for application.
   4. Manufacturers:
      a. Pecora Corporation: www.pecora.com.
      b. Substitutions: Refer to Section 01 45 00 - Product Options and Submittals.

D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot ; ASTM C864 Option II; color black.

2.08 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing for insulated glass.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that the minimum required face and edge clearances are being provided.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

D. Verify that sealing between joints of glass framing members has been completed effectively.

E. Glass Product:
   1. Verify that each piece of glass is free of scratches or marred surfaces.
   2. Verify that all edges are clean cut and finished in the specified manner.

F. Obtain installers written report listing conditions detrimental to performance of glazing work. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.
   1. Use a rolling block in rotating glass units to prevent damage to glass corners.
   2. Do not impact glass with metal framing.
   3. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar.
   4. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening.
   5. Discard glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.

E. Provide spacers for glass lites where length plus width is larger than 50 -inches (1270 mm) as follows:

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

F. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

G. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Install so that appropriate rating agency markings remain permanently visible.

J. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - WET/DRY GLAZING METHOD (PREFORMED TAPE AND SEALANT)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

C. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

D. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

E. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

F. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

G. Fill gap between glazing and stop with self-leveling polyurethane type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

H. Apply cap bead of self-leveling polyurethane type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.05 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with self-leveling polyurethane type sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

3.06 TOLERANCES

A. Erection Tolerances: Install components plumb, level, accurately aligned, and located in reference to column lines and floor levels. Erection tolerances indicated below are the maximum allowable for both no-load and full-load conditions and are not cumulative. Adjust work to conform to the following tolerances:
   1. Plumb: 1/8 -inch in 10 -feet; 1/4 -inch in 40 -feet.
   2. Level: 1/8 -inch in 20 -feet; 1/4 -inch in 40 -feet.
   3. Alignment: Limit offset of member alignment to 1/16 -inch where surfaces are flush or less than 1/2 -inch out of flush and separated by less than 3 -inches by protruding work; otherwise limit offsets to 1/8 inch.

3.07 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.08 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove non-permanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.09 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste ; do not mark heat absorbing or reflective glass units.

B. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

C. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 08 91 00

LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section specifies shop fabricated and manufactured metal louvers and vents which are not an integral part of the mechanical system. Metal mesh screens are also specified.

1.02 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.

B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

C. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating.

D. AMCA 511 - Certified Ratings Program for Air Control Devices.

E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittals for submittal procedures.

B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

1.05 PROJECT CONDITIONS

A. Coordinate work of this section with installation of mechanical ductwork .

1.06 WARRANTY

A. See Section 01 700 - Contract Closeout, for additional warranty requirements.

B. Provide twenty year manufacturer warranty against distortion, metal degradation, and failure of connections.
   1. Finish: Include coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Airolite Company, LLC: www.airolite.com.

B. Construction Specialties, Inc: www.c-sgroup.com.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
   1. Wind Load Resistance: Design to resist positive and negative wind load of 25 psf without damage or permanent deformation.
   2. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.
   3. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.

B. Stationary Louvers: Horizontal blade, extruded aluminum with high performance organic coating construction, with intermediate mullions matching frame.
   1. Free Area: 50 percent, minimum.
   2. Static Pressure Loss: As required for proper operation of mechanical systems as designed. Provide test data confirming appropriate values in inches wg maximum per square foot of free area at indicated velocity(ies) in fpm, when tested in accordance with AMCA 500-L.
   3. Blades: Drainable.
   4. Frame: depth as required for door thickness, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
   5. Aluminum Thickness: Frame 12 gage, 0.0808 inch minimum; blades 12 gage, 0.0808 inch minimum.
   6. Aluminum Finish: High performance organic coatings; finish welded units after fabrication.

2.03 ACCESSORIES

A. Fasteners and Anchors: Stainless steel.

B. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

2.04 FACTORY FINISHING

A. Polyvinylidene Fluoride Coating: Minimum 70 percent Kynar 500/Hylar 500 resin, two coat finish, complying with AAMA 2604.
   1. Colors: Custom, to match approved sample.

B. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
   1. Chemically clean, pre-treat and apply finishes after fabrication.

C. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.

B. Verify that field measurements are as indicated.

3.02 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

D. Secure louver frames in openings with concealed fasteners.

3.03 CLEANING

A. Strip protective finish coverings.

B. Clean surfaces and components.

C. Touch-up surfaces damaged after installation so that no unfinished substrate is visible in completed assemblies, including joint edges.

END OF SECTION

SECTION 09 05 11
CONCRETE FLOOR PREPARATION

PART 1 GENERAL

1.01 SUMMARY

A. Mechanical cleaning of new or existing concrete floor surfaces for application of finished flooring.

1.02 RELATED REQUIREMENTS

A. Section 01 41 00 - Sustainable Design Requirements.

B. Division 03 Section - Cast-In-Place Concrete for concrete floor slabs.

C. Division 07 Section - Water Vapor Emission Control System.

D. Division 09 Sections for applied floor finishes.

1.03 REFERENCES

A. ASTM C1583 - Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating.

C. ASTM D4259 - Standard Practice for Abrading Concrete.

D. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

E. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

F. International Concrete Repair Institute (ICRI) Guideline No. 03732- Selecting and Specifying Concrete; Surface Preparation for Sealers, Coatings and Polymer Overlays.

1.04 ADMINSTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
   1. Review conditions affecting substrate preparation.
   2. Review procedures that will be used for substrate preparation.
   3. Require attendance by Water Vapor Emission Control and Finish Flooring installers to review preparation requirements of floor finish product and flooring adhesive manufacturers

1.05 SUBMITTALS

A. Product Data: For each type of mechanical cleaning equipment used on the project.

B. CAL-Green Submittals:
   1. Dust Control Plan: Written description of materials and procedures used to control and remove dust from working area, prevent contamination of HVAC systems.

C. Informational Submittals
   1. Qualification Data: For Installer performing surface preparation.
   2. Field quality-control reports.
      a. Submit report of observations.
      b. Certify installation is complete in accordance with acceptance criteria specified.

c. Indicate supplementary instructions provided for Project specific conditions.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained in the use of the equipment and techniques required to produce the specified results.

B. Mockups: Provide field mockups to set quality standards for surface preparation execution and for preconstruction testing.
   1. Provide mockup of typical surface preparation, minimum 100 sq. ft. area. Coordinate required size with requirements for preconstruction testing.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work..

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify new concrete floors have cured minimum 28 days.

B. Examine substrates, with Installer (s) present, for compliance with requirements for surface contamination, damage, and other conditions affecting performance of the Work.

C. Examine substrate to determine repairs required to restore substrate surface to be within tolerances required for floor finishes specified in other sections, prior to completing Work of this section.

D. Examine substrate to verify surfaces prepared in accordance with this section will be suitable for application of finishes specified in other sections.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance with recommendations for methods and materials required to correct conditions before proceeding with work of this section.

F. Proceed with surface preparation only after unsatisfactory conditions have been corrected.
   1. Proceeding with surface preparations indicates acceptance and of surfaces and conditions of substrate.

3.02 SURFACE PREPARATION EQUIPMENT

A. Mechanical Cleaning Equipment: Automatic, dry shot blast type, self contained capable of recycling blast materials and collecting surface abrasions.

3.03 SURFACE PREPARATION

A. Protection: Mask and protect walls, equipment from adjacent work and finishes during installation process.

B. Mechanically clean concrete substrate and create surface profile in existing concrete substrate in accordance with ASTM D 4259 as required to meet acceptance criteria specified.
   1. Acceptable methods include shotblasting, scarifying or grinding. Grinding is only acceptable in locations unreachable by shotblast or scarification equipment.

C. Acceptance Criteria:
   1. Surface profile of ICRI CSP 3 minimum, and greater as required by coating manufacturer in related sections, all in accordance with ICRI Technical Bulletin No. 03732.

2. Tensile Strength of Concrete Surface: 200 psi minimum according to ASTM C1583 Test Method.
3. Free of laitance, oil, grease, flooring adhesive, paint, and other surface contaminants capable of affecting bond of specified floor coatings and finishes to concrete substrate.

D. If floor develops areas of surface roughness greater than ICRI CSP-4 during preparation, apply patching/leveling compound in those areas and re-abrade to produce specified profile.

E. Repair surface irregularities after cleaning.
1. Fill bugholes, spalls, cracks, deteriorated joints and other surface damage exposed or created as a result of substrate cleaning operations flush with adjacent surfaces to provide sound substrate for specified floor finish.

F. Dry broom or vacuum clean concrete substrates immediately before application of specified floor finishes in accordance with ASTM D 4258 to remove loose materials on substrate surface.

G. When field quality control report indicates portions are unsatisfactory, repeat process until field quality control report indicates there are no unsatisfactory portions remaining.
1. Areas of insufficient strength shall be ground to remove weak materials and abrasively prepared again using appropriately modified methods. Retest these areas for tensile strength until compliance is determined.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
1. Visual inspection of completed substrate preparation to verify contamination is removed.
2. Visual inspection of completed substrate preparation to verify surface profile matches ICRI profile required for specified coating or finish, using ICRI standard rubber mold for visual comparison.
3. Test tensile strength of the concrete surface according to ASTM C1583 Test Method to verify tensile strength of 200 psi minimum.
4. Prepare field quality control report. Clearly indicate the locations, extents, and conditions of areas where surface preparation does not conform to specified profile and cleanliness. Document observed conditions with digital photographs.
5. Repeat inspections when additional surface preparation for unsatisfactory conditions indicated in the previous field quality control report is completed.

3.05 PROTECTION

A. Protect prepared concrete substrates from contamination. Reclean substrates that are contaminated by construction operations prior to installation of specified floor coatings or finishes.

END OF SECTION

SECTION 09 05 12

CONCRETE FLOOR MOISTURE CONTENT AND PH TESTING

PART 1 GENERAL

1.01 SUMMARY

A. Concrete moisture content testing using relative humidity method.

B. Concrete pH testing.

1.02 RELATED REQUIREMENTS

A. Pertinent section of Division 07 specifying water vapor emission control coating.

B. Pertinent section of Division 09 specifying concrete floor preparation.

C. Division 09 flooring sections specifiying flooring and accessories requiring moisture and pH testing.

1.03 REFERENCES

A. ASTM F2170-09 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

C. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California Amendments.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

B. Scheduling: Schedule work to permit concrete moisture testing to be completed minimum one week and maximum 3 weeks before floor coverings are installed.

1.05 SUBMITTALS

A. Product Data:
   1. Submit data indicating model, manufacturer, and calibration record for relative humidity measuring equipment.
   2. Submit data for pH test material products.

B. Shop Drawings:
   1. Indicate test locations shown on building floor plan,

C. Informational Submittals:
   1. Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for concrete moisture acceptable limits. Report test results in chart form.
      a. Relative Humidity Test Method: Indicate test dates, time, depth of test well, in-situ temperature, relative humidity and pH levels.
      b. Submit record of ambient air temperature, ambient relative humidity, and floor slab surface temperature when test sites are prepared, start of test, and end of test.
      c. Indicate condition of building enclosure including position of operable windows and exterior doors when test sites are prepared, start of test, and end of test.
      d. Submit transcript of datalogger.

e. Indicate operational status of HVAC systems maintaining environmental condition of spaces where tests are conducted when test sites are prepared, start of test, and end of test.

1.06 FIELD CONDITIONS

A. Ambient Conditions:
   1. Do not perform concrete moisture testing until building is enclosed and HVAC system is operational.
   2. Maintain building test areas at design operating conditions for minimum 48 hours before, during, and continuously after conducting testing.
   3. When HVAC system is not operational at start of tests, maintain ambient conditions within test areas at 65 to 85 degrees F and 40 to 60 percent relative humidity for minimum 48 hours before, during, and continuously after conducting testing until building HVAC system is capable of maintaining design operating conditions.

PART 2 PRODUCTS

2.01 RELATIVE HUMIDITY TEST EQUIPMENT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Vaisala www.vaisala.com.
   2. Wagner Moisture Meters, Rapid RH, www.wagnermeters.com.
   3. Substitutions: Section 01 25 13.

B. Humidity and Temperature Probe and Meter: Comply with ASTM F2170.

2.02 PH TEST MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Micro Essential Laboratory www.microessentiallab.com.
   2. Substitutions: Section 01 25 13.

B. pH Test Paper: Capable of indicating minimum 7.0 to 13 pH range.

C. pH Color Gage: Furnish pH test paper manufacturer's visual color gage to identify measured pH.

D. Water: Distilled or de-ionized.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify new concrete floors have cured minimum 28 days.

3.02 PREPARATION

A. When a building HVAC system is not operational and maintaining test areas at design operational conditions, install recording hygrometer or data logger in each separate test area to record ambient temperature and relative humidity beginning 48 hours before start of tests until completion of tests within each area.

B. Identify three moisture test sites for first 1,000 sf and one moisture test site for each additional 1,000 sf of floor area receiving floor covering on each separate floor slab.
   1. Uniformly distribute test site locations throughout each test area.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform concrete moisture tests and inspections and prepare test reports.

1. Test all concrete slabs (on grade and elevated) in accordance with ASTM F-2170, not more than 45 days prior to the installation of the finished flooring. Test all floors scheduled to receive adhered floor coverings, such as hardwood, wood athletic flooring, bamboo, carpet, resilient tile, resilient sheet goods, rubber, fluid-applied, cork tile, ceramic tile, cementititious and epoxy resin terrazzo, and porcelain tile.

B. Acceptance Criteria at HVAC Design Operating Conditions:
   1. Relative Humidity Test Result: 75 percent maximum relative humidity.
   2. pH Test Result: Within alkalinity range of 7.0 to 9.0.

C. Concrete Moisture Testing – General
   1. Conduct relative humidity test at each test site.
   2. Conduct one pH test at each test site.

D. Relative Humidity Testing:
   1. Perform tests in accordance with ASTM F2170.
   2. Conduct relative humidity testing at the following depths:
      a. Slabs-On-Grade: Measure temperature and relative humidity at 40 percent of slab thickness measured from top surface.
      b. Elevated Slabs: Measure temperature and relative humidity at 20 percent of slab thickness measured from top surface.
   3. Drill test hole at each test site to accommodate test sleeve.
      a. Hole Diameter: In accordance with test equipment manufacturer's instructions.
      b. Drilling Fluids: Not permitted.
   4. Vacuum dust and debris from test hole.
   5. Insert sleeve, to the full depth of test hole. Cap or plug sleeve to prevent test hole contamination.
   6. Permit the test site to acclimate for minimum 72 hours before measuring relative humidity.
   7. Remove sleeve plug and insert probe to bottom of test hole. Allow test probe to reach temperature equilibration with concrete slab.
   8. Measure and record temperature and relative humidity at the test site.
   9. Record and report results.

E. pH Testing:
   1. Place several drops of water onto the concrete surface to form a puddle approximately 1 inch in diameter.
   2. Allow the water to set for approximately 60 seconds
   3. After 60 seconds, dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading.
   4. Record and report results.

3.04 PROTECTION

A. Protect tested concrete substrates from contamination. Reclean substrates that are contaminated by construction operations prior to installation of specified water vapor emission control coating, floor coatings or finishes.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gypsum wallboard.

B. Joint treatment and accessories.

C. Textured finish system.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 41 00 - Volatile Organic Compound (VOC) Content Restrictions.

C. Section 06 10 00 - Rough Carpentry: Building framing and sheathing.

D. Section 07 21 00 - Thermal Insulation.

E. Division 09: Pertintent sections specifying finishes installed over gypsum board substrates.

F. Section 09 7223 - Wall Panels

G. Section 09 9123 - Interior Painting.

H. Divisions 22 and 23: Pertinent sections specifying building utility systems penetrating gypsum board.

1.03 REFERENCE STANDARDS

A. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units.

B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units.

C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

D. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

E. ASTM C 635, Standard Specifications for Metal Suspension Systems.

F. ASTM C 636, Recommended Practice for Installation of Metal Suspension Systems.

G. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.

H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.

J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

K. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base.

L. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

M. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.

N. ASTM C1396/C1396M - Standard Specification for Gypsum Board.

O. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels.

P. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

Q. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

R. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

S. CISCA Ceiling Systems Installation Handbook.

T. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

U. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, "CAL-Green".

V. Division of the State Architect (DSA) Interpretation of Regulations: IR 25-3.13, Drywall Ceiling Suspension Conventional Construction One-Layer.

W. GA-214 - Recommended Levels of Gypsum Board Finish; Gypsum Association

X. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association.

Y. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association.

Z. California Building Code,Title 24, Part 2, California Building Code, Chapter 8.

AA. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc..

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.

D. Product Data: Provide data on metal framing, gypsum board, accessories, and tackboard.

E. CAL-GREEN Submittals: Product Data - VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

F. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.02 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.03 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. National Gypsum Company : www.nationalgypsum.com.
   2. USG Corporation : www.usg.com.
   3. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
   3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
      a. Mold resistant board is required at all locations.
   4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   5. Thickness:
      a. Vertical Surfaces: 5/8 inch.
   6. Mold Resistant Paper Faced Products:
      a. National Gypsum Company; Gold Bond XP Gypsum Board .
      b. USG Corporation: www.usg.com.
      c. Substitutions: See Section 01 25 13 - Product Options and Substitutions.
   7. Glass Mat Faced Products:
      a. National Gypsum Company; Gold Bond eXP Fire-Shield Interior Extreme Gypsum Panel.
      b. USG Corporation; USG Sheetrock Brand Glass-Mat Panels Mold Tough.
      c. Substitutions: See Section 01 60 00 - Product Requirements.
      d. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

C. Backing Board For Wet Areas: One of the following products:
   1. Application: Surfaces behind tile in wet areas including Toilet Rooms.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
      a. Thickness: 5/8 inch.
      b. Products:
         1) National Gypsum Company; PermaBase Cement Board: www.nationalgypsum.com.
         2) USG Corporation : www.usg.com.
         3) Substitutions: See Section 01 25 13 - Product Options and Substitutions.
   4. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
      a. Fire Resistant Type: Type X core, thickness 5/8 inch.
      b. Products:
         1) National Gypsum Company; Gold Bond eXP Tile Backer.
         2) USG Corporation: www.usg.com.
         3) Substitutions: See Section 01 25 13 - Product Options and Substitutions.

D. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 5/8 inch.
3. Edges: Tapered.

2.04 ACCESSORIES

A. Acoustic Insulation: Acoustic fiberglass batt type specified in Section 07 21 00.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated. Mechanically fastened.
1. Types: As detailed or required for finished appearance.
2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.

D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions. Water resistant where used with water resistant backer board.
1. Tape: 2 inch wide, coated glass fiber tape for joints and corners , except as otherwise indicated.
2. Tape: 2 inch wide, creased paper tape for joints and corners , USG "Perf-A-Tape", or equal.
3. Ready-mixed vinyl-based joint compound.
4. Chemical hardening type compound.

E. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

F. Textured Finish Materials: Latex-based compound; plain.

G. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

H. Screws: ASTM C 1002; self-drilling type . Lengths as required for minimum penetration into support members per reference standards.
1. For Wood: "Type W".
2. For Metal: "Type S".
3. For joint backing: "Type G".

I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

J. Adhesives
1. Modified contact adhesive: As recommended by the gypsum board manufacturer and having a placement time before setting of at least 15 minutes.
2. Joint compound adhesive: As recommended by the gypsum board manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

B. Verify that framed substrates demonstrate flatness characteristics such that work of this section will meet specified tolerances.

3.02 INSTALLATION - GENERAL

A. Install materials in accordance with gypsum board application and finishing standards referenced.

1. Single layer application: Screw attachment.
2. Float interior angles, except where required to conform to fire or acoustical separation requirements.
3. Do not install scored, scratched, broken, damp, or otherwise damaged boards.
4. Smooth cut edges and ends to obtain neat fitting joints.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.
   3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.04 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

D. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

E. Cementitious Backing Board: Install over wood framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

F. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:
   1. Single-Layer Applications: Screw attachment.
   2. Double-Layer Applications: Install base layer using screws. Install face layer by screws.

G. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

H. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as directed.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials .

3.06 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.

B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

C. Finish gypsum board in accordance with levels defined in ASTM C 840, and required by Section 09 9000 Painting and Coating, as follows:
   1. Level 5: Corridor walls to receive eggshell paint finish.
   2. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   3. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   4. Level 3: Walls to receive textured wall finish.
   5. Level 3: Ceilings to receive glued on acoustical ceiling tiles.
   6. Level 2: Behind cabinetry and on backing board to receive tile finish.
   7. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board, Tack Board, or Cementitious Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile: Ceramic tile for wall, and interior applications.

B. Cementitious backer board as tile substrate.

C. Coated glass mat backer board as tile substrate.

D. Ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 41 00 - Volatile Organic Compound (VOC) Content Restrictions

C. Section 06 10 00 - Rough Carpentry: Wood frame substrates.

D. Section 08 31 00 - Access Doors.

E. Pertinent Sections specifying work penetrating tile surfaces.

1.03 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium).
   1. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.
   2. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement.
   3. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive.
   4. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
   5. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy.
   6. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout.
   7. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout.
   8. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework.
   9. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units.
   10. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.
   11. American National Standard Specifications for Latex-Portland Cement Mortar A118.4
   12. ASTM C373 - Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products, Ceramic Tiles, and Glass Tiles.
   13. American National Standard Specifications for Polymer Modified Cement Grouts for Tile Installation A118.7

B. Manufacturer's specifications and recommendations for mounting in exterior or wet areas.

C. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

D. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

E. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

F. Division of the State Architect Interpretation of Regulations (IR) 23-3: Approved Alternate for Toilet Room Curb, latest edition.

G. TCNA (HB) - Handbook for Ceramic Tile Installation; Tile Council of North America, Inc..

1.04 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
   1. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

B. Module Size: Actual tile size plus joint width indicated.

C. Face Size: Actual tile size, excluding spacer lugs.

D. Large Format Tile: Tile that is greater than 15 inches (381 mm) in width or length.

E. Wet Area: Includes tile surfaces that are either soaked, saturated, or regularly and frequently subjected to moisture such as tub enclosures, showers, swimming pools, commercial kitchens and exterior areas.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, grout sealer and accessories. Include instructions for using grouts and adhesives.
   1. Identify additional requirements and areas where manufacturer's installation instructions differ from TCNA documents.

C. CAL-GREEN Submittals:
   1. Product Data – VOC Limits: For adhesives, sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Product Data - Low/No-VOC Paints, Coatings and Tile Sealers. Provide certification that all primers and coatings meet VOC emission limits specified in in related section. List manufacturer, brand, application, type (flat or non-flat), number of gallon, and the VOC emissions in grams/liter. Include MSDS and product data sheet indicating VOC limits for each product provided.

D. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

E. Samples for Selection:
   1. Two manufacturer color charts consisting of actual tiles or sections of tile showing full range of standard and custom colors, textures and patterns available for each type of tile indicated.

2. Grout and accessories requiring color selection.

F. Installation Instructions: Manufacturer's printed instructions for each product.

G. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

H. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 25 13 - Product Options and Substitutions, for additional provisions.
2. Extra Tile: 1 percent of each size, color, and surface finish combination , but not less than 10 square feet of each type.
3. Leftover Materials: all leftover materials not installed.

1.06 QUALITY ASSURANCE

A. Maintain one copy of the most recent edition of ANSI A108/A118/A136.1 and TCNA (HB) on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

C. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.07 MOCK-UP

A. See Section 01 45 00 - Quality Control, for general requirements for mock-up.

B. Construct tile mock-up in a mutually accepted location, incorporating all components specified for the location. Minimum size 8 feet long by full height of indicated tile extent.

C. Approved mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.
1. Provide heated and dry storage facilities on site.

B. Package labeling in accordance with ANSI A137.1. Retain labels and packaging until disposal is authorized by Architect.

C. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions. Do not use frozen materials.

D. Deliver and store materials on site at least 24 hours before work begins.

1.09 FIELD CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

PART 2 PRODUCTS

2.01 DESIGN REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Expansion Joints: In accordance with EJ-171 of the Tile Installation Handbook. Provide at expansion joints in the backing materials, cold joints in concrete substrate or where backing materials change.
   1. Exterior Work and Interior Wet Locations: Provide on all surfaces maximum 12-feet on center in both axes.
   2. Interior Work, not otherwise specified: Provide on continuous wall areas at intervals of 24-feet.

D. Wainscots: Make top course full uncut tile. Extend wainscot to higher elevation by adding horizontal courses of tile as required to completely surround access panels, switch or outlet covers with finished tile. Do not permit these items penetrating tile surfaces to split the boundary of the tile surface.

2.02 TILE

A. General:
   1. Field and accent tiles shall be of the same caliper.
   2. Each room with tile in each building shall have a separate color scheme.
   3. Field colors to be selected from price group 2, accent colors to be selected from premium price groups. Allow for one accent color to be selected from price groups 3 or 4, minimum per tile type at each separate location unless noted otherwise below.

B. Manufacturers: All products by the same manufacturer.
   1. Dal-Tile Corporation: www.daltile.com.
   2. Substitutions: See Section 01 60 00 - Product Requirements.
   3. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

C. Glazed Wall Tile : ANSI A137.1, standard grade.
   1. Moisture Absorption: 7.0 to 20.0 percent as tested in accordance with ASTM C373.
   2. Size: 8 x 8 inch, nominal.
   3. Edges: Cushioned.
   4. Surface Finish: Semi-gloss.
   5. Color: Field colors To be selected from manufacturer's standard range Price Group 1 or 2 , and two accent colors selected from Price Groups 1, 2 or 3.
   6. Pattern: As indicated; if none indicated, allow for field and two accent colors (three colors) and request pattern.
   7. Trim Units: Matching bead, bullnose, cove, and base shapes in sizes coordinated with field tile.
   8. Products:
      a. Daltile; Keystones™ Mosaic Colorbody.

2.03 TRIM AND ACCESSORIES

A. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
   1. Applications:
      a. Open Edges: Bullnose.
      b. Inside Corners: Coved.
      c. Floor to Wall Joints: Cove base.
   2. Manufacturers: Same as for tile.

2.04 SETTING MATERIALS

A. Acceptable Manufacturers:
   1. Bostik Inc: www.bostik-us.com.
   2. Custom Building Products; 13001 Seal Beach Blvd., Seal Beach, CA 90740, (800) 272-8786 John Gallup - (209) 518-1153 johng@cbpmail.net, www.custombuildingproducts.com
   3. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

B. Source Limitations: Provide tile grout, setting materials, additives, and factory-prepared dry-set mortars and surface preparation materials, waterproofing and crack isolation membranes, and self-leveling underlayments from the same manufacturer.

C. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
   1. Applications: Where indicated on drawings and as required by TCNA methods specified.
   2. Products:
      a. Bostik Inc: www.bostik-us.com.
      b. Custom Building Products; EBMLite - Lightweight Epoxy Bonding Mortar or CEGLite - Lightweight Commercial Epoxy Grout - Setting and Grouting Epoxy www.custombuildingproducts.com.
      c. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

2.05 GROUTS

A. Manufacturers:
   1. Bostik Inc: www.bostik-us.com.
   2. Custom Building Products: www.custombuildingproducts.com
   3. Substitutions: See Section 01 25 13 - Product Options and Substitutions

B. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout with a VOC content of 65 g/L or less and a System Warranty of Twenty-Five Years.
   1. Applications: Where indicated.
   2. Color(s): As selected by Architect from manufacturer's full line.
   3. Products:
      a. Bostik Inc: www.bostik-us.com.
      b. Custom Building Products; CEGLite Lightweight Commercial Epoxy Grout.

2.06 MAINTENANCE MATERIALS

A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
   1. Applications: Between tile and plumbing fixtures.
   2. Color(s): As selected by Architect from manufacturer's full line.
   3. Products:
      a. LATICRETE International, Inc ; LATICRETE LATASIL: www.laticrete.com.
      b. ProSpec, an Oldcastle brand ; ProColor Advantage Caulk: www.prospec.com.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout that does not change color or appearance of grout. Colorless, no-sheen, water-based penetrating slip and stain-resistant sealer, not affecting color or physical properties of surfaces as recommended by tile manufacturers..
   1. Composition: Water-based colorless silicone.
   2. Products:
      a. Aqua Mix® Sealers Choice® Gold as manufactured by CUSTOM Building Products, www.custombuildingproducts.com www.custombuildingproducts.com.
      b. DuPont™ StoneTech® Professional Impregnator Pro® Sealer as manufactured by Dupont, www2.dupont.com as supplied by Laticrete, www.laticrete.com.
      c. MAPEI Corporation, www.mapei.com, Ultracare™ line of products.
      d. Miracle, www.miraclesealants.com, Impregnator 511 (Original).
      e. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 ACCESSORY MATERIALS

A. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

B. Backer Board: Coated glass mat type complying with ASTM C1178/C1178M; inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.

C. Mesh Tape: 2 inch wide self-adhesive fiberglass mesh tape.

D. Cleaning solutions
   1. Glazed tile: Acid or pH-neutral solutions as approved by the grout and tile manufacturers.
   2. Unglazed Tile: Clean with pH-neutral solutions.

E. Tile Polish: As recommend by tile and grout manufacturers.

2.08 MIXES

A. Proportion and mix materials in accordance with manufacturer's instructions and applicable ANSI standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine, with installer present, surfaces to receive tile work and conditions under which tile will be installed. Do not proceed with tile work until surfaces and conditions comply with requirements indicated in referenced tile installation standards and manufacturer's printed instructions. Prepared substrates to be in accordance with ANSI A108, A3.1 and Tile Council of North America (TCNA) recommendations.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances. Shim wood framing substrates to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

E. Blend tile before installation and ensure that variations are uniform in each location.

3.03 INSTALLATION - GENERAL

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCNA Handbook recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
   1. Align joints when adjoining tile on floor, base, walls and trim are same size.
   2. Layout tile work and center tile fields in both directions in each space or on each wall area.
   3. Provide minimum 1/2 tile at field edges.
   4. Adjust to minimize tile cutting. Provide uniform joint widths.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.

F. Form internal angles square and external angles bullnosed.

G. Accurately form intersections and returns.
   1. Perform cutting and drilling of tile without marring visible surfaces.
   2. Carefully grind cut edges of tile abutting trim, finish or built-in items to produce straight aligned joints.
   3. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.
   4. Terminate tile at center line of doors, unless otherwise indicated.
   5. Ensure that joints are symmetrical and that tile surfaces are plumb, true to line, and parallel to the room axis

H. Sound tile after setting. Replace hollow sounding units.

I. Install expansion and control joints in accordance with TCNA method EJ171.

J. Keep control and expansion joints free of mortar, grout, and adhesive.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints. Conform to requirements of ANSI A108.10.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

N. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
   1. Seal joint between wainscots and fixtures; seal around pipes penetrating wainscots. Tool exposed sealant joints to a uniformly smooth surface without laps, sags or depressions.

O. Grout Sealing: Test sealer before application and assure that sealer will not stain grout.
   1. Test sealer before application and assure that sealer will not stain grout.
   2. Seal joints between wainscots and fixtures, seal around pipes pentrating wainscots.
   3. Tool exposed sealant joints to uniform smooth surface without laps, sags or depressions.

P. Cracked, split, chipped, misaligned or broken tiles will not be accepted in finished work.

3.06 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA Handbook Method W244C. using membrane at toilet rooms.

B. Over coated glass mat backer board on studs, install in accordance with TCNA Handbook Method W245, using membrane at toilet rooms.

3.07 GROUTING

A. Grout joints in accordance with manufacturer's instructions and ANSI A108.10.

B. Clean sanding water, dust, and foreign substances from joints to be grouted.

C. Clean and dry tile surfaces.

D. After grouting, remove all grout residue promptly.

3.08 TOLERANCES

A. Variation from Plumb: For vertical joints, external corners, and other conspicuous lines, do not exceed 1/8 inch in 10 feet.

B. Variation in Level: For horizontal joints and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 -inch (12 mm) maximum.

C. Maximum Variation of Surface Flatness For Tile Walls: 1/8 inch in ten feet, non-cumulative.

D. Variation in Plane between Adjacent Units (Lipping): Do not exceed the following differences between faces of adjacent units as measured from a straightedge parallel to stone tiled surface:
   1. Units with Polished Faces: 1/64 -inch (0.4 mm).
   2. Units with Honed Faces: 1/32 -inch (0.8 mm).
   3. Units with Sand-Rubbed Faces: 1/32 -inch (0.8 mm).
   4. Units with Thermal-Finished Faces: Depth of thermal finish or 3/16 -inch (5 mm), whichever is less.
   5. Units with Natural-Cleft Faces: Depth of natural-cleft finish or 3/16 -inch (5 mm), whichever is less.

E. Variation in Joint Width: Do not vary joint thickness more than 1/16 -inch (1.6 mm) or one-fourth of nominal joint width, whichever is less.

F. Correct surfaces if tolerances are not as specified.

G. Correct defects by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas for compliance.

3.09 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Allow grout to cure 14 days before cleaning. Clean all ceramic tile surfaces so they are free of foreign matter. Flush surface with clean water before and after cleaning.

C. Clean tile and grout surfaces.

D. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning.

E. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.10 PROTECTION

A. Walls: Protect from impact, vibration and heavy hammering on adjacent and opposite walls for at least 14 days after installation, unless manufacturer's instructions allow a shorter period.

B. Protect from food products and chemicals which can cause staining for at least 14 days.

C. Protect from freezing and total water immersion for at least 21 days after installation.

END OF SECTION

SECTION 09 51 00

SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system, seismically restrained.

B. Acoustical units.

1.02 RELATED REQUIREMENTS

A. Section 07 21 00 - BOARD AND BATT BUILDING INSULATION: Acoustical insulation.

B. Section 08 31 00 - Access Doors and Panels: Access panels.

C. Division 23: Pertinent sections specifying mechanical work above and in ceilings.

D. Divisions 26-28: Pertinent sections specifying electrical work above and in ceilings.

1.03 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

D. CISCA (Ceilings and Interior Systems Contractors Association) - Acoustical Ceilings: Use and Practice.

E. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc..

F. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, "CAL-Green".

G. California Building Code (CBC), Title 24, Part 2, Section 1616A.

H. Division of the State Architect (DSA) Interpretation of Regulations (IR) 25-2.13: Metal Suspension Systems for Lay-In Panel Ceilings, 2013 CBC, revised 2/10/2016..

I. ASCE 7-10, Minimum Design Loads for Buildings and Other Structures, American Society for Civil Engineers

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Shop Drawings: Indicate layout and related dimensioning, mechanical and electrical items installed in the ceiling, and locations and spacing of seismic restraint elements.

D. Product Data: Provide data on suspension system components and acoustical units.

E. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

F. Samples: Submit two samples 12 by 12 inch in size illustrating material and finish of acoustical units.

G. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

H. Manufacturer's recommendations for cleaning and refinishing acoustical units and suspension system, including precautions against materials and methods detrimental to finishes and acoustical performances.

1.06 QUALITY ASSURANCE

A. Conform to CISCA requirements.

B. Requirements of regulatory agencies: Conform to governing codes and regulations. All materials shall be UL tested, listed and labeled.

C. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 PROJECT CONDITIONS

A. Before installation acoustical material, ensure that temperature and humidity conditions approximate interior conditions to exist when room is occupied. Maintain this conditions during and after installation.

B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 70 percent prior to, during, and after acoustical unit installation.

C. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

D. Install acoustical units after interior wet work, including painting and coating, is dry.

E. Protect completed work above suspension system from damage during installation of suspension system components.

1.08 EXTRA MATERIALS

A. See Section 01 77 00 - Contract Closeout for additional provisions.

B. Provide 10% additional panels for Owner use.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Design Load Requirements:
   1. Hangers and Connections: Capable of carrying at least five times design load indicated in ASTM C 635; and minimum of 100 pounds.
   2. Ultimate strength of connections in tension of at least 280 pounds or twice actual load whichever is greater.

B. VOC Limits for adhesives, sealants, fillers, primers and coatings. Comply with limits specified in related section.

C. Surface burning less than 25 in accordance with ASTM E 84.

2.02 MANUFACTURERS

A. Acoustic Panels:
   1. Armstrong World Industries, Inc.: www.armstrong.com.
   3. USG.: www.usg.com.
   4. Substitutions: See Section 01 25 13 - Product Options and Substitutions

B. Suspension Systems:
   1. Same as for acoustical units.
   2. Substitutions: See Section 01 25 13 - Product Options and Substitutions

2.03 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A, and ANSI S12.60

B. Acoustical Panels: Mineral fiber
   1. Size: 24 x 48 inches.
   2. Light Reflectance:. 85 LR determined in accordance with ASTM E1264.
   3. NRC Range:. 70 min, determined in accordance with ASTM E1264.
   4. CAC rating 40
   5. Recycled Content 55%
   6. Fire Hazard Classification: Class A (Flame spread 25 or under), UL Labeled.
   7. Panel Edge: square lay-in
   8. Surface Color: White.

C. Basis of Design: Armstrong 'Fine Fissured' High Acoustics.

2.04 SUSPENSION SYSTEM

A. Suspension System: 15/16" Heavy duty, white exposed tee system, with lateral bracing and compression struts as indicated on drawings.

B. Basis of Design: Armstong 'Prelude XL.'

2.05 ACCESSORIES

A. Support Hangers, stabilizer bars, clips, splices: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Ceiling Suspension Wire: Class 1 zinc coated (galvanized) carbon steel conforming to ASTM A641-09a, #12 gage (0.106 inch diameter) with soft temper and minimum tensile strength = 70 ksi.

C. Galvanized Sheet Steel (including that used for metal stud and track compression struts/posts): ASTM A653-11, or other equivalent sheet steel listed in Section A2.1 of the North American Specification for the Design of Cold-Formed Steel Structural Members 2007, including supplement 2 dated 2010 (AISI S100-07/S2-10).
   1. Material 43 mil (18 gage) and lighter: minimum yield strength of 33 ksi.
   2. Material 54 mil (16 gage) and heavier: minimum yield strength of 50 ksi.

D. Electrical Metallic Tube (EMT): ANSI C80.3/UL 797 carbon steel with G90 galvanizing; minimum yield strength (Fy) of 30 ksi and minimum ultimate strength (Fu) of 48 ksi.

E. Sheet Metal Screws: ASTM C1513-10, ASME B18.6.4-89 (R2005). Length as required so that penetration of screws through joined material shall not be less than three exposed threads.

F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636 and manufacturer's instructions, UBC Standard 25-2, as required by California Code of Regulations, DSA IR-25-2.13, and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Coordinate layout with lighting fixtures, air outlets, partitions and other adjoining work.

J. Seismic Restraints: install in accordance with ASTM E 580, referenced standards and governing codes.

K. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

M. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

N. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

3.03 FACILITY SERVICES WITHIN THE CEILING:

A. Positively attach all flexible sprinkler hose fitting mounting brackets, ceiling-mounted air terminals, light fixtures, and other similar facility service items to the ceiling suspension systems by means of screws or approved fasteners with a minimum of two attachments required at each component.

B. Provide #12 gage slack safety wire (s) attached from the service item to the structure above to each item as described below:
   1. Items weighing less than or equal to 20 lb. shall have one (1) safety wire.
   2. Items weighing more than 20 lb. but less than or equal to 56 lb. shall have two (2) safety wires (at diagonal corners).

3. Items weighing more than 56 lb. shall be supported directly from the structure above by not less than four (4) taut #12 gage hanger wires or other approved hangers attached from the item to the structure above.

C. Miscellaneous Devices: Attach all lightweight miscellaneous devices, such as strobe lights, occupancy sensors, speakers, exit signs, video cameras, etc., to the ceiling grid.
   1. For Devices weighing more than 10 lbs., provide #12 gage slack safety wire anchored to the structure above.
   2. For Devices weighing more than 20 lb., provide support independently from the structure above.

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 TESTING

A. Perform all field testing in the presence of the project inspector.

B. Post-Installed Anchors In Concrete: Field test power actuated fasteners for 200 lbs. in tension.
   1. Hanger Wire Anchors: Test at a frequency of 10 percent.
   2. Bracing Wire Anchors: Test at a frequency of 50 percent in accordance with CBC Section 1913A.7.
   3. All Other Post-Installed Anchors: Test in accordance with CBC Section 1913A.7.

3.07 CLEANING

A. Comply with requirements of Section 01 7000.

B. Clean soiled surfaces in accordance with manufacturer's printed instructions. Remove and replace, with new materials, tiles and suspension systems that are damaged or cannot be acceptably cleaned to the Architect's satisfaction.

C. Repainting exposed parts of suspension system shall be with a paint type and application method recommended for use over metal surfaces.

D. Upon completion of the work, remove all materials, containers, equipment and debris. Leave area in a clean condition.

END OF SECTION

SECTION 09 51 53
DIRECT-APPLIED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustic units.

1.02 RELATED REQUIREMENTS

A. Section 01 41 00 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. ASTM E1264 - Standard Classification for Acoustical Ceiling Products.

C. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

D. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide data on acoustic units and accessories.

C. CAL-GREEN Submittals: Product Data - VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Shop Drawings: Indicate tile layout and related junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system and other ceiling-related work.

E. Samples: Submit two samples, 6 by 6 inch in size, illustrating material and finish of acoustic units.

F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention .

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of documented experience.

1.06 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after installation.

1.07 PROJECT CONDITIONS

A. Sequence work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustic units after interior wet work is dry.

1.08 EXTRA MATERIALS

A. Provide 100 sq ft of extra units to Owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Tile:
1. Armstrong World Industries, Inc.: www.armstrong.com.
2. USG : www.usg.com.

B. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

2.02 MATERIALS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Acoustic Tile: ASTM E1264; and in compliance with the following requirements.
1. Size: 12 by 12 inches.
2. Thickness: 5/8 inches.
3. Composition: Mineral.
4. Light Reflectance: 85 percent.
5. NRC Range: .45 to .55.
6. CAC Rating: 35
7. Fire hazard Classification: Class A (Flame Spread 25 or under), UL Labeled.
8. Surface Burning Characteristics: Flame spread index of 0-25, smoke developed index of 0-450, when tested in accordance with ASTM E84.
9. Joint: Kerfed.
10. Edge: Staple Flange.
11. Surface Color: White.
12. Surface Finish: Perforated .
13. Product: "Radar #2570" by U.S. Gypsum.

C. Staples: per manufacturer's requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION

A. Install system in accordance with manufacturer's instructions.

B. Center tile on room axis leaving equal border units.

C. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.

D. Install acoustic units level in uniform plane.

3.03 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 41 00 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 30 00 - Cast-In-Place Concrete.

C. Pertinent sections specifying Concrete Floor Preparation, Concrete Floor Moisture Content & pH Testing and Water Vapor Emission Control Coating (Moisture Mitigation System).

1.03 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile.

D. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing.

E. ASTM F1344 - Standard Specification for Rubber Floor Tile.

F. ASTM F1861 - Standard Specification for Resilient Wall Base.

G. ASTM F2195 - Standard Specification for Linoleum Floor Tile.

H. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

I. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

J. ASTM F 1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride, latest Edition.

K. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

D. CAL-GREEN Submittals:

1. Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
2. Product Data – Resilient Flooring: Documentation from an independent testing agency indicating compliance with the FloorScore Standard, or evidence of listing on the RFCI FloorScore database, or evidence of listing on the CHPS Product Registry.

E. Shop Drawings: Indicate floor pattern layout and color selections for each field and accent color. Request floor patterns from Architect where no patterns are indicated.

F. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

G. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient flooring product specified.

H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.05 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.06 EXTRA MATERIALS

A. See Section 01 60 00 - Product Requirements, for additional provisions.

B. See Section 01 25 13- Product Options and Substitutions, for additional provisions.

C. Provide 100 sq ft of flooring, 50 lineal feet of base, of each type and color specified.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Resilient Flooring VOC Emission Limits: Comply with CAL-GREEN 5.504.4.6; products must be listed on one of the following databases.
1. Collaborative for High Performance Schools (CHPS) 2009 CA Criteria and Low Emitting Materials List (Product Registry); www.chpsregistry.com/live/public.
2. Resilient Floor Covering Institute (RFCI) FloorScore Program, database of certified products; www.scscertified.com/products/index.php.

C. ASTM D2047 Slip-Resistance: All Resilient Flooring Products shall meet or exceed Federal ADA recommendations of minimum Coefficient Of Friction of 0.6 for flat surfaces and 0.8 for sloped surfaces.

D. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.

2.02 TILE FLOORING

A. Vinyl Composition Tile: Homogeneous with color extending throughout thickness.
1. Manufacturers:
   a. Armstrong Workd Industies, Inc; www.armstong.com.
2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.

3. Critial Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
4. Tile shall be slip resistant.
5. Tile Size: 12 x 12 inches.
6. Thickness: 0.125 inch.: low maintenance Forbo Topshield or equal.
7. Pattern: Armstrong "Standard Excelon"
9. Color: To be selected by Architect from manufacturer's full range Allow for three color pattern.

2.03 RESILIENT BASE

A. Base: Type TP, rubber, thermoplastic; top set Style B, Cove:
   1. Manufacturers:
      a. Burke Flooring : www.burkemercer.com.
      b. Roppe Corp : www.roppe.com.
      c. Substitutions: See Section 01 25 13 - Product Options and Substitutions.
   2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
   3. Height: 4 inch.
   4. Thickness: 0.125 inch thick.
   5. Finish: Satin.
   6. Length: Roll.
   7. Color: Color as selected from manufacturer's standards.
   8. Accessories: Premolded external corners and internal corners.

2.04 WATER VAPOR EMISSION CONTROL COATING

A. Type specified in Section 07 26 33.

2.05 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
   1. Exception: Provide grey cementitious types where required by flooring manufacturers.

B. Primers, Adhesives, and Seam Sealer: Waterproof; two part polyurethane types recommended by flooring manufacturer.

C. Moldings, Transition and Edge Strips: Rubber.
   1. Types as indicated or required for specific applications.

D. Filler for Coved Base: Plastic.

E. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

B. Cementitious Subfloors:
   1. Verify that substrates have been prepared and tested for moisture content and pH as specified in related sections.
   2. Verify preparation of substrate to specified flatness and levelness tolerances.
   3. Verify installation of Water Vapor Emission Control Coating (Moisture Mitigation System Coating) as specified in related section is complete.

4. Verify that concrete sub-floor surfaces with Water Vapor Emission Control Coating are ready for resilient flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
   a. Test completed Water Vapor Emission Control Coating in accordance with ASTM F1869.

C. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. If test results from Section 09 05 12 are within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer, prepare floor substrates for installation of flooring in accordance with Section 09 05 11 and as recommended by flooring and adhesive manufacturers.

B. If test results from Section 09 05 12 are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer, verify installation of Water Vapor Emission Control Coating as specified in Section 07 26 33 is complete.

C. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface. Repair damage to Water Vapor Emission Control Coating where occurs and re-test as specified in Section 07 26 33.

D. Prohibit traffic until filler is fully cured.

E. Clean substrate.

F. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints and butt seams tightly.

E. Set flooring in place, press with heavy roller to attain full adhesion.

F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 TILE FLOORING

A. Install in accordance with manufacturer's instructions.

B. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Set flooring in place, press with heavy roller to attain full adhesion.

E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
   1. Lay grain all in one direction.

F. Lay out floor tile pattern for approval by Architect.

G. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.

H. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.05 RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 120 inches between joints.

B. At inside and outside corners, use premolded units. At exposed ends, use premolded units.

C. Use 120 foot roll. Roll out base during installation. Use maximum lengths with minimal joints.

D. Install base on solid backing. Bond tightly to wall and floor surfaces.

E. Scribe and fit to door frames and other interruptions.

3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

C. Clean, seal, and wax resilient flooring in accordance with manufacturer's instructions using manufacturer recommended products.

3.07 PROTECTION AND ADJUSTING OF FINISHED WORK

A. Prohibit traffic on resilient flooring for 48 hours after installation.

B. Linoleum "Drying Room Film": Expose installed linoleum to either natural or artificial light to allow "drying room film" (the yellow film is a natural occurrence of the oxidation of the linseed oil in linoleum products) on installed linoleum flooring to disappear prior to initiating temporary protection procedures.

C. Protect flooring during construction period in accordance with resilient flooring manufacturer's directions.
   1. Protect resilient flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishings across floors.
   2. Cover resilient flooring with undyed, untreated building paper until inspection for substantial completion.

D. Adjusting: Following Owner's move-in, replace resilient flooring indicated as damaged by move-in operation, up to five percent of completed floor area.

END OF SECTION

SECTION 09 67 00

FLUID-APPLIED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid-applied flooring and base.
   1. Medium Duty.

B. Divider strips and accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 – Cast-in-place Concrete

B. Section 06 10 00 – Rough Carpentry

B. Section 07 92 00 - Joint Sealants: Sealing joints between fluid-applied flooring and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

A. ASTM C 307 - Standard Test Method for Tensile Strength of Chemical Resistant Mortar, Grouts, and Monolithic Surfacings.

B. ASTM C 413 - Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

C. ASTM C579 - Standard Test Method for Compressive Strength of Chemical Resistant Mortar, Grouts, Monolithic Surfacings and Polymer Concretes.

D. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.

E. ASTM D905 - Standard Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading.

F. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine, 2004.

G. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact), 2010.

H. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

I. MIL-PRF-24613A, Performance Specification: Deck Covering Materials, Interior, Cosmetic Polymeric (03 Nov 2007).

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available. Demonstrate compliance with specified attributes.

C. VOC Submittals:
   1. Product Data - VOC Limits: For adhesives sealants, fillers and primers, documentation including printed statement of VOC contents.

D. Qualifications: For Manufacturer and Applicator. Demonstrate compliance with specified attributes.

E. Samples: Submit two samples, 6 x 6 inch in size illustrating color and pattern for each floor material for each color specified.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section.
   1. Approved by manufacturer.

C. Manufacturer's representative shall be available to advise applicator on proper surface preparation and application techniques.

1.06 MOCK-UP

A. Following review of complete submittals, Provide complete mock-up, 6 feet long by 6 feet wide, illustrating finish color and texture.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store resin materials in a dry, secure area.

B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.08 PROJECT CONDITIONS

A. Sequence cabinet base and wall finish installation prior to fluid flooring to enable installation of integral coved flooring base in a single operation.

B. Coordinate fluid flooring installation with size, location and installation of service utilities.

1.09 FIELD CONDITIONS

A. Maintain minimum temperature in storage area of 55 degrees F.

B. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fluid-Applied Flooring:
   1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
   2. Crossfield Products Corp;: www.crossfieldproducts.com.
   3. Sherwin-Williams Company: General Polymers Brand; : www.generalpolymers.com.
   4. Tera-Lite, Inc.; www.tera-lite.com
   5. Stonhard, www.stonhard.com.

B. Substitutions: See Section 01 25 13 – PRODUCT OPTIONS AND SUBSTITUTIONS

2.02 MATERIALS

A. VOC Limits for adhesives sealants, fillers, coatings and primers. Comply with limits specified in Section 01 41 00.

B. Provide Fluid-Applied Flooring with specified adhesion to concrete floors at up to 100% Relative Humidity as measured by ASTM D 2170, in situ probe testing.

C. Fluid-Applied Troweled Flooring System, Medium Duty Type FF1: Epoxy, polymer modified, water-dispersed cementitious, three component, nominal 3/16 inch thickness.
   1. Products:
      a. BASF Construction Chemicals-Building Systems: Selbatwede HD; www.buildingsystems.basf.com.
      b. Crossfield Products Corp: Cheminert CFS: www.crossfieldproducts.com.
      c. Sherwin-Williams Company: General Polymers Brand; TPM 115-U1: www.generalpolymers.com.
      d. Stonhard; Stoneshield HRI; www.stonhard.com.
      e. Tera-Lite; Tera-Gem III Decorative Quality (DQ) Troweled.
      f. Substitutions: See Section 01 6000 - Product Requirements.
   2. Components:
      a. Epoxy Primer: Manufacturer's standard penetrating two-component type.
      b. Base Coat: 1/8 inch thick; selected color, three component mortar consisting of epoxy resin, curing agent and finely graded aggregates.
      c. Undercoat (Receiving Coat): 100% solids epoxy formulation, three component, free-flowing.
      d. Top Coat: Epoxy, single component; UV resistant, 1/16 inch thick; clear color.
      e. Non-slip Surfacing: Quartz Aggregate, manufacturer's standard integral color type, suitable for broadcast application, selected color blend. Install to produce Coefficient of Friction between 0.7 and 0.8
   3. Performance Criteria:
      a. Tensile Strength: 1,700 psi, when tested in accordance with ASTM D 307.
      b. Compressive Strength: 10,000 psi, when tested in accordance with ASTM C 579.
      c. Water Absorption: <0.1 percent, when tested in accordance with ASTM C 413 for 24 hr.
      d. Mildew Resistance: No growth.
      e. Adhesion in Shear (Bond) Strength: 300 PSI or failure of concrete bond minimum, when tested in accordance with ASTM D4541.
      f. Impact Resistance: 60 in/lb; no cracking, chipping or delamination, when tested in accordance with ASTM D2794 or MILPRF24613.
      g. Flammability: Self-Extinguishing (Class I) per ASTM E648.
      h. Color: Selected from full range of available colors. Minimum of 7 colors in product line.
      i. VOC Content: 100 g/l or less.
      j. Coefficient of Friction, Installed: 0.60 minimum, wet, measured in accordance with ASTM D2047.

2.03 ACCESSORIES

A. Divider Strips: Zinc, 1/8 inch thick, height to match flooring thickness, with anchoring features; color as selected. At transitions to dissimilar flooring.

B. Base caps: Type recommended by manufacturer for conditions required.

C. Cant Strips: Molded of flooring resin material.

D. Primer: Type recommended by manufacturer for substrate and body coats indicated.

E. Patching and Fill Material: Resinous product of or approved by epoxy coating manufacturer and recommended by manufacturer for application indicated.

F. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.

G. Sealant: manufacturer's recommended type, suitable for conditions required.

H. Cleaners: Heavy-duty industrial detergent, manufacturer's recommended type, suitable for conditions required.

I. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of materials to sub-floor surfaces.

B. Verify that sub-floor surfaces are sloped to drain, free of ponding areas or conditions which would impair positive drainage when installation is complete. Flood-test with water to confirm free drainage.

c. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Prepare substrates using mechanical means and industrial cleaners/detergents, recommended by flooring manufacturer in writing. Provide substrate surface meeting recommendations of flooring manufacturer for installation.

C. Surface Preparation (Compromised Overlay): Chip back or cut out damaged or unconsolidated overlay at damaged areas to sound and intact overlay.
   1. Prepare exposed substrate (or overlay) by mechanical cleaning per SSPC-SP13/NACE No. 6 Surface Preparation of Concrete, creating a CSP 5 to 9 per ICRI Technical Guideline No. 03732. Leave all surfaces clean and dry.

D. Crack Repair: Repair concrete slab cracks as recommended, using materials recommended by the flooring manufacturer and included in their warranty. Quantity Allowance: One lineal foot of crack repair per square foot of floor installation.

E. Apply, trowel, and float filler to achieve smooth, flat, hard surface with positive drainage configuration. Grind irregularities above the surface level. Prohibit traffic until filler is cured.

F. Vacuum clean substrate.

G. Apply primer to surfaces required by flooring manufacturer.

H. Install topical vapor control coating for fluid flooring complete with primer and recommended accessories at all areas indicated to receive fluid-flooring.

3.03 INSTALLATION - STRIPS

A. Accurately saw cut substrate and/or adjacent flooring as required to install divider strips.

B. Install strips straight and level.

C. Install fillet strips at base of walls where flooring is to be extended up wall as base.

D. Install terminating cap strip at top of base; install "H" or "T" channel configurations as required to suit specific conditions where wall panel finishes abut base; attach securely to wall substrate.

3.04 INSTALLATION - FLOORING

A. Apply in accordance with manufacturer's instructions.

B. Apply each coat to minimum thickness required by manufacturer, free from trowel marks, swirls, pooled glaze or imperfections. Completed mock-up shall serve as appearance and texture standard for completed work.

C. Apply first coat of clear sealer and broadcast aggregate to refusal and allow to cure as required by manufacturer. Sweep off excess aggregate and apply second seal coat to obtain specified thickness and surface finish textures matching approved mockups.

D. Finish to smooth level surface with positive drainage as indicated. No ponding or birdbaths, all surface water flows to drain.

E. Fillet and cove at vertical surfaces.

F. Install sealants at perimeter and transition conditions in accordance with manufacturer's standard details and installation recommendations.

3.05 FIELD QUALITY CONTROL

A. Following manufacturer's recommended curing period, and prior to installation of further work, flood completed floor with water in presence of Owner's Inspector to verify positive drainage.

B. Completed work shall exhibit positive drainage, free from ponding or "birdbaths", with uniform color and texture consistent with the granular character of the flooring material, free of pooled,"swirled", or glazed topcoat, with surface finish textures matching approved mockups.

C. Immediately remove and replace work not conforming to these requirements.

D. Adjust textures at no cost to Owner at locations where finish textures do not match approved mockups:
   1. Too Rough: Apply additional coats of glaze topcoat until texture is acceptable.
   2. Too Smooth: Apply additional broadcast of aggregate and lock-in with additional glaze top coat until texture is acceptable.

3.06 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Barricade area to protect flooring until fully cured.

END OF SECTION

SECTION 09 77 23
WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabric-Wrapped Tackboard Paneling, factory fabricated.

B. Installation accessories.

1.02 RELATED SECTIONS

A. Sections specifying products serving as substrates for wall panels.

1.03 REFERENCES

A. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

B. ASTM D 256 - Standard Test Methods for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.

C. ASTM D 543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.

D. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.

E. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.

F. ASTM D 1929 - Standard Test Method for Determining Ignition Temperature of Plastics.

G. ASTM D 2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

H. ASTM D 3841 - Standard Specification for Glass-Fiber-Reinforced Polyester Plastic Panels.

I. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide manufacturer's standard details and catalog data demonstrating compliance with referenced standards. Provide installation instructions.

C. Samples:
   1. Submit 6 inch square samples of each surface and color required.
   2. Submit 6 inch long samples of each trim profile and trim color required.

D. Test Reports: Indicate conformance to specified reqirements and referenced standards.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products indoors and protect from moisture, construction traffic, and damage.

B. Store panels flat on clean, dry surface. Do not stand on edge or stack on fresh concrete or other surfaces that emit moisture.

C. Store panels for at least 24 hours at temperature and humidity conditions approximating the average environment of the finished room.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install materials when projects conditions do not meet manufacturer requirements.

1.07 EXTRA MATERIALS

A. Supply five percent of installed area of each material and color for Owner 's use in maintenance of project.

PART 2 PRODUCTS

2.01 PRE-FINISHED INTERIOR PANEL SYSTEM

A. Manufacturer:
   1. Decorative interior wall surfacing system and trim shall be manufactured by Marlite, 202 Harger St., Dover, OH 44622 Ph (330) 343-6621 is specified.
   2. Panel Specialists, Inc.; 3115 Range Rd., Temple, TX 76504. ASD. Toll Free Tel: (800) 947-9422. Tel: (254) 774-9800. Fax: (254) 774-7222. Email: psiwalls@panelspec.com. Web: http://www.panelspec.com.
   3. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

B. System: Decorative interior wall surface systems shall be "SURFACE SYSTEMS" as follows.
   1. System Forty. Shall consist of panels with square cut edges, installed utilizing an exposed Horizontal Narrow Main Rail and exposed Vertical Narrow Cross Splines, for proper panel alignment.
   2. All exposed application hardware shall be (System Ten, Twenty, Thirty, Forty & One Hundred only) provided in:
      a. Clear Satin Anodized Aluminum

C. Panels: Decorative interior wall surfaces shall be "SURFACE SYSTEMS" with panel construction and finish as follows.
   1. High Pressure Laminate: Panels have a "vertical grade" decorative laminate face on a wood fiber substrate. Panels are 3/4" thick, square cut. All edges are sealed black.
   2. Grain Direction: Shall be manufacturer's standard, except as requested by specifier.
   3. Panel Sizes:
      a. Custom Sizes as indicated on drawings.
   4. Fire Classification of panel system shall be Class 1/A - Flame Spread 0-25, Smoke Developed 450 or less.

D. Trim: All trim specified shall be heavy weight extruded aluminum 6063-T5 alloy prefinished at the factory, and as detailed by the architect.

2.02 VINYL-WRAPPED TACKBOARD WALL PANELS

A. Vinyl-Fabric-Wrapped Tackboard Wall Panels: Wood fiber substrate with factory-laminated vinyl-coated fabric wall covering.
   1. Panel Thickness: 1/2 inch.
   2. Weight: approximately 0.9 lbs./sq. ft.
   3. Sheet Sizes: select from standard sizes available to minimize joints, 48 inch width standard.
   4. Fire Hazard Classification per ASTM E84: Class II.
      a. Flame Spread: <75.
      b. Smoke Developed <150.

B. Vinly Fabric Wall Materials: Meet or exceed FS CCC-W-408A, Type I, Class A and the following;
   1. Total Weight (oz/lin. yd.) 15.0.
   2. Total Weight (oz/sq. yd.) 10.0.

3. Vinyl Weight (oz/sq. yd.) 8.9.
4. Cloth Weight (oz/sq. yd.) 1.1.
5. Fire Hazard Classification per ASTM E84:
   a. Flame Spread: <10.
   b. Smoke Developed <5.

C. Pattern and Color(s): Woven Texture, color selected from manufacturer's standard line, provide minimum of seven choices.

D. Manufacturers:
1. Chatfield-Clarke Company; 14614 Valley Blvd., Fontana, CA 92335; 909-823-4297; www.chatfield-clarke.com .
2. Vinyl Wall Covering: Koroseal Contract vinyl Wall Covering
3. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

2.03 ACCESSORIES

A. Fasteners: Non-staining, as recommended by manufacturer in writing.
1. Match panel colors at fiberglass reinforced composite panels.
2. Concealed at laminate wall panels.
3. Length to suit project conditions.

B. Adhesive: Structural construction adhesive as recommended by manufacturer, meeting or exceeding specifed fire code criteria.

C. Sealant: Color matched silicone sealant as recommended by manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates that will receive panels to ensure that surfaces are smooth, dry, true, and free of dirt, dust, oil, or grease.

B. Remove high spots. Fill low spots.

C. Apply leveling coat of plaster to concrete block walls, if required to bring surface to a true plane.

D. Verify that substrate construction is completed and approved.

E. Correct deficiencies in substrate before installing panels.

F. All panels shall be allowed to equalize to the moisture and temperature in the room environment prior to installation, and in accordance with manufacturer's limitations.

G. Panel edges must be refinished to manufacturer's instructions after field cutting, before installation. Field refinishing shall be provided as to match pre-finished edge.

3.02 INSTALLATION

A. Install in accordance with manufacturer's printed installation instructions.

B. Apply adhesive at temperature between 50 and 90 degrees F, unless otherwise recommended by manufacturer for specific project conditions.
1. Spread adhesive 1/4-inch deep over entire back side of panel to achieve 100 percent coverage.
2. Do not use beads of adhesive.
3. Do not use mechanical fasteners or adhesive alone.
4. Allow open time recommended by adhesive manufacturer before setting panels into position.
5. Once in position, apply sufficient pressure to make full contact between panel and wall.

6. Roll panel surface to ensure complete contact.
7. If necessary, install bracing to maintain intimate contact until adhesive cures in accordance with manufacturer's instructions.

C. Sealants: Seal corner seams, ceiling and base junctures, around door frames and other openings, and between penetrating items and panel cut-outs.

3.03 ADJUST AND CLEAN

A. Remove scraps and debris from the site, and leave in a neat and clean condition.

B. Protect installed Work from subsequent construction operations.

END OF SECTION

SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and varnishes.

C. Materials for backpriming woodwork.

D. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Exposed surfaces of steel lintels and ledge angles.
   2. Mechanical and Electrical:
      a. On the roof and outdoors, paint equipment that is exposed to weather or to view, including factory-finished materials.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 41 00 - Volatile Organic Compound (VOC) Content Restrictions.

C. Pertinent sections of Division 05 specifying shop-primed and galvanized metal items.

D. Section 05 50 00 - METAL FABRICATIONS: Shop-primed items.

E. Section 09 91 23 - Interior Painting.

F. Pertinent sections specifying civil, mechanical and electrical work requiring painting.

G. Pertinent Division 32 Section specifying Painted Pavement Markings.

1.03 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

B. Manufacturer's recommendations and specifications, including installation instructions.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.

D. SSPC-SP 1 - Solvent Cleaning.

E. SSPC-SP 2 - Hand Tool Cleaning.

F. SSPC-SP 6 - Commercial Blast Cleaning.

G. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015).

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
4. Manufacturer's installation instructions.
5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
6. Resin Type.
7. Total VOC Content in grams per liter.
8. Solids Content By Volume SCBV (not solids by weight). All products shall be minimum 35% SCBV.
9. Composition-By-Weight. Demonstrate composition by percentage related to total weight of all components.
10. Film Thickness Per Coat, Wet and Dry.
11. Prime Pigment: Demonstrate prime pigment by percentage related to total volume of all components.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Architect.
   4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   2. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten (10) years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five (5) years experience and approved by manufacturer.

1.07 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. See Section 01 45 00 - Quality Control, for general requirements for mock-up.

C. Provide panel, 8 feet long by 10 feet wide, illustrating paint color, texture, and finish.

D. Provide door and frame assembly illustrating paint color, texture, and finish.

E. Locate where directed by Architect.

F. Final color selections and acceptance will be made only after review of mock-ups under lighting conditions approximating finish conditions.

G. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain, high wind or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
   1. Do not paint exterior materials when inclement weather is expected within the full drying time specified by the manufacturer.
   2. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated and dry within temperature and humidity limits specified by paint manufacturer during application and drying periods.

D. Schedule work to avoid painting surfaces, when surfaces are exposed to direct sunlight.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 DESIGN REQUIREMENTS

A. Design Intent: Paint all Work which is normally painted in a building of this type and quality, whether or not the item or surface is specifically identified within the Contract Documents.
   1. The number of coats specified is the minimum to be applied. Provide paint finishes of even, uniform color, free from cloudy or mottled surfaces. Provide one additional coat if necessary where "deep colors" are selected.
   2. Non-scheduled items: Provide manufacturer's approved and recommended system as set forth in Manufacturer's "Specifications Architectural Finishes ".

2.02 MANUFACTURERS

A. Manufacturer's proprietary names or catalog numbers are indicated for covnenience in identifying products. Manufacturer's complete product catalog description and composition for indicated product names or numbers shall constitute requirements for each product specified. Products shall incorporate all attributes set forth in the manufacturer's catalog description for the specified item, except for such modifications thereto as may be indicated in the Contract Documents.

B. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
   2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
   3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

C. Substitutions: Not permitted.
   1. Provide product data documenting conformance to specified requirements and provide all specified information as listed above in SUBMITTALS article. Failure to include all information specified is grounds for rejection of substitution.

D. Paints:
   1. Base Manufacturer: Dunn Edwards Corporation, Los Angeles CA.

2.03 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:
   1. Provide products conforming with local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product does not comply with current requirement, provide conforming product at no additional cost.

C. Chemical Content: The following compounds are prohibited:
   1. Intentionally added methylene chloride or perchloroethylene.
   2. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   3. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, ethylene glycol, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

D. Flammability: Comply with applicable code for surface burning characteristics.

E. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

1. Finish Sheen: The following designations are measured in percentage of reflectance when viewed at a 60 degree angle. Provide manufacturer's standard sheen most closely matching the characteristic of specified sheen.
   a. Flat: 0-5%.
   b. Velvet: 5-9%.
   c. Eggshell: 10-15%.
   d. Low Sheen: 20-25%.
   e. Semi-Gloss: 40-50%
   f. Gloss: 70-80%
   g. High Gloss: >85%

F. Colors: To be selected from manufacturer's full range of available colors.
   1. Selection to be made by Architect after award of contract.
   2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
   3. Extend colors to surface edges; colors may change at any edge as directed by Architect.
   4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under unless accent colors are denoted.

G. Fabricate paints and stains in accordance with the Color Schedule which will include both standard colors and special, non-standard colors.
   1. If deep colors are not available in a specified product, propose substitute formula for approval
   2. Tint undercoats slightly to approximate finish coat color

2.04 PAINT SYSTEMS - EXTERIOR

A. Paint WE-OP-3L - Wood, Opaque, Latex, 3 Coat:
   1. One coat of latex primer sealer.
      a. Dunn-Edwards: E-Z PRIME Premium EZPR00.
   2. Gloss: Two coats of latex enamel
      a. Dunn-Edwards: SPARTASHIELD SSHL60.
   3. Semi-gloss: Two coats of latex enamel .
      a. Dunn-Edwards: SPARTASHIELD SSHL50.

B. Paint WE-STR-2S - Redwood or Cedar, Semi-Transparent Color Stain, 2 Coat.
   1. Two coats:
      a. Dunn-Edwards: Okon Inc., Weather Pro WP 3-5, apply wet-on-wet, product will repel itself if second coat is attempted on dry finish. Tint to match Architect selected color.

C. Paint WE-TR-VS - Wood, Transparent, Varnish, Stain:
   1. Filler coat (for open grained wood only).
   2. One coat stain:
      a. Dunn-Edwards: Okon Weather-Pro.
   3. One coat sealer:
      a. Dunn-Edwards: Okon Multi-Surface Water-Repellent Sealer.

D. Paint WE-TR-S - Wood,Transparent, Sealer, Optional Stain:
   1. One coat sealer:
      a. Dunn-Edwards: Okon Natural Choice Sealer.

E. Paint CE-OP-3L - Masonry/Concrete, Opaque, Latex, 3 Coat:
   1. One coat of block filler:
      a. Dunn-Edwards: Smooth BLOCFIL Premium SBPR00.

2. Semi-gloss: Two coats of latex enamel .
   a. Dunn-Edwards: EVERSHIELD EVSH50.
3. Flat: Two coats of latex enamel ; .
   a. Dunn-Edwards: EVERSHIELD EVSH10.

F. Paint GE-OP-3L - Gypsum Board or Plaster, Opaque, Latex, 3 Coat:
1. One coat of epoxy primer sealer; .
   a. Dunn-Edwards: SUPER-LOC Premium A&B SLPRA00, SLPRB00.
2. Flat: Two coats of latex .
   a. Dunn-Edwards: EVERSHIELD EVSH10.
3. Eggshell: Two coats of latex enamel;
   a. Dunn-Edwards: SPARTASHIELD SSHL30.

G. Paint FC-OP-3L - Fiber Cement Siding or Paneling, Opaque, Latex, 3 Coat:
1. Factory Pre-Primed Surfaces: Spot prime concrete sealer;
   a. Dunn-Edwards: EFF-STOP Premium ESPR00.
2. Unprimed Surfaces: One coat of concrete sealer;
   a. Dunn-Edwards: EFF-STOP Premium ESPR00.
3. Flat: Two coats of latex ;
   a. Dunn-Edwards: SPARTASHIELD SSHL10.
4. Eggshell: Two coats of latex ;
   a. Dunn-Edwards: SPARTASHIELD SSHL30.
5. Semi-gloss: Two coats of latex enamel ;
   a. Dunn-Edwards: SPARTASHIELD SSHL50.

H. Paint ME-OP-3A - Ferrous Metals, Primed or Unprimed, Alkyd, 3 Coat:
1. One coat of alkyd primer.
   a. Dunn-Edwards: BLOC-RUST BRPR00-1-WH for light finish colors; BLOC-RUST BRPR00-1-RO for dark finish colors.
2. Gloss: Two coats of alkyd enamel.
   a. Dunn-Edwards: ARISTOSHIELD 60.
3. Semi-gloss: One coat of alkyd enamel.
   a. Dunn-Edwards: ARISTOSHIELD 50.

I. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. Pretreatment, reduce to minimum level for finish coat adhesion]. One coat .
   a. Dunn-Edwards: Supreme Chemical Metal Clean and Etch ME01.
2. Prime Coat:
   a. Dunn-Edwards: ULTRA-GRIP UGPR00 corrosion inhibitive primer.
3. Gloss: One coat of alkyd enamel , exterior handrails and guardrails.
   a. Dunn-Edwards: ARISTOSHIELD 60.
4. Semi-gloss: One coat of alkyd enamel , all other locations.
   a. Dunn-Edwards: ARISTOSHIELD 50.

2.05 PRIMERS

A. Primers: As required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

2.06 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Sanding materials: 120-180 grit, for architectural woodwork, finish carpentry, wood doors, or other surfaces requiring touch-up.

D. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the manufacturer-recommended maximums.

3.02 PROTECTION OF ADJACENT WORK

A. Protect surrounding elements from damage from painting procedures. Provide temporary facilities and barricades required. Additional requirements specified in Division 01.

B. Carefully remove and store removable items located in areas to be painted, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.

C. Separate areas to be protected from painting areas using means adequate to prevent damage.

D. Cover existing landscaping with tarpaulins or similar covers.

E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

F. Close off adjacent occupied areas with dust proof and weatherproof partitions.

G. Protect roof membrane and flashings from damage with 1/2 inch plywood laid on roof surfaces over full extent of work area and traffic route.

H. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

3.03 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

E. Surfaces: Correct defects and clean surfaces which affect work of this section. Feather-edge patches to make finished edges inconspicuous.

F. Seal surfaces that might cause bleed through or staining of topcoat.

G. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

H. Provide barrier coats over incompatible primers, or remove and re-prime.

I. Spot prime shop primed materials in field as required to assure that all surfaces are primed before finished coats are applied. Prime coats specified in this Section shall be provided in addition to shop prime coats on materials supplied for field finish.

J. Verify compatibility of specified products with shop applied primer(s). In the event of incompatibility of products specified in the Section, recommend alternate compatible product for review.

K. Provide full number of coats specified for each coating system indicated. Where recommended alternate compatible primers or undercoats require fewer coats than specified products, provide additional finish coat so that specified number of coats is not reduced.

L. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.

M. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
   2. Prepare surface as recommended by top coat manufacturer.

N. Exterior Plaster: Fill hairline cracks, small holes, and imperfections with exterior patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

O. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
   2. Prepare surface according to SSPC-SP 2.

P. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

Q. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

R. Exterior Wood to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied. Prime concealed surfaces.

S. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

T. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.04 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual". In the event of conflict, manufacturer recommendations to prevail.

D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied. Do not re-coat until;
   1. Paint has dried until firm to the touch.
   2. Paint does not deform or feel sticky under moderate thumb pressure.
   3. Application of another coat of paint will not cause lifting or loss of adhesion of the undercoat.

F. Apply each coat to uniform appearance.

G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.

H. Sand wood and metal surfaces lightly between coats to achieve required finish.

I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

J. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

K. Make work uniform without sags, runs, skips or brush marks. Make all edges sharp including interior intersections and transitions between split finishes.

th Backprime all concealed surfaces of finish carpentry, architectural woodwork, wood doors and unclad wood windows.

M. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Paint shop-finished equipment (electrical panels, load centers, and similar elements) exposed to view. Factory coatings intended for finished exposure may remain in utility areas.

B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

C. Finish equipment, piping, conduit, and exposed duct work throughout in colors according to the color schedule.

D. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.06 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field inspection.

3.07 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Upon completion of work, clean window glass and other paint-spattered surfaces.

3.08 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.
   1. Remove spatters, spots, runs, sags, blemishes and other defects without marring adjacent unpainted surfaces.
   2. Repaint defective surfaces.

C. Provide "Wet Paint" signs as required to protect newly-painted finishes.

D. Adjusting: Following owner's move-in and occupancy at a time acceptable to the Owner, touch-up and adjust blemishes and other defects incurred by move-in operations and the actions of the Owner and their separate contractors. Limit: Two workers for two full days labor, per building.

3.09 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead items.
   6. Non-metallic roofing and flashing.
   7. Marble, granite, slate, and other natural stones.
   8. Ceramic and other types of tiles.
   9. Pre-finished wall, ceiling and floor materials or coverings, unless specifically scheduled for field painting.
   10. Floors, unless specifically indicated.
   11. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco unless specifically indicated.
   12. Glass.
   13. Concealed pipes, ducts, and conduits.

B. General: Paint the surfaces described below under Schedule - Paint Systems. All surfaces exposed to weather, or visible to the eye, exterior and interior, unless specifically excluded by the Article titled "Do Not Paint or Finish the Following Items". If a coating system is not specified for a particular surface or substrate, provide a three-coat finish system recommended by the paint or coating manufacturer for that surface or substrate. Include all preparation necessary as appropriate for a similar substrate listed in the Article titled "PREPARATION", or preparation for that substrate as recommended by the paint or coating manufacturer.

C. Mechanical and Electrical: Use paint systems defined for the materials to be finished.

1. Paint all conduit, insulated and exposed pipes, boxes, hangers, brackets, collars and supports, mechanical equipment, electrical equipment, and exposed ducts occurring in finished areas to match background surfaces, unless otherwise indicated.
2. Paint all equipment, including that which is factory-finished, exposed to weather or to view on the roof and outdoors.
3. Paint shop-primed items occurring in finished areas.
4. Paint dampers exposed behind louvers, grilles, to match face panels.

D. Paint behind moveable equipment and furniture.

E. Finish top, bottom, and side edges of exterior doors the same as exposed faces.

F. Paint access doors, fire hose and extinguisher cabinets, panelboards, conduits and exposed plumbing piping.

G. Paint reveal moldings, expansion joints, and handrails.

H. Paint tube column and miscellaneous connections.

I. Provide split finishes for painted doors and interior windows where different connected room colors are selected.

J. Paint continuous surfaces with the same paint system. Do not change systems at elevation breaks.

K. Touch-up factory paint finishes where damaged.

3.10 SCHEDULE - PAINT SYSTEMS

A. Concrete: Finish only surfaces exposed to view which are indicated to receive paint .
   1. Exterior: Flat sheen.

B. Plaster: Finish all surfaces exposed to view , except plaster with acrylic-modified finish per Section 09 25 13..
   1. Exterior Walls and surfaces, including soffits, (Stucco): GE-OP-3L

C. Wood: Finish all surfaces exposed to view .
   1. Exterior trim, beams, soffits and frames: WE-OP-3L.
      a. Semi-gloss sheen.

D. New Wood Doors: WI-TR-VS

E. Steel Doors and Frames: Finish all surfaces exposed to view and to weather, including door tops and bottoms. Select prime coats compatible with finish color selections.
   1. Semi-gloss sheen.

F. Metal Fabrications: Finish all surfaces exposed to view and concealed, before installation. . Select prime coats compatible with finish color selections.
   1. Exterior - Handrails and Guardrails: Gloss sheen .
   2. Exterior - All Other Surfaces: Semi-gloss sheen.

G. Galvanized Steel and Shop-Primed Metal Items: Exterior and Interior; Finish all surfaces exposed to view and to weather, including exposed portions of roof deck systems .
   1. Exterior - Handrails and Guardrails: Gloss sheen.
   2. Exterior - All Other Surfaces: Semi-gloss sheen.

H. Miscellaneous metals, conduits, non-factory-finished access panels: As specified for either unprimed or shop primed metals, modified as required to make sheen match adjacent surfaces. Finish the following items:

1. Exposed portions of metal roof deck assemblies.
2. Exposed surfaces of lintels.
3. Exposed surfaces of steel stairs, ladders, fences, gates and railings.
4. Mechanical and electrical equipment.

I. Exterior Pavement Markings: As specified in related Division 32 section.

3.11 SCHEDULE - COLORS

A. Building and Structure Exteriors: Allow individual Schedule with separate color selections for each Building:
   1. Walls; Field color as selected.
   2. Ceilings/soffits; as selected.
   3. Wainscot; as selected, allow for deep tones.
   4. Accent walls; as selected, allow for deep tones.
   5. Paint access doors and panels same as walls/wainscots.
   6. Wood Trim; as selected, allow for deep tones.
   7. Accent members; as selected, allow for deep tones.
   8. Doors and Frames; as selected, allow for deep tones and split finishes exterior/interior.
   9. Guardrails, handrails; as selected.
   10. Fences, gates; as selected.
   11. Rainwater leaders; as selected to match walls or gutters.
   12. Mechanical and electrical units and ductwork exposed to view; match wall/wainscot or as selected.

B. Site Work:
   1. Vehicle Barriers, Bollards and Gates: Paint OSHA "Hi-Visibility" Yellow.
   2. Domestic, Fire and Irrigation Water Service Piping and Valves: Paint above-ground portions selected color.
   3. Playground Equipment: Paint vertical posts of permanent basketball goals, volleyball net posts, tetherball poles OSHA "Hi-Visibility" Yellow.

END OF SECTION

SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and varnishes.

C. Materials for backpriming woodwork.

D. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Prime surfaces to receive wall coverings.
   3. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. In finished areas, paint shop-primed items.
      c. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      d. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

1.02 RELATED REQUIREMENTS

A. Section 01 41 00 - Volatile Organic Compound (VOC) Content Restrictions.

B. Pertinent sections of Division 05 specifying shop-primed and galvanized metal items.

1.03 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

C. Manufacturer's recommendations and specifications, including installation instructions.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.

E. SSPC-SP 1 - Solvent Cleaning.

F. SSPC-SP 2 - Hand Tool Cleaning.

G. SSPC-SP 6 - Commercial Blast Cleaning.

H. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015).

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.
   5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
   6. Resin Type.
   7. Total VOC Content in grams per liter.
   8. Solids Content By Volume SCBV (not solids by weight). All products shall be minimum 35% SCBV.
   9. Composition-By-Weight. Demonstrate composition by percentage related to total weight of all components.
   10. Film Thickness Per Coat, Wet and Dry.
   11. Prime Pigment: Demonstrate prime pigment by percentage related to total volume of all components.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Architect.
   4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished metals, wood cabinets, wood doors, and wall coverings and tile, have been approved.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   2. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten (10) years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five (5) years experience and approved by manufacturer.

1.07 MOCK-UP

A. See Section 01 45 00 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 8 feet long by 10 feet wide, illustrating paint color, texture, and finish.

C. Provide door and frame assembly illustrating paint color, texture, and finish.

D. Locate where directed by Architect.

E. Final color selections and acceptance will be made only after review of mock-ups under lighting conditions approximating finish conditions.

F. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Paints:
   1. Dunn Edwards; www.dunnedwards.com.

B. Substitutions: Not permitted.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:
   1. Provide products conforming with local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product does not comply with current requirement, provide conforming product at no additional cost.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: To be selected from manufacturer's full range of available colors.
   1. Selection to be made by Architect after award of contract.
   2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
   3. Extend colors to surface edges; colors may change at any edge as directed by Architect.
   4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
   5. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:
   1. One coat of latex primer sealer.
      a. Cedar, redwood, architectural glue-laminated beams, provide number of coats necessary for stain resistance and uniform color:
         1) Dunn-Edwards: E-Z PRIME Premium EZPR00.
      b. All other interior wood:
         1) Dunn-Edwards: INTER-KOTE Premium IKPR00.
   2. Semi-gloss: Two coats of latex enamel ; ; typical interior wood trim with opaque finish.
      a. Dunn-Edwards: SUPREMA SPMA50.
   3. Eggshell: Two coats of latex enamel, typical exposed interior beams above 8'-0".
      a. Dunn-Edwards: "SUPREMA SPMA30 ".

B. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
   1. One coat of block filler.
      a. Dunn Edwards: Smooth BLOCFIL Premium SBPR00.
   2. Semi-gloss: Two coats of latex enamel ;
      a. Dunn Edwards: SPARTAZERO SZRO.

C. Paint MI-OP-3A - Ferrous Metals, Primed or Unprimed, Alkyd, 3 or 4 Coat (As specified and as required to achieve specified appearance):
   1. One coat of alkyd primer:
      a. Dunn Edwards: BLOC-RUST Premium BRPR00-1-WH.
   2. Gloss (Handrails and Guardrails): Alkyd enamel ;
      a. Dunn Edwards: One coat, ARISTOSHIELD 60.
   3. Semi-gloss (All other surfaces): Alkyd enamel ; ,
      a. Dunn Edwards: One coat, ARISTOSHIELD 50.
   4. Low Sheen (For use in matching sheen of metal elements in wall surfaces): Latex enamel ; .
      a. Dunn Edwards: One coat, SPARTAZERO SZRO.

D. Paint MI-OP-3L - Ferrous Metals, Primed or Unprimed, Latex, 3 Coat: Surfaces 8 feet or more above finish floor, trusses, metal roof deck, ductwork.
   1. One coat of alkyd primer:
      a. Dunn Edwards: BLOC-RUST Premium BRPR00-1-WH.
      b. Kelly-Moore: Devoe Devprime 1405 Alkyd Metal Primer.
   2. Gloss (Exposed Spiral Ductwork): 2 coats of latex enamel ;
      a. Dunn Edwards: SPARTASHIELD SSHL.
      b. Kelly-Moore: 1680 DURA-POXY + 100% Acrylic Gloss Enamel.
   3. Semi-gloss (Other Surfaces): 2 coats of latex enamel ;

a. Dunn Edwards: SPARTAZERO SZRO50.
b. Kelly-Moore: 1650 ACRY-PLEX Interior 100% Acrylic Semi-Gloss Enamel.

E. Paint MgI-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. Pretreatment: reduce to minimum level for finish coat adhesion.
   a. Dunn Edwards: Supreme Chemical Metal Clean and Etch ME01.
2. One coat alkyd metal primer ;
   a. Dunn Edwards: ULTRA-GRIP Premium UGPR00.
3. Gloss (Handrails, Guardrails): Two coats of alkyd enamel ;
   a. Dunn Edwards: ARISTOSHIELD 60.
4. Semi-gloss (All Other Locations): Two coats of alkyd enamel ;
   a. Dunn Edwards: ARISTOSHIELD 50.

F. Paint MgI-OP-3L - Galvanized Metals, Latex, 3 Coats: Surfaces 8 feet or more above finished floor, metal roof deck, ductwork, etc.
1. Pretreatment: Solvent wash to remove oily residue, ensure finish coat adhesion.
2. One coat galvanize primer:
   a. Dunn Edwards: ULTRA-GRIP Premium UGPR00.
3. Gloss (Exterior of Exposed Mechanical Ductwork): Two coats of latex enamel ;
   a. Dunn Edwards: SPARTASHIELD SSHL60.
4. Semi-gloss (All Other Surfaces): Two coats of latex enamel ;
   a. Dunn Edwards: SSPARTAZERO SZRO50.
5. Flat (Black color at visible interiors of mechanical ductwork): Two coats of latex enamel ;
   a. Dunn Edwards: SPARTAZERO SZRO10.

G. Paint GI-OP-3A-L Gypsum Board/Plaster, Acrylic, Low-VOC, 3 Coat:
1. One coat of low odor/low-VOC vinyl acrylic primer sealer: pigmented.
   a. Dunn Edwards: ENSO ENSO00.
2. Semi-gloss: Two coats of low odor / low-VOC acrylic .
   a. Dunn Edwards: ENSO ENSO50.
3. Eggshell: Two coats of low odor/low-VOC acrylic enamel
   a. Dunn Edwards: ENSO ENSO30.
4. Flat: Two coats of low odor/low-VOC Acrylic Wall Paint .
   a. Dunn Edwards: ENSO ENSO10.

H. Paint GI-P-1A - Gypsum Board/Plaster, Alkyd Primer, 1 Coat: Preparation for application of Wall Covering.
1. One coat of primer sealer .
   a. Dunn Edwards: ZINSSER Shieldz Universal Wallcovering Primer.
   b. Kelly-Moore: 265 Water-Oil Hybrid Int/Ext Primer Undercoat.

I. Paint ACI-OP-1NB Acoustic tile, existing suspended and glue-applied, Non-Bridging:
1. Vacuum clean.
2. Spot prime water stains and other discolorations with stain-blocking primer, type recommended by manufacturer.
   a. Dunn Edwards: 'Zinsser BIN Primer / Sealer.
   b. Kelly-Moore: Zinsser BIN Primer / Sealer.
3. Non-Bridging Paint: One coat of :
   a. Dunn Edwards: Acoustikote W-615.
   b. Kelly-Moore: 485 KM Commercial Flat Wall Paint.

2.04 PRIMERS

A. Primers: As required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Sanding materials: 120-180 grit, for architectural woodwork, finish carpentry, wood doors, or other surfaces requiring touch-up.

C. Patching Material: Latex filler.

D. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the manufacturer-recommended maximums.

3.02 PROTECTION OF ADJACENT WORK

A. Protect surrounding elements from damage from painting procedures. Provide temporary facilities and barricades required. Additional requirements specified in Division 01.

B. Carefully remove and store removable items located in areas to be painted, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.

C. Separate areas to be protected from painting areas using means adequate to prevent damage.

D. Cover existing interior planters and landscaping with tarpaulins or similar covers.

E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

3.03 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.

H. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

I. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
   2. Prepare surface according to SSPC-SP 2.

J. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

K. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.04 PREPARATION - EXISTING SURFACES

A. General: As specified above and as follows below.

B. Remove or repair existing coatings that exhibit surface defects. Feather-edge patches to make finished edges inconspicuous.

C. Existing Gypsum Board Surfaces to be Painted: Remove dirt, loose texturing, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Surfaces to be clean, dry, free of dirt, dust, grease, oil, mildew, efflorescence and other contaminants affecting paint adhesion or performance. Completely remove all loose, peeling or checked paints by sanding, scraping or other methods. Fill all holes and defects with suitable patching or spackling material compatible with the substrate material, allow to completely dry and sand to approximate existing adjacent textures. Spot prime patched areas.

D. Existing Metal Surfaces With Existing Coatings to be Recoated; sheet metal flashings and trim, hollow metal doors, frames, columns and similar items. Sand and scrape to remove existing finishes, loose primer and rust. Clean surfaces with solvent. Prime bare metal surfaces. Feather edges to make touch-up patches inconspicuous.

E. Existing Wood to Receive Opaque Finish: Completely remove all loose, peeling chalking, flaking or peeling paint by pressure-washing, scraping, wire brushing, sanding or other appropriate methods which will not damage existing substrates or adjacent finishes. Dull glossy surfaces to provide roughened surface for proper adhesion. Remove all loose sealant and glazing compounds. Feather

back rough paint edges and weathered wood material by sanding. Spot prime all areas before and after application of new sealants, patching or glazing materials. Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior sealant compound after prime coat has been applied. Remove mildew growth as recommended by paint manufacturer.

F. Existing Wood Surfaces Previously Stained with Semi-Transparent or Transparent finishes: Prepare as for Existing Wood to Receive Opaque Finish and as follows; Completely remove existing finishes to bare wood. Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied. Prime concealed surfaces. Apply finish stains of selected colors, equal to or darker than original finish, blending carefully to achieve color and finish uniformity.

G. Existing Metal Doors and to be Painted Sand, patch, clean with solvent. Prime metal door top and bottom edge surfaces. Finish otherwise as for Existing Metal SurfacesWith Existing Coatings to be Recoated.

3.05 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Sand wood and metal surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.06 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.07 PROTECTION

3.08 SCHEDULE - SURFACES TO BE FINISHED

A. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead items.
   6. Marble, granite, slate, and other natural stones.
   7. Ceramic and other types of tiles.

8. Pre-finished wall, ceiling and floor materials or coverings, unless specifically scheduled for field painting.
9. Floors, unless specifically indicated.
10. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco unless specifically indicated.
11. Glass.
12. Concealed pipes, ducts, and conduits.

B. General: Paint the surfaces described below under Schedule - Paint Systems. All surfaces exposed to weather, or visible to the eye, exterior and interior, unless specifically excluded by the Article titled "Do Not Paint or Finish the Following Items". If a coating system is not specified for a particular surface or substrate, provide a three-coat finish system recommended by the paint or coating manufacturer for that surface or substrate. Include all preparation necessary as appropriate for a similar substrate listed in the Article titled "PREPARATION", or preparation for that substrate as recommended by the paint or coating manufacturer.

C. Mechanical and Electrical: Use paint systems defined for the materials to be finished.
1. Paint all conduit, insulated and exposed pipes, boxes, hangers, brackets, collars and supports, mechanical equipment, electrical equipment, and exposed ducts occurring in finished areas to match background surfaces, unless otherwise indicated.
2. Paint all equipment, including that which is factory-finished, exposed to weather or to view on the roof and outdoors.
3. Paint shop-primed items occurring in finished areas.
4. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
5. Paint dampers exposed behind louvers, grilles, to match face panels.

D. Paint behind moveable equipment and furniture.

E. Finish top, bottom, and side edges of interior doors the same as exposed faces.

F. Paint access doors, fire hose and extinguisher cabinets, panelboards, conduits and exposed plumbing piping.

G. Paint all exposed and semi-exposed galvanized metal, projections through and on roofs.

H. Paint reveal moldings, expansion joints, and handrails.

I. Paint tube column and miscellaneous connections.

J. Provide split finishes for painted doors and interior windows where different connected room colors are selected.

K. Paint continuous surfaces with the same paint system. Do not change systems at elevation breaks.

L. Touch-up factory paint finishes where damaged.

M. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

3.09 SCHEDULE - PAINT SYSTEMS

A. Gypsum Board: Finish all surfaces exposed to view, GI-OP-3A. .
1. Interior Ceilings and Bulkheads: Flat sheen.
2. Interior Walls: Semi-gloss Sheen at Toilet Rooms, Custodians, Storage Room, Food Service.
3. Interior Walls: Eggshell at Classrooms, Corridors, Administrative Offices and Work Rooms.

B. Wood: Finish all surfaces exposed to view .
   1. Interior Opaque Finish: WI-OP-3L
      a. Trim and frames: Semi-gloss sheen.
      b. Beams: Low Sheen.

C. New Wood Doors: WI-TR-VS.

D. Steel Doors and Frames: Finish all surfaces exposed to view and to weather, including door tops and bottoms. Select prime coats compatible with finish color selections. MI-OP-3A.
   1. Semi-gloss sheen.

E. Metal Fabrications, Galvanized Steel and Shop-Primed Metal Items: Finish all surfaces exposed to view and concealed, before installation, including exposed portions of metal roof or floor deck assemblies. . Select prime coats compatible with finish color selections. MI-OP-3A for surfaces under 8 feet above floor. MI-OP-3L for surfaces over 8 feet above floor.
   1. Interior - Handrails and exposed spiral seamed ductwork: Gloss sheen.
   2. Interior - All Other Surfaces: Semi-gloss sheen.

F. Exposed Interior Steel with Intumescent Mastic Fireproofing: Finish all surfaces MI-IT-3A, Gloss.

G. Miscellaneous metals, conduits, non factory finished access panels: As specified for either unprimed or shop primed metals, modified as required to make sheen match adjacent surfaces.
   1. Finish the following items:
      a. Exposed portions of metal roof and floor deck assemblies.
      b. Exposed surfaces of lintels.
      c. Exposed surfaces of steel stairs, ladders, fences, gates and railings.
      d. Mechanical equipment.
      e. Electrical equipment.

H. Wall and Substrate Surfaces Under Wall Covering: GI-P-1A.

3.10 SCHEDULE - COLORS

A. Interiors, allow individual schedule for each Building:
   1. Walls; Field color as selected.
   2. Ceilings/soffits; as selected, allow for deep tones.
   3. Wainscot; as selected, allow for deep tones.
   4. Accent walls; as selected, allow for deep tones.
   5. Paint access doors and panels same as walls and wainscots.
   6. Wood Trim; as selected, allow for deep tones.
   7. Accent members; as selected, allow for deep tones.
   8. Doors and Frames; as selected, allow for deep tones and split finishes exterior/interior.
   9. Doors and Frames for Utility or staff access only, as selected; match walls/wainscot.
   10. Guardrails, handrails; as selected.
   11. Exposed trusses or structural members; as selected, allow for deep tones.
   12. Exposed ductwork; as selected, allow for deep tones.
   13. Mechanical or other equipment exposed to view; as selected or match wall/wainscot as directed.

END OF SECTION

SECTION 09 91 60

ANTI-GRAFFITI COATINGS

PART 1 GENERAL

1.01 DESCRIPTION

A. Includes all services, labor, materials and equipment necessary to complete application of graffiti-resistant coatings on all exposed exterior vertical concrete surfaces to the extent shown on the plans and as follows: utility boxes, concrete seat walls (if not included as part of precast concrete seat walls), and handrails.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 32 13 13 – Landscape Concrete.

B. Section 12 93 00– Site Furnishings.

C. Section 05 52 05 – Handrails and Railings.

1.03 QUALITY ASSURANCE

A. Contractor shall contact the manufacturer prior to bidding work so as to familiarize themselves with current warranty requirements, costs, application procedures, notification requirements.

B. The manufacturer's representative shall inspect and approve all surfaces prior to application and verify correct material for each application.

1.04 SUBMITTALS: Per Section 01 3300.

PART 2 PRODUCTS

2.01 PRODUCTS

GCP 1000, Matte/Clear by Genesis Coatings, 1-800-533-4273.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

All surfaces shall be dry and free from excess dirt, dust, loose paint, greasy stains and efflorescence. Porous concrete should be sealed first with a minimum of 48 hours before application. All cracks, voids, bee holes, or mortar shrinkage shall be properly repaired and primed if necessary to make the surface uniform. If using GCP 1000 over a previously coated surface, apply a small amount in an inconspicuous place to check for lifting.

3.02 APPLICATION

A. Apply per manufacturer's specifications.

B. Temperature and humidity shall be 50-90 degrees and humidity less than 80 percent.

C. Test on materials before applying and request approval from Construction Manager before applying completely on materials.

3.03 PROTECTION AND CLEANUP: Per Section 01 7000.

A. Applicator shall be responsible for protection of this and all adjacent work from damage during application with drop cloth or other suitable materials. Completely remove over spray and spills as soon as possible fore curing, and remove excess material from job site.

END OF SECTION

SECTION 10 11 01
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Markerboards.
   1. Sliding Types.
   2. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 41 00 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 06 10 00 - Rough Carpentry: Blocking and supports.

C. Section 06 4100 - Architectural Woodwork: Reference standards for installation of sliding visual display boards into custom cabinets.

1.03 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard.

B. ANSI A208.1 - American National Standard for Particleboard.

C. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling.

D. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

E. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, "CAL-Green".

F. GREENGUARD Environmental Institute: GREENGUARD Indoor Air Quality Certified.

G. Porcelain Enamel Institute: PEI-1002 Manual and Performance Specifications for Porcelain Enamel Writing Surfaces.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Provide manufacturer's data on markerboard, trim, and accessories.

C. CAL-GREEN Submittals:
   1. Product Data – VOC Limits: For adhesives, sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Composite Wood Formaldehyde Limits: Provide certification that all products meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.

D. Shop Drawings: Indicate wall elevations, dimensions, joint locations , special anchor details.

E. Samples: Submit color charts for selection of color and texture of chalkboard, markerboard, tackboard, tackboard surface covering, and trim.

F. Test Reports: Show conformance to specified surface burning characteristics requirements.

G. Manufacturer's printed installation instructions.

H. Maintenance Data: Include data on regular cleaning, stain removal , and maintenance precautions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

A. Field measure prior to preparation of shop drawings and fabrication, to ensure proper fit.

B. Do not begin installation of visual display boards until environmental conditions approximate normal occupied conditions.

1.07 WARRANTY

A. See Section 01 78 36 - Warranties, for additional warranty requirements.

B. See Section 01 - Closeout Submittals, for additional warranty requirements.

C. Submit manufacturer's "Life of the Building" warranty, stating that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, porcelain enamel steel chalkboards and markerboards are guaranteed for the life of the building.
   1. Warranty shall cover replacement of defective boards but not the cost of removal or reinstallation.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in Section 01 6116.

2.02 MANUFACTURERS

A. Visual Display Boards:
   1. AARCO Products, Inc.; web: www.aarcoproducts.com .
   2. Claridge Products and Equipment, Inc ; ____: www.claridgeproducts.com.
   3. Platinum Visual Systems as distributed by ABC School Equipment. www.pvsusa.com
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 VISUAL DISPLAY BOARDS

A. Markerboards: Porcelain enamel on steel, laminated to core.
   1. Steel Face Sheet Thickness: 24 gage, 0.0239 inch .
   2. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
   3. Backing: Aluminum foil, laminated to core.
   4. Size: As indicated on drawings. If no size is shown, provide 48 inches by 96 inches.
   5. Frame: Extruded aluminum , with concealed fasteners.
   6. Frame Finish: Anodized, natural.
   7. Accessories: Provide chalk tray, map rail, and flag holder. (Two flag holders per room).

B. Horizontal Sliding Markerboards: Double or triple panel types as indicated.

1. Metal Trim and Accessories: Heavy gage aluminum extrusions one piece aluminum housing with 2 inch wide fascia.
   a. Finish: Etched and anodized satin finish.
   b. Chalktrough: Standard continuous solid type, with ribbed section and curved open ends with radius, profile suitable for incorporation into custom cabinets.
   c. Sliding hardware: Two adjustable ball bearing carriers per panel, nylon roller guides in bottom track, fingerpulls at each operating panel, resilient bumper stops at each end.
2. Accessories: Provide chalk tray, map rail, and flag holder. (Two flag holders per room).
3. Size: Standard 4 feet height by lengths as shown on drawings.
4. Color: As selected from manufacturer's standard colors.

2.04 FABRICATION

A. Laminate facing sheet and backing sheet to core material under pressure, using manufacturer's recommended adhesive.

B. Provide factory-assembled visual display boards, except where sizes demand partial field assembly.
   1. Free of cups and bows, facing sheet and core continuous with no joints for entire length of board.

C. Assemble units in one piece without joints, wherever possible. Where required dimensions exceed maximum panel size available, provide 2 or more pieces of equal length, as indicated on approved shop drawings. Assemble to verify fit at factory, then disassemble for delivery and final assembly at project site.

D. Miter corners to neat hairline closure.

E. Combination Units and Units Made of More Than One Panel: Factory-assembled markerboards in a single frame, of materials specified above.
   1. Join panels of different construction with H-shaped extruded aluminum molding finished to match frame.
   2. Join panels of similar construction with butt joints, aligned and secured with steel spline concealed in edge of core.
   3. Configuration: As indicated on drawings.

2.05 MATERIALS

A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.

B. Hardboard for Cores: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides).

C. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.

D. Foil Backing: Aluminum foil sheet, 0.005 inch thick.

E. Adhesives: Type used by manufacturer.

2.06 ACCESSORIES

A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories ; 1 inch wide overall , full width of frame.

B. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

C. Flag Holders: Cast aluminum bored to receive 1 inch diameter flag staff, bracketed to fit top rail of board .

D. Cleaning Instruction Plate: Provide instructions for chalkboard cleaning on a metal plate fastened to perimeter frame near chalkrail.

E. Chalk Tray: Aluminum , manufacturer's standard profile , one piece full length of chalkboard , open ends, concealed fasteners, same finish as frame.

F. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

A. Install boards in accordance with manufacturer's instructions.

B. Install all grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for a complete installation.

C. Secure units level and plumb. Align perimeter trim for visual continuity and in accordance with manufacturer's recommendations.

D. Butt Joints: Install with tight hairline joints.

E. Where sliding visual display boards are installed in custom cabinets, provide track stops as recommended by board manufacturer to prevent sliding boards from impacting cabinet frames and comply with Referenced Standards for cabinet work.

3.03 CLEANING

A. Verify that all accessories are installed as required for each unit.

B. Clean board surfaces in accordance with manufacturer's instructions.

C. Cover with protective cover, taped to frame.

D. Remove temporary protective cover at Date of Substantial Completion.

E. Protect completed work from damage until acceptance. Replace damaged work.

END OF SECTION

SECTION 10 14 00
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Plaque signs with raised tactile letters and braille.

1.02 RELATED SECTIONS

A. Section 32 12 23 - Pavement Markings and Signs.

B. Division 08: Pertinent sections specifying doors and glazing materials serving as the mounting surface for signage.

C. Division 09: Pertinent sections specifying wall finishes and substrates serving as the mounting surface for signage.

1.03 REFERENCES

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2002.

B. C.C.R., Title 24, Part 2. California Building Code, Section 1011.3, 1115B, and 1117B.

C. Manufacturer's recommendations and specifications.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Include material descriptions including dimension, finish, and performance limitations of each product component.
   1. Provide paint manufacturer's written specifications and durability guarntee against color fading, chipping and peeling.
   2. Provide manufacuter's written specifications and durability guarantee.

C. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.
   1. Submit shop drawing at scaled size for each typical sign. Indicate: Proposed copy, letter height, spacing and location of lettering on the sign field, colors and materials of each element and lettering. Tabular listing of signage and copy alone is not acceptable.
   2. Submit tabular listing for each sign keyed to location indicated on drawings, including all text and adjacent space for Owner modification/confirmation of text.
   3. Provide all drawings and detail documents necessary to complete the project.
   4. Where sizes for signs are impacted by dimensions of surfaces or locations on which they are to be installed, verify dimensions by field measurement. Indicate measurements and signage locations on shop drawings for approval prior to production.
   5. Indicate for monument sign: Member and material profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details

D. Samples for Selection: For each exposed material type, provide selection samples, minimum 4 inch by 6 inch, indicating manufacturer's full range of available finishes, including anodizing and/or powder coating.

E. Samples for Verification: Submit two sample plaque signs of each type, actual size, illustrating type, style, letter font, and colors specified; method of attachment.

F. Manufacturer's Installation Instructions: Include written instructions, installation template and attachment devices.

G. Qualifications: For sign fabricator and sign installer, submit list of five projects completed within the last five years, with contact names and telephone numbers documenting experience specified in Article titled QUALITY ASSURANCE.

H. Certification: Provide manufacturer certificate that all braille symbols conform to the requirements of these specifications and the referenced standards.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section and with projects of similar size and scope with minimum five years of documented experience.

B. Guarantee: Provide written guarantee for all products against color fading, paint peeling and chipping, delaminating, installation failure, and for any other failure due to inferior quality, workmanship and/or inproper installation. This gaurantee to remain in effect for a period no less than two years from installation or Notice of Substantial Completion, whichever is later. Any signage failing this guarantee in any respect shall be replaced.

C. All signage must be field inspected after installation CBC Section 11B.703.1.1.2

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements for accessibility Chapter 11B;
   1. C.C.R., Title 24, Part 2. California Building Code, requirements governing signage design, location and attributes.
   2. Braille Symbols: California Contracted Grade 2 Braille symbols shall be used. Provide only domed Contracted Grade 2 Braille symbols as follows: Dots shall be 1/10 inch on center in each cell, with 2/10 inch space between cells. Dots shall be raised minimum of 1/40 inch above background.

B. It is the sole responsibility of the signage contractor to obtain all permits required for any signage contained in this project. Signage contractor to obtain, provide, produce and process all documentation, and pay all fees required for the permitting process.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Package signs, labeled in name groups.

B. Store adhesive materials at ambient room temperatures.

C. Comply with pertinent provisions of Section 01 6000.

D. Prevent contact with materials which may cause discoloration or staining. Clean materials which are discolored or stained.

E. Replacements: In the event of damage, immediately make repairs and replacements necessary to the approval of the Architect and DSA without change in contract amount or time.

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not install signs when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plaque Signs:
1. Advance Corporation / Braille-Tac Division; Product Braille-Tac Etched Magnesium (Chemsast): 8200 - 97th Street South, Cottage Grove, Minnesota 55016: Telephone 800-328-9451; www.advancecorp.com/brailletac

B. Substitutions: See Section 01 25 13 - Product options and Substitutions.

2.02 PLAQUE SIGNS

A. Plaque Signs: One piece magnesium metal construction with raised copy and braille and thermal-set, polyurethane finish. Tactile legends and Braille shall comply with Americans with Disabilities Act (ADA) , Califiornia Building Code (CBC) and requirements indicated for quantities, sizes, layouts, materials, finishes, color, etc. as specified in the Graphics Schedule and Drawings/Specifications.
1. Exterior durability rating: 3 years minimum.
2. Painted Finish:
   a. Weatherability: When tested in acordance with ASTM G 53, after 500 hours in a Weatherometer (equivilent to 3 years of esterior esposure) gloss retention of not less than 88.0 determined in accordance with ASTM D 523 as a 60 degree angle.
   b. Color Fade Resistance: Color shall not change more than 1.68 units determined in accordance with ASTM D 2244 and measured with a Hunter colormeter, Model D25.
   c. Durability: Sign finish shall show no effect after requested use of cleaners such as Graffiti Remover #1120 manufactured by Fine Organics Corp., Lodi, NJ.
3. Colors: Custom, as selected by Architect.
4. Characer Font: As Indicated.
5. Total Thickness: 0.153 inches.
6. Edges: Square.

2.03 ACCESSORIES

A. Mounting Hardware: Vandal-proof screws, stainless steel, size recommended by manufacturer to suit applications and resist applied loads.

B. Adhesive: 3M corporation, "VHB", applied in 5 mil thickness covering entire back of sign plaque without void or bubble.

C. Tape Adhesive: Double sided tape, permanent adhesive, 1/16 inch thick by 1/2 wide, 3M Corp. #4416, black.

D. Silicon Adhesive: Silglaze II #2801 GE Clear - Silicone Sealant / Adhesive.

E. Accessories and materials required for complete installation as indicated.

PART 3 EXECUTION

3.01 COORDINATION

A. For signs supported by or anchored to permanent construction such as building such as building fascias, advise installers about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.

3.02 EXAMINATION

A. Confirm visibility of site signage and graphics in indicated locations. Do not install signs in locations where they will not be visible or where they will obstruct visibility of other related building elements, such as exit signage or life safety equipment provided under other contracts or sections. Request direction from Architect in the event of conflict with signage and building elements.

B. Verify that substrate surfaces are ready to receive work.

3.03 INSTALLATION

A. Install in accordance with manufacturer's written instructions.

B. Install signs after surfaces are finished, in locations indicated.

C. Position signs as indicated on drawings.

D. Install signage and graphics plumb, level and proportionally spaced or kerned as required for uniform appearance; centered on, or aligned with related building elements, measured from established lines and levels, accurately fitted, free from distortion or defects.

E. All vinyl graphics to be installed flat smooth, free of defects, bubbles dust, blemishes and air pockets.

F. Plaque Mounting on Glazing: Install on glazing with double stick tape and silicone adhesive. Provide self-adhesive opaque plastic film, in matching or contrasting color as selected, to conceal reverse side of signs mounted on glazing. No exposed fasteners, adhesives or glazing tapes permitted. Film backer must be computer cut to match the shape of the plaque(s).

G. Plaque Mounting at all interior and exterior locations: Provide double stick tape and anchorage devices and fasteners as necessary for securing items to in-place construction; including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws, wedge anchors and other connectors as required.

3.04 ADJUSTING

A. Correct all damaged work by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

3.05 CLEANING

A. Clean-up: During progress of work, remove from site discarded materials and rubbish at end of each work day. No waste materials shall be placed in Owner's dumpsters. Removal of project wastes is sole responsibility of the Contractor.

B. Clean completed work.

C. Protect installed work from subsequent construction operations.

END OF SECTION

SECTION 10 21 13
REINFORCED COMPOSITE TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforced Composite toilet compartments.

1.02 RELATED SECTIONS

A. Pertinent sections of other divisions specifying backing and blocking for compartment support.

B. Section 06 10 00: Concealed wood framing and blocking for compartment support.

C. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCES

A. ADA STANDARDS - Americans with disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI A117.1-1998 Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

C. American Society for Testing and Materials Standards:
1. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2000.
2. ASTM E84-01 Standard Test Method for Surface Burning Characteristics of Building Material.
3. ASTM D2794-93(1999)e1 Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
4. ASTM D2197-98(2002) Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion.
5. ASTM D6578-00 Standard Practice for Determination of Graffiti Resistance.

D. Manufacturer's recommendations for installation.

E. C.C.R., Title 24, Part 2. California Building Code, edition as noted on the drawings.

F. US Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) Program, latest Version.

1.04 PERFORMANCE REQUIREMENTS

A. Conform to applicable codes and referenced standards for accessibility requirements.

B. Graffiti Resistance: Partition material shall have the following graffiti removal characteristics when tested in accordance with ASTM D6578-00 Standard Practice for Determination of Graffiti Resistance in accordance with Section 9, "Graffiti Removal Procedure Using Manual Solvent Rubs":
1. Cleanability: Five (5) required staining agents shall be cleaned off material.

C. Scratch Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D2197-98(2002) Standard Test Method for Adhesion of Organic Coating by Scrape Adhesion, using Gardner Stock #PA-2197/ST pointed stylus attachment on scrape tester:
1. Scratch Resistance: Maximum Load Value shall exceed 10 kilograms.

D. Impact Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D2794-93(1999)e1 Standard Test Method for Resistance of Organic Coating to the Effects of Rapid Deformation (Impact), using .625" hemispherical indenter with 2-lb impact weight:

1. Impact Resistance: Maximum Impact Force value shall exceed 30 inch-lbs.

E. Fire Resistance: Partition material shall comply with the following requirements, when tested in accordance with ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials:
   1. Smoke Developed Index: Not to exceed 450.
   2. Flame Spread Index: Not to exceed 75.
   3. Material Fire Ratings:
      a. National Fire Protection Association (NFPA): Class B.
      b. International Code Council (ICC): Class B.

1.05 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings, anchorage, accessory items and finishes. Provide location drawings for bolt hole locations in supporting members for attachment of compartments.

C. Product Data: Provide data on panel construction, hardware, and accessories, demonstrate conformance with specified requirements.

D. Samples:
   1. Selection Samples: Submit three samples of partition panels, 3 x 3 inch in size illustrating panel finish, color, and sheen.
   2. Verification Samples: Provide, upon request, additional samples of partition panels for use in preparing final color boards.
   3. Scale Model: Upon request, provide scale model of compartments, including stile, shoe, door, door hardware, divider panel, and mounting brackets. Provide sections showing stile anchoring and leveling devices, concealed threaded inserts, panel, stile, and edge construction. Scale models will be returned following review.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Cleaning and maintenance information including how to obtain replacement parts.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver and store items in manufacturer's original unopened protective packaging, prevent physical damage or wetting.

B. Prevent damage to finished surfaces during handling.

1.07 WARRANTY

A. Provide ten-year limited warranty for panels, doors, and stiles against breakage, corrosion, delamination, and defects in factory workmanship.

B. Provide one-year guarantee against defects in material and workmanship for stainless steel door hardware and mounting brackets.

1.08 COORDINATION

A. Coordinate the work with placement of support framing and anchors in wall.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Reinforced Composite Toilet Compartments: "Sierra™ Series 1092.67 " as manufactured by Bobrick Washroom Equipment, Inc., www.bobrick.com, as represented by R. E. Edwards, 925-829-2942.

B. Toilet partitions constructed of High Density Polyethylene (HDPE) or High Density Polypropylene will not be acceptable.

C. Substitutions: Section 01 25 13 - Product Options and Substitutions.
   1. Request For Substitution of proposed alternate systems must be made in writing as specified in Section 01 25 13 and shall demonstrate that the proposed substitution meets or exceeds the specified characteristics.
   2. All performance requirements listed in Articles titled QUALITY ASSURANCE, DESIGN CRITERIA, PERFORMANCE REQUIREMENTS and WARRANTY must be met and documented with the Request For Substitution.
   3. Submit complete product and test data as specified under SUBMITTALS for each proposed substitution.
   4. Architect will accept or reject Request for Substitution in writing as specified in Section 01 25 13. Accepted substitutions will be issued via Addendum.
   5. No substitutions will be accepted following the bid, except as otherwise specified in Section 01 25 13 00.

2.02 MATERIALS

A. Reinforced Composite Material: composed of dyes, organic fibrous material, and polycarbonate/ phenolic resins; non-ghosting, graffiti-resistant surface integrally bonded to core through a series of manufacturing steps requiring thermal and mechanical pressure. Edges of material shall be the same color as the surface., with solid integral color through the full depth of the panel.

B. Stainless Steel: ASTM A 666, 18-8 Type 304 stainless steel with No. 4 finish.

C. Aluminum: Satin finish, extruded anodized aluminum. Provide for specified items only.

2.03 COMPONENTS

A. Toilet Compartments: Solid reinforced composite panels, doors, and pilasters, floor-mounted headrail-braced. Stiles, Panels, Doors, and Screens shall be all be manufactured from Solid Color Reinforced Composite material.
   1. Provide materials selected for surface flatness and smoothness. No exposed surfaces which show pitting, seam marks, roller marks, stains, discoloration, or other imperfections.
   2. Color: As selected by Architect from Manufacturer's standards.

B. Panel and Bench Thickness: 1/2 inch.

C. Door and Stile Dimensions:
   1. Thickness: 3/4 inch.
   2. Door Width: 24 inch.
   3. Door Width at accessible stall: 36 inch .

2.04 ACCESSORIES

A. Hardware - General: Polished stainless steel at all locations, unless noted otherwise below:

B. Standard Concealed Stainless Steel Barrel Hinges (1090):
   1. Heavy-gauge type 304 stainless steel

2. Adjustable for partial opening or self-closing

C. Door Stop Plates: 11-gauge (3-mm) stainless steel with attached rubber bumpers, two per door to resist door from being kicked in/out beyond stile.

D. Vandal-Resistant Latch:
1. Sliding door latch 14 gauge (2 mm) on nylon track.
2. Operate with less than 5-lb force. Twisting latch operation will not be acceptable.
3. Attach Latch track to door by machine screws into factory-installed threaded brass inserts.
4. Threaded brass inserts: Factory installed for door hinge and latch connections.
5. Latch keeper-to-stile connections: Through-bolted, stainless steel, pin-in-head Torx sex bolt fasteners.

E. Door Strike and Keeper with rubber bumper; mounted on pilaster in alignment with door latch.

F. Coat Hook: Stainless steel with rubber bumper; one per compartment, mounted on door. Maximum projection 1-1/8 inches, Bobrick B-233 Clothes Hook. Secure to door by through-bolted, theft-resistant, pin-in-head Torx stainless steel screws.

G. Mounting Brackets:
1. Stainless steel, mounted inside compartment.
2. Provide double thickness 11 gauge brackets at wall mounted urinal screens.

H. Panel-to-Stile connections.
1. Mounting brackets: 18-gauge (1.2- mm) stainless steel, full height of panel.
2. U-channels: Panel-to-stile connections.
3. Angle brackets: Secure stiles to walls and panels to walls.

I. Leveling Device: 7-gauge, 3/16" (5-mm) hot rolled steel bar; chromate-treated and zinc-plated; through-bolted to base of solid color reinforced composite stile.
1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

J. Stile Shoe: One-piece, 4" (102-mm) high, 22-gauge (0.8-mm) stainless steel. Top shall have 90° return to stile. Shoe: one-piece of stainless steel and capable of being fastened (by clip) to stiles starting at wall line.

K. Headrail (Overhead Braced Configurations): Aluminum (.125" / 3-mm thick) with anti-grip profile.

L. Door Pull: Stainless steel"wire-type" or u-shaped type, outside of outswinging doors and one at each side of wheelchair accessible stall doors.

M. Fasteners and Threaded Inserts:
1. Theft-and-Vandal-resistant, pin-in-head Torx stainless steel machine screws with factory-installed, threaded brass inserts.
2. Theft-and-Vandal-resistant, through-bolted pin-in-head Torx stainless steel sex bolt fasteners.
3. Fasteners secured directly into the core are not acceptable.
4. All fasteners and threaded brass inserts shall withstand a direct pull force exceeding 1,500 lbs per fastener or insert.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions. Installation methods shall conform to manufacturer's recommendation for backing and proper support.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Conceal evidence of drilling, cutting, and fitting to room finish.

E. Maintain uniform clearance at vertical edge of doors.

F. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

G. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

H. Install coat hooks in accessible stalls at elevation of 48 inches above finish floor maximum to the top edge of the hook.

3.03 ERECTION TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

3.05 CLEANING AND PROTECTION

A. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

B. Protect finished work until acceptance. Replace damaged panels as required.

END OF SECTION

SECTION 10 28 00
TOILET ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Accessories for toilet rooms.

B. Installation of Owner furnished accessories.

1.02 RELATED REQUIREMENTS

A. Section 10 21 13 - Reinforced Composite Toilet Compartments

B. Divisions 22 and 26: Pertinent sections specifying plumbing and electrical work.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.

B. C.C.R., Title 24, Part 2, California Building Code for accessibility standards.

C. Manufacturer's recommendations and specifications.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

F. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

G. ASTM C1036 - Standard Specification for Flat Glass.

H. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror.

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.05 COORDINATION

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Bobrick Washroom Equipment.

B. Other Acceptable Manufacturers:
   1. Bobrick Washroom Equipment, Inc.: www.bobrick.com
   2. Bradley Corporation: www.bradleycorp.com.

3. Rubbermaid/United Receptacle: www.rubbermaid.com
4. Substitutions: Section 01 25 13 - Product Options and Substitutions.

C. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
1. Grind welded joints smooth.
2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide five keys for each accessory to Owner ; master key lockable accessories.

C. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

D. Adhesive: Two component epoxy type, waterproof.

E. Fasteners, Screws, and Bolts: Hot dip galvanized ; tamper-proof ; security type.

2.03 FINISHES

A. Stainless Steel: No. 4 Brushed finish , unless otherwise noted.

B. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 TOILET ROOM ACCESSORIES

A. Toilet Paper Dispenser: Double roll, semi-recessed, stainless steel , spindleless type for tension spring delivery designed to prevent theft of tissue roll.
1. Product: B3888 manufactured by Bobrick.
2. Location: All ADA accessible stalls.

B. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator , tumbler lock.
1. Minimum Capacity: 40 ounces.
2. Product: B-2111 manufactured by Bobrick.

F. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
1. Size: as indicated.
2. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners , and tamperproof hanging system; No.4 finish.
3. Product: B-165 2436 manufactured by Bobrick.

G. Grab Bars: Stainless steel, 1-1/4 min. to 2 max. inches outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.
1. Conform to CBC accessiblity requirements and referenced standards, support vertical loading of 400 pounds and horizontal loading of 200 pounds applied at any portion of the bar.
2. Length and configuration: As indicated on drawings.
3. Product: B5806 manufactured by Bobrick.

H. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
1. Product: B-270 manufactured by Bobrick, surface mounted.

I. Sanitary Napkin Disposal Unit: Stainless steel, semi-recessed, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
   1. Product: B-35303, manufactured by Bobrick.

J. Coat Hooks: Doors of single occupancy toilet rooms. Stainless steel, bright polished finish, Bobrick B-682, 6-1/4 inch high, projection 3 inches.
   1. Mount coat hooks at 48" above finish floor in single occupancy toilet rooms and accessible stalls.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation. Conform to referenced standards and applicable codes.

C. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

A. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

D. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings

END OF SECTION

SECTION 12 21 00
WINDOW SHADE SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manually-operated window shades and accessories for sun/glare/heat control and room darkening.

1.02 RELATED SECTIONS

A. Section 06 10 00: Rough Carpentry; blocking for support of window shades.

B. Division 08: Pertinent sections specifying window, door and/or storefront opening systems.

C. Division 09: Pertinent Sections specifying wall finishes adjacent to window shades.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Product Data: Manufacturer's catalog data, product descriptions, installation instructions, detail sheets, and specifications for each type system specified.

C. Samples for Selection: Manufacturer's color chart or sample sets;
1. 3 inch X 5 inch (76 mm x 127 mm) shadecloth fabric swatches for initial fabric color selection from manufacturer's full range of available fabrics.
2. Standard aluminum finish color samples from manufacturer's range of standard colors.

D. Shop Drawings: Prepared specifically for this project; show dimensions and interface with other products.
1. Interior Elevations at 3/8 inch = 1 foot scale minimum indicating shade layout, seam / batten locations and coordination with surrounding conditions.
2. Floor plans or reflected ceiling plans showing overall arrangement of shades and control locations and mounting details and installation methods.
3. Head, Jamb and sill details as necessary to coordinate work with surrounding conditions and construction.
4. Room schedule including field-verified dimensions of each opening to receive window shade systems, coordinating room number, window type, shade fabric type and color, quantities and key to details.
5. Indicate System Series, operator, fabric selection, and mounting type.
6. Selection Samples: For each finish product specified, two complete sets of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns. or as indicatedon the drawings.
7. Indicate control type.

E. Manufacturer's standard installation instructions.

F. Design Data, Test Reports, Certificates: Current reports from independent testing laboratories demonstrating compliance with specified criteria.

G. Extra Materials:
1. Provide additional 10% of the total length of qualified stainless steel chain required on the project, not to exceed the quantity of one 500' spool.
2. Provide additional 10% of each type of shade mounting hardware or brackets, but not less than one pair of each type.

3. Provide a quantity of replacement shadebands completely fabricated and ready to attach to roller tubes equal to 10% of the total number of shadebands of each fabric and each color in the largest size required for each of those fabrics.
4. Clearly label all spare components and supply to Owner upon completion in original packaging for storage on site by Owner.
5. Maintenance Service: Provide a separate proposal to the Owner for the cost for annual maintenance contract providing service 'on demand' for repair and maintenance as may be generally anticipated for the conditions of this project.

1.04 QUALITY ASSURANCE

A. Manufacturer: 20 years minimum experience manufacturing products comparable to those specified in this section.

B. Installer: Approved by manufacturer. 5 years minimum experience installing products comparable to those specified in this section.

C. Fire Resistance: Provide shade fabrics tested in accordance with:
1. NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
2. 1996 NFPA 701 small scale Vertical Burn (telephone booth test) and rated "PASS."

D. Toxicity: Provide shade fabrics tested in accordance with University of Pittsburgh Toxicity Protocol including LC50 analysis and toxicity characteristics.

E. Anti-microbial: ASTM G-22-80 results for ATCC6538 (Staphylocaoccus aureus) and ATCC13388 (Psuedomonas aeroginosa) indicating minimum 5mm (0.197 inches) 'No Growth Contact Area'.
1. ASTM G-21-85 results for ATCC9642, ATCC9644, ATCC9348 and ATCC9645 indicating 'No Growth'.

F. Electrical: Control systems and components approved AS A SYSTEM by either Underwriter Laboratories (UL) or Electronic Testing Laboratories (ETL).

G. Do not fabricate shades without obtaining field dimensions for each opening. Coordinate construction of surrounding conditions to allow for timely field dimension verification.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to project site in manufacturer's original cartons.

B. Individually package and mark shades with room number and opening number.

C. Inspect the materials upon delivery to assure that specified products have been received.

D. Store and handle shades to prevent damage to fabrics, finishes, and operators prior to installation.

E. Do not deliver items to the project until all concrete, masonry, plaster, painting and other wet work has been completed and dry.

1.06 WARRANTY

A. Shadecloth and all other components of shade system are warranted to be fit for the use intended for a minimum of 10 years.

B. Installation: Provide Contractor's warranty under provisions of Division 01 - General Requirements that installation shall be free from defects for a period of not less than 2 years from manufacturer and Installer.

C. In the event of a warranted product failure, the Shade Contractor will, at no cost to owner, facilitate acquisition and delivery of all necessary components to the owner.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. MechoShade Systems Inc.: Mecho /5: www.mechoshade.com.

B. Lutron Electronics Co., Inc: 150 Series: www.lutron.com.

C. Draper: www.draper.com.

D. Substitutions: See Section 01 25 13 - Product Options and Substitutions.

E. Provide all window shade systems from a single manufacturer.

2.02 EQUIPMENT

A. Bead/Chain Operation: Bi-directional, wrap spring clutch made of high-strength fiberglass-reinforced polyester and high carbon steel.
   1. Continuous loop, certified No. 10 metal bead chain in appropriate length.

2.03 ROLLER SHADE ASSEMBLIES

A. Shade Fabric for Sun/Glare/Heat Control: MechoShade ThernoVeil 2011 Series: PVC coated fiberglass and polyester weave, 10 percent open; meet or exceed California flame tests.

B. Shade Hardware and Shade Brackets:
   1. Provide shade hardware constructed of minimum 1/8" thick (3.175 mm) cadmium plated steel or thicker as required to support 150% of the full weight of each shade.
   2. Allow for removal of shade roller tube from brackets without removing hardware from opening or without requiring end or center support brackets to be removed.
   3. Allow for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
   4. Allow for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets regardless of mounting position (inside or outside mount).
   5. Allow for removable regular roll fascia(s) to be mounted continuously across two or more shades without requiring exposed fasteners.
   6. Allow for operation of multiple shadebands offset by a maximum of (12) (45) from the motor axis between shadebands, (6) (22.5) on each side of the radial line, by a single motor (Multi-banded shades) subject to manufacturer's design criteria.
   7. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connections for drive mechanism to shade roller tube shall not be acceptable.
   8. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics are not acceptable: polyester or reinforced polyester shall not be acceptable.
   9. Shade roller and shadecloth attachment:
   10. Use extruded aluminum shade roller tube of diameter and wall thickness required to support shade fabric without (excessive) deflection. Roller tubes less than 2.55 inches (65 mm) in diameter are not acceptable.
   11. Provide for positive mechanical engagement with drive / brake mechanism.
   12. Provide for positive mechanical attachment of shadeband without requiring use of adhesives, adhesive tape, staples or rivets. Two sided pressure sensitive adhesive tape is not acceptable, shade bands stapled to roller tube shall not be acceptable.

13. Attach shadebands to tube such that removal and replacement of a shadeband can be accomplished without removing either the tube from the brackets or without removing shade brackets or the drive operator. Shadebands must be replaceable on site.

C. Regular Roll Fascia:
1. Continuous removable extruded aluminum fascia (Architect to select color from manufacturer's standards) that attaches to shade mounting brackets without the use of adhesives, magnetic strips or exposed fasteners.
2. Fascia shall be able to be installed across two or more shadebands in one piece.
3. Fully conceal brackets, shade roller and fabric on the tube.
4. Chain drive shall fall behind the bottom return edge of the fascia without requiring notching of the fascia.

2.04 FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb to jamb, unless specifically indicated otherwise. Comply with Manufacturer's edge clearance standards and recommendations.

B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch in either direction per 8 feet of shade height due to warp distortion or weave design.

C. Provide battens in non-railroaded shades as required the by Manufacturer to assure proper tracking and uniform rolling of the shadebands, in accordance with the manufacturer"s published width x height fabricate guide and standards.

D. Weighted batten bars: At locations recommended by manufacturer.

E. For railroaded shadebands, provide seams or battens in railroaded multi-width shadebands as required by Manufacturer to meet Width:Height ratios and size requirements.

F. Provide batten pockets utilizing self-colored fabric front and back, RF welded into the shadecloth.

G. Provide a self-colored opaque liner front and back to eliminate any see through of the batten pocket and shall not exceed 1-1/2 inches (38 mm) high and be totally opaque. A see-through moiré effect which occurs with multiple layers of transparent fabrics is not acceptable. Reinforce batten pockets using coil coated, roll formed spring steel to insure flatness of shadebands in accordance with manufacturer's standards. Concave formed profile of batten stiffeners to be compatible with diameter of shade roller tube.

2.05 FINISHES

A. Aluminum Components: Architect shall select from Manufacturer's standard PPG Duracron baked enamel colors.

B. Steel Components: Cadmium-plated, satin-finished, or bonderized prior to painting with Manufacturer's standard baked-enamel finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrate and conditions for installation. Do not commence installation until conditions are satisfactory. Commencement of installation indicates acceptance of site conditions by Contractor.

B. Verify that utilities and control conduits are of the correct types and in correct locations.

3.02 INSTALLATION

A. Install window shade systems in accordance with manufacturer's instructions and these specifications. Install units to comply with the Manufacturer's instructions for the type of mounting and operation required. Provide units plumb, true, and securely anchored in place with recommended hardware and accessories to provide smooth operation without binding.

B. Assume responsibility for all field dimensions and mounting surfaces.

C. Adjust window shade systems for proper operation.

D. Tolerances:
   1. Maximum variation of gap at window opening perimeter: 1/4 inch, per 8 feet (+/- 1/8 inch) of shade height (6.35 mm per 2438 mm +/- 3.2 mm).
   2. Maximum offset from level: 1/16 inch per 5 feet of shade width (1.587 per 1524 mm of shade width).

3.03 ADJUST AND CLEAN

A. Adjust drive / brake mechanism of units for smooth operation. Adjust shade and shadecloth to hang flat without buckling or distortion. Replace any units or components which do not hang properly or operate smoothly.

B. Touch up damaged finishes and repair minor damage in order to eliminate evidence of repair. Remove and replace work that cannot be satisfactorily repaired.

C. Clean exposed surfaces, including metal and shadecloth, using non-abrasive materials and methods recommended by the Shadecloth Manufacturer. Remove and replace work which cannot be satisfactorily cleaned

3.04 DEMONSTRATION

A. Demonstrate operation method and instruct Owner's personnel in the proper operation and maintenance of the window shade systems.

END OF SECTION

SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for architectural cabinet work.

1.02 RELATED REQUIREMENTS

A. Section 01 41 00 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 06 41 00 - Architectural Wood Casework.

C. Pertinent sections of other divisions specifying penetrating countertops.

D. Pertinent sections of other divisions specifying assembly, installation, and connection of plumbing work, plumbing elements penetrating countertops or splashes.

E. Pertinent sections of other divisions specifying assembly, installation, and connection of electrical work, electrical elements penetrating countertops or splashes.

1.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard.

B. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. AWI (QCP) - Quality Certification Program.

E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.

F. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0.

G. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

H. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

I. NEMA LD 3 - High-Pressure Decorative Laminates.

J. PS 1 - Structural Plywood.

K. WI (CCP) - Certified Compliance Program (CCP).

L. AWI/AWMAC/WI - Architectural Woodwork Standards (AWS)

1.04 SUBMITTALS

A. See Section 01 33 00 - Submittals, for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: Demonstrate compliance with specified attributes, provide Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.

3. Specimen warranty.

D. CAL-GREEN Submittals:
   1. Product Data - VOC Limits: For adhesives, sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Composite Wood Formaldehyde Limits: Provide certification that all products meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.

E. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.

F. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

G. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

H. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

I. Installation Instructions: Manufacturer's installation instructions and recommendations.

J. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.

B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
   1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   2. Provide designated labels on shop drawings as required by certification program.
   3. Provide designated labels on installed products as required by certification program.
   4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
   5. Arrange and pay for inspections required for certification.
   6. Replace, repair, or rework all work for which certification is refused.

C. Installer Qualifications: Fabricator.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in Section 01 6116.

2.02 COUNTERTOPS

A. Quality Standard: See Section 06 41 00.

B. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
   1. Laminate Sheet : NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
      a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
      b. NSF approved for food contact.
      c. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
      d. Finish: Matte or suede, gloss rating of 5 to 20.
      e. Manufacturers: Selected from those listed in Section 06 41 00. Provide all materials from a single manufacturer.
   2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
   3. Back and End Splashes: Same material, same construction.

2.03 MATERIALS

A. Wood-Based Components:
   1. Wood fabricated from old growth timber is not permitted.

B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

C. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.

D. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
   1. Type specified in Section 06 41 00.

E. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

F. Countertop Support Brackets: Provide at locations where countertop span is not supported by base cabinet, maximum 36 inches on center.
   1. Steel, welded construction, powder coat finish, color selected by Architect.
   2. Support Arms: Match countertop depth, 2 inch flanges, extended concealed arm predrilled for bolting to wall studs or other support.
   3. A&M Hardware, Inc. 2.0 inch Concealed Brackets: www.AandMhardware.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

G. Joint Sealant: Mildew-resistant silicone sealant, color-matched to countertop, clear at stainless steel.

2.04 FABRICATION

A. Fabricate in accordance with standards governing fabrication quality that are specified in Section 06 41 00.

B. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
   4. Locate openings accurately and use templates or roughing-in diagrams to provide accurate size and shape.
   5. Smooth edges of cutoffs and, where located in countertops and similar exposures, seal edges of cutouts with a water resistant coating.

C. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

D. Epoxy and Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install concealed support brackets before wall finishes are applied. Install at spacings indicated on Drawings, except if none are shown, install at maximum 36 inches on center.

B. Securely attach countertops to cabinets or concealed brackets using concealed fasteners. Make flat surfaces level; shim where required.

C. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.

D. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnish and install all manufactured items shown on drawings and specified.

B. Related sections can include, but may not be limited to the following:

(1) Section 31 00 00, Earthwork

(2) Section 32 13 13, Landscape Concrete

(3) Section 32 80 00, Irrigation

1.02 REFERENCES AND REGULATORY REQUIREMENTS

A. State of California Department of Transportation Standard Specifications, current edition.

B. Perform all work in accordance with all applicable laws, codes, and regulations required by State of California and the City of South San Francisco and County of San Mateo.

1.03 SUBMITTALS

A. Conform to applicable specifications, General Conditions and/or Special Provisions.

B. Product Data: Submit catalog "cut sheets" and installation instructions of all materials and equipment proposed to be furnished and/or installed under this portion of the work. Include the manufacturers and distributors name, sub-contractor as applicable. Insure that the "cut sheets" clearly describe the specific product by catalog number and that additional non-specified products that may appear on the same "cut sheet" are cross out where applicable.

C. Samples: Submit samples of colors and finishes for all applicable products and furnishings for selection by District.

D. Shop Drawings: Submit complete shop drawings for all materials or furnishings requiring field or shop fabrication.

1.04 QUALITY ASSURANCE

A. All Site Furnishings sub-contractors bidding on this project must have a California license and be experienced in the installation, in Northern California, of site furnishings for at least 5 years and have completed five (5) projects in Northern California of comparable size, type and complexity, in the past three (3) years.

B. Review: All equipment shall be reviewed for conformance with the intent of the Contract Documents and accepted by the contractor prior to installation. All site furnishings shall be in a new, "first-class" condition, per the discretion of the District' Representative, prior to Final Acceptance.

1.05 DELIVERY, STORAGE AND HANDLING

A. The contractor is responsible for coordination of the delivery, acceptance, handling and storage of all site furnishings.

B. Store and handle site furnishings as acceptable to the Construction Manager and so that work or access of others is not impeded.

C. The contractor shall protect all site furnishings from theft or damage at all times until the District's Representative has accepted such items.

1.06 SOILS REPORT

A. A soil investigation report has been prepared for the project.

B. The report is available in the office of the Architect and the Construction Manager for inspection by the Contractor. Unless otherwise specified, it is intended that all work be performed in accordance with the provisions of the report.

C. Drilled piers may encounter ground water. Excavations for drilled piers may require casings and installation of concrete by means of pumping under the direction of the Geotechnical Engineer.

1.07 SOILS BORINGS

A. Subsurface soils investigations have been made at the site and logs of the test holes are available with the Soils Report. Such investigations have been made for the purposes of design only, and neither the Landscape Architect, the Owner, nor the Soils Engineers guarantee adequacy or accuracy of the data, or that data are representative of all conditions to be encountered. Such information is made available for general information only and shall not relieve the Contractor of the responsibility for making his own investigations

PART 2 - MATERIALS

2.01 SITE FURNISHINGS

A. As shown on drawings or accepted equal.

B. Greenscreen: as shown on drawings or accepted equal

2.02 OTHER EQUIPMENT

A. As shown on drawings or accepted equal.

2.03 LOCKS and KEYS

A. All lock keys shall be keyed alike. Provide locks keyed alike to what the school uses.

PART 3 - EXECUTION

3.01 SEQUENCING AND SCHEDULING

A. Coordinate construction timing of installation of site furnishings in conformance with all other work.

B. Install site furnishings as shown on the drawings. Final location to be determined in field. Pothole to determine location of existing utilities. Install site furnishings without affecting existing utilities. Install plumb, neatly aligned and per manufacturer's specifications.

3.02 INSTALLATION

A. Concrete footings: Install as shown in Drawings and per requirements of Section 01 40 00 Section 32 13 13 unless noted otherwise.

B. Equipment:

(1) Conform to layout shown on Drawings.

(2) Erect site furnishings in strict conformance with details, accepted Shop Drawings, and manufacturer's instructions. If specified equipment and/or materials are revised, plans and Drawings are subject to revisions based on manufactures.

(3) If specified equipment and/or materials are revised, plan and Drawings are subject to revisions based on manufacturers' recommendations.

C. Install manufactured items in accordance with the manufacturer's instruction and as shown in the drawings and as specified herein.

D. Set all work true and square, plumb and level.

E. Size bolts to fit flush with nuts. Countersink nuts and bolts as detailed. Vandal proof bolts as directed by Project Inspector.

F. Securely fasten and/or anchor all equipment with bolts, angles, plates, flanges, concrete footings and/or other items required for proper and complete installation and/or erection of the units.

G. Concrete for footings, as specified in Section 32 13 13, Landscape Concrete. Slope top of footings to drain.

H. Supply all miscellaneous metal units and install as specified herein.

I. Install all equipment in strict conformance with the manufacturer's specifications and/or as accepted by the Landscape Architect.

J. Set all equipment, etc., level as recommended by manufacturer.

K. Transport, store and handle precast units and manufactured items in a manner to avoid hairline cracks, staining or other damage. Store units free of the ground and protected from mud or rain splashes. Cover units, secure covers firmly, and protect the units from dust, dirt or other staining material.

L. Heights of tables and benches shall be as follows, unless otherwise required by ADA; California Title 24 or other code requirements.

Description	Height Above Finish Grade
Table Surface Height	34" Maximum, 28" minimum
Knee Space Height	27" Minimum Clear Space
Knee Space Depth	19" Minimum from edge of table to nearest obstruction under table top
Width of Knee Space	30" Minimum clear width beneath table
Bench Surface Height	16" Minimum, 18" Maximum

3.03 FIELD QUALITY CONTROL

A. All site furnishings shall be inspected and accepted upon delivery by the Contractor. Final acceptance of site furnishings and locations of site furnishings shall be per the discretion of the Landscape Architect.

3.04 CLEANUP: Per General Conditions.

A. During construction, protect work from damage by accident, staining or otherwise.

B. Upon completion, repair or replace broken, damaged or defective parts.

C. Remove all surplus materials and debris from the premises.

D. All work shall be left in a condition satisfactory to the Landscape Architect.

3.05 CLOSEOUT

A. Include manufacture's cut sheets and maintenance instructions of specified items in Operations and Maintenance Manual.

B. Include manufacture's warranty information of specified items with warranties.

END OF SECTION

SECTION 22 0000

PLUMBING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The bidding requirements and contract forms, including General Conditions and Supplemental General Conditions, all Division 01 Sections and Section 23 0500 - General Mechanical apply to all work herein.

1.02 DESCRIPTION

A. This Specification establishes the required standards for all labor, materials, equipment, and workmanship in connection with the furnishing, fabrication, and installation of "Plumbing". Plumbing work includes, but is not necessarily limited to, the following items of work:
   1. A complete system of soil, waste, vent and sanitary sewer piping and structures, including provisions for mechanical equipment drainage; and connection of same to public sanitary sewers, located as indicated on the Drawings.
   2. Natural gas piping system, complete from utility company meters (located as indicated on the Drawings) and terminating in stopcocks adjacent to all natural gas fired equipment, as noted on the Drawings. All gas-fired equipment shall be equipped with a gas pressure regulator as hereinafter specified.
   3. Cold water distribution system, complete, from points of contact with site domestic water systems (located approximately as indicated on the Drawings) to all plumbing fixtures, mechanical equipment, building specialties, and Owner supplied equipment scheduled for service on the Drawings.
   4. All plumbing fixtures and trim as scheduled on the Drawings, inclusive of setting of fixtures and connections to drainage and water supply systems.
   5. Flashing of all plumbing pipe penetrations through exterior walls, roofs, and foundations. Sheet metal and lead flashings for pipe penetrations through roofs shall be furnished by the Plumbing Contractor and installed by the appropriate Roofing Contractor.
   6. Rough in and connection of all fixtures and equipment furnished by the Owner and/or Tenant.
   7. Excavation and backfill as required for the work of this Section in conformity with Earthwork Section of the Specifications.
   8. Final connection of natural gas to equipment furnished under other Sections.
   9. Condensate drainage piping and connections from points of attachment to equipment to indirect waste locations, as noted on the Drawings.
   10. Protection of all piping specified herein and/or shown on the Drawings, from freezing. Buried piping shall be a minimum of 12" below the local frost line. Piping above grade in unconditioned areas shall be insulated.
   11. Testing and adjusting of all piping systems and equipment herein specified.
   12. Pipe wrapping and insulation.
   13. Sterilization of domestic water systems.
B. Should any work or material not be included in the Drawings or Specifications but is nevertheless necessary for the proper execution of the stated scope therefore for full compliance with codes, laws, rules and regulations, the Contractor shall understand such work and material is required, and shall perform all such work and furnish such material as fully as if it were particularly delineated or described.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Sheet metal gutters and gutter transition pieces to downspouts: Section 07 6200 Sheet Metal Flashing and Trim.

B. Line voltage wiring: See Section applicable Section(s) of Division 26 - Electrical.

C. Final connection of water and gas to equipment furnished under other Sections of the Specifications.

D. Finish painting: See Section 09 9100 for painting requirements.

1.04 QUALITY ASSURANCE

A. Codes and Standards: Conform to all applicable codes and standards as stated herein and as described in Division 01 of the Specifications, including the following:
   1. American Gas Association (AGA)
   2. American National Standards Institute (ANSI)
   3. Adhesive and Sealant Council (ASC)
   4. American Society of Mechanical Engineers (ASME)
   5. American Society for Testing and Materials (ASTM)
   6. American Society of Civil Engineers (ASCE)
   7. California Building Code (CBC)
   8. California Plumbing Code (CPC)
   9. California Fire Code (CFC)
   10. California Energy Conservation Code, Title 24
   11. State of California Administrative Code (CAC) Titles 8, 17, and 24
   12. California Electric Code (CEC)
   13. National Electrical Manufacturers Association (NEMA)
   14. National Fire Protection Agency (NFPA)
   15. Underwriters' Laboratories (UL)
   16. Comply with all ADA and California Title 24 requirements for disabled access.
   17. City Fire Marshal requirements
   18. Comply with the latest edition of all applicable standards, including AWWA, PDI, and OSHA
   19. NSF/ANSI 61 Standard, *Drinking Water System Components - Health Effects* for fixture materials that will be in contact with potable water.
   20. AB 1953, Amendments to Section 116875 of the Health and Safety Code relating to lead plumbing. All new faucets, and all drinking fountains must comply with this and must be certified by an independent, accredited third party as being in compliance. Fixtures shall not be accepted until compliance has been proven. Fixtures that fail must be replaced.

B. Minimum requirements: The requirements of these are the minimum that will be allowed unless such requirements are exceeded by applicable codes or regulations, in which the regulatory codes or regulation requirements shall govern.

1.05 SUBMITTALS

A. All submittals shall be submitted under the provisions of Section 01 3300 - Submittals.

   1. Product Data
      a. Submit manufacturer's catalog cut sheets for all fixtures.
      b. Submit manufacturer's product data for all plumbing piping, fittings, materials, and equipment.
   2. Shop Drawings

a. Prepare complete consolidated and coordinated layout drawings for all new systems, and for existing systems that are in the same areas. Shop drawings shall be prepared using AutoCAD 2012 or newer and shall be drawn at a minimum ¼" = 1' - 0" scale. Sections, details, and diagrams shall be to required scales for specified areas.
b. Submit shop drawings to Architect for approval, prior to fabrication or installation of any work. Do not install equipment or piping until layout drawings have been approved. Any work installed without prior shop drawing approval shall be removed at the Contractor's expense.
c. Complete and detailed shop drawings shall be maintained throughout the coordination and construction phase indicating all equipment and trades' work clearly. All equipment including piping, etc. shall clearly identify both top and bottom elevations as well as distances from equipment to established building lines. Coordinate with other trades and field conditions and show dimensions and details including building construction and access for servicing.
d. Use of contract documents for shop drawings is not acceptable
e. Any work installed without prior shop drawing approval shall be removed at the Contractors expense.

1.06 AS-BUILT DRAWINGS

A. Comply with the requirements of Section 01 78 39 – PROJECT RECORD DOCUMENTS and the following.
   1. A complete set of Contract Drawings shall be maintained at the work site, and all changes in the work shall be recorded on this set on a daily basis. In addition to changes made during course of work, show the following:
      a. Exact location, type and function of concealed valves and controllers.
      b. Exact size, elevations and location of underground and under floor piping.
B. Submit to Architect for final approval.

1.07 OPERATION & MAINTENANCE DATA (Closeout)

A. Comply with the requirements of Section 01 78 23 – OPERATION AND MAINTENANCE DATA and the following.
   1. Installing contractor shall provide all operating and maintenance instructions provided by the manufacturer, describing proper operation and maintenance of any equipment and devices installed. Operating and maintenance instructions shall cover maintenance, adjustment, and operation of each piece of apparatus.
   2. Contractor shall also provide a parts list of all equipment and component parts for all equipment under this Section. The equipment list shall include manufacturer's name, model number, and local representative, service facilities and normal channel of supply for each item.
   3. Data shall be bound in a hard cover 3-ring binder, with table of contents identifying items therein, and index tabs for each system. Neatly obscure or cross out inapplicable data from manufacturer's literature. Include the following:
      a. Manufacturer's brochures, ratings, certified shop drawings, lubrication charts and data, and parts list with part numbers. Mark each sheet with equipment identification number and actual installed condition or system and location of installation. Specifically identify which options are provided.
      b. Description of start-up and operating procedures for each system, including controls diagrams and description of operating sequences.
      c. Recommend preventative maintenance schedule and procedures.

B. Submit data to the Architect for approval. Final acceptance of the work will not be made until a satisfactory submission of this material is received and approved by the Architect

1.08 COORDINATION

A. All work shall be coordinated with water, gas, sanitary sewer, and other services on the site. The locations of points of connection to the site services shall be confirmed prior to commencement of any and all work required under this Section of the Specifications.

B. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

PART 2 PRODUCTS

2.01 GENERAL

A. Only specified materials shall be utilized in the work of this Section unless substitutions have been approved in accordance with the General Conditions and Division 1 Sections of the Specifications.

B. All materials shall be new and unused, of the best quality for the intended use, and shall be listed by the ASA, AGA, and UL as meeting their requirements and bearing their label wherever standards have been established and label services are regularly furnished by them.

C. Tracer wire shall be installed with all non-metallic piping below grade. Tracer wire shall be solid core copper, 14-gauge minimum, lain continuously along pipes. Wire shall be "ty-wrapped" to pipe at eight feet (8' o.c.) on center. Tracer wire shall terminate in concrete access boxes at the beginning and terminal ends of the buried pipe.

D. All accessible pipe 2" and smaller shall be threaded. Fittings for threaded pipe shall be 150-lb. malleable iron, screwed and banded.

E. Vent piping shall have vandal resistant mushroom vent caps.

2.02 PIPE, FITTINGS

A. Below Ground Sanitary Soil, Waste, Vent, and Storm Drainage Piping:

1. Lines 2" and larger shall be standard weight, no-hub cast iron soil pipe and fittings manufactured from gray cast iron with a tensile strength of not less than 21,000 psi, bituminous coated interior and exterior, conforming to the requirements of ASTM A888 and CISPI Standard 301. Each length of pipe shall be hydrostatically (water) tested by the manufacturer to verify compliance. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF international. All pipe and fittings shall be of the same manufacturer. Approved manufacturers: AB&I, Charlotte, or Tyler.
2. Joints: No hub couplings shall conform to CISPI 310 Standard, current edition.
    a. Super-duty no-hub couplings shall have a shield constructed of type 304 stainless steel with a minimum thickness of 0.016" (28 gauge). The worm gear drive clamps shall have a hexagon head to accept a 3/8" socketed torque wrench. The clamps shall be tightened to a minimum of 80 in pounds. The gaskets shall be manufactured using neoprene rubber meeting the requirements of ASTM C-564. Couplings shall meet FM 1680 class 1. Smooth shielded couplings shall have a 304 stainless steel shield with a minimum thickness of 0.025" (24 gauge). Couplings 1-1/2" through 4" shall have four bands and 5" through 10" shall have six bands. The clamps shall be tightened between

115 and 125 inch pounds. Approved manufacturers: Husky SD4000, Clamp-All High Torq 125, or MG Couplings.

b. Couplings shall be installed in accordance with manufacturer's installation instructions, local code requirements, and shall be tightened using a calibrated torque wrench

B. Above Ground Soil, Waste, Drain, and Vent Pipe:

1. Lines 2" and larger shall be no-hub cast iron soil pipe and fittings manufactured from gray cast iron with a tensile strength of not less than 21,000 psi, bituminous coated interior and exterior, conforming to the requirements of ASTM A888 and CISPI Standard 301. Each length of pipe shall be hydrostatically (water) tested by the manufacturer to verify compliance. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF international. All pipe and fittings shall be of the same manufacturer. Approved manufacturers: AB&I, Charlotte, or Tyler.
2. Joints: No hub couplings shall conform to CISPI 310 Standard, current edition.
   a. Piping 2" and smaller: Medium duty No-Hub couplings shall conform to the requirements of ASTM 1540. Approved manufacturers: Husky 2000, Tyler Wide Body, Clamp All 80.
   b. Piping 2½" and larger: Heavy duty No-Hub couplings shall conform to the requirements of ASTM 1540. Approved manufacturers: Husky 4000, Mission, Clamp All 125.
3. Couplings shall be installed in accordance with manufacturer's installation instructions, local code requirements, and shall be tightened using a calibrated torque wrench.
4. Lines under 2" shall be galvanized steel pipe, with threaded cast iron drainage fittings.
5. At the option of this Contractor, all soil, waste, and vent piping above ground may be DWV copper, with wrought copper fittings, with "Stay-Safe 50" lead free solder and a suitable non-corrosive flux.

C. Hot & Cold Water Piping:

1. All domestic hot and cold water piping 3" and smaller shall be Type L, hard temper, copper pipe with wrought copper or cast brass solder joint fittings or ProPress fittings. Pipe shall be NSF 61 Certified and bear the NSF Certification mark. All joints shall be made up with lead free solder. A suitable non-corrosive flux shall be used at all joints.
   a. Viega Copper Press fittings: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press end shall have SC (Smart Connect) feature design (leakage path).
2. Pipes below grade inside buildings shall be Type K, soft annealed copper tubing with no joints below slabs. Pipes shall be sleeved with 20-mil plastic sheathing.

D. Natural gas Pipe:

1. Above ground piping shall be Schedule 40 black steel, ASTM A-53-84a, electric resistance welded or seamless, Grade B
   a. All concealed pipe and all pipe 2½" and larger shall be welded. Fittings for welded pipe shall be seamless steel, weld neck.
   b. All accessible pipe 2" and smaller shall be threaded. Fittings for threaded pipe shall be 150-lb. malleable iron, screwed and banded.
   c. All pipe and fittings exposed to weather shall be Schedule 40 galvanized steel, painted with rust resistant paint and lead free primer.

E. Condensate Drainage Pipe:

1. Condensate drainage piping shall be Anvil, Mueller, Watts, or equal.
   a. 1 ½" and larger shall be type DWV copper tube, ASTM B-306.

b. 1 ¼" and smaller shall be type M, hard temper copper, standard copper fittings.
2. Drainage fittings shall be ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings. 1 ¼" & smaller, standard pressure fittings.
3. Solder shall be ASTM B 32, lead free with ASTM B 813, water-flushable flux.

F. Condensate piping from the furnace units shall be PVC plastic pipe, Schedule 40, complying with ASTM D 175.

2.03 UNIONS

A. Provide unions at all threaded connections to equipment, regulators, and controls that may have to be removed or replaced and at all points where necessary for the disassembly of piping for maintenance.

B. Steel pipe unions: 150 PSI malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe.

C. Copper pipe unions shall be 200 PSI working pressure, bronze body, solder or grooved ends.

1. Pipes 2" and larger: ground joint
2. Pipes 2 ½" and larger: flanged face or grooved ends

D. Dielectric insulating unions: 250 psi working pressure, pipe ends and material to match piping. Electric current below 1 percent of galvanic current. Gasket material as recommended by manufacturer. Epco or approved equal.

E. Avoid the use of dielectric unions or dielectric pipe nipples on heating hot water, domestic and chilled water piping applications, exterior and interior.

2.04 VALVES, SPECIALTIES

A. General Requirements:
1. All valves of a particular type and size range shall be the product of one manufacturer.
2. Valve body materials shall be compatible with piping system materials.
3. All valves shall be provided with reusable strap-on insulation covers.
4. All exposed valves in finished areas shall be chrome-plated.
5. Where insulation is indicated, install extended stem valves, arranged in proper manner to receive insulation.

B. Ball Valves: Nibco, Crane or Milwaukee
1. System supply and return piping shut-off and isolation valves for application in piping system up to and including 2 ½" in diameter.
2. Class 125, bronze body, screw-in bonnet, integral seat, renewable disc, straight body.

C. Butterfly Valves: Nibco, Crane or Milwaukee
1. System supply and return piping shut-off and isolation valves for applications in piping system over 2 ½" in diameter.
2. 6" and smaller: 200 psi, ductile iron body, extended neck, aluminum bronze disc, reinforced resilient EDPM seat, manual lever and lock.

D. Check Valves: Where required, install on equipment side of all shutoff valves.
1. Lift Check Valves (vertical): Nibco T-480-Y-LFor KITZ 836; bronze body, inline lift type, Teflon seat, and discs, spring actuated, 125 lb.
2. Swing Check Valves (horizontal):
a. 2 inches and smaller: Nibco T-413-Y-LF, Stockham B-345, or KITZ 822T; bronze body, Y-pattern swing-type, rated 200 PSI non-shock CWP. Body, bonnet, and disc hanger shall be of lead-free dezincification-resistant material and TFE seat disc. Valve ends shall be threaded type. Valves shall be 3rd party certified to Annex G of NSF/ANSI 61.

E. Gas Shut-Off Valves:

1. At Building Service: Homestead Fig. 601, semi-steel, lubricated plug, lever handle, 200 lb. Install CALIFORNIA Series 300 seismic actuated shut off valve at meter. Brace per manufacturer's instructions.
2. At Connection to Equipment: Jomar T-203 gas ball valves, 1/4 -turn, hot forged brass, 2-piece design, standard port, appliance type with side tap/drain. Provide with AGA certified stainless steel flex connection 12" max.

F. Backflow Preventers (Where shown on the Drawings or required by local code):
1. Atmospheric type: Wilkins #35 series
2. Pressure type: Wilkins #720A series
3. Reduced pressure type:
   a. ¼" to 2" - Wilkins #975-XLMS series
   b. 2½" to 10" - Wilkins #375 series

G. Water Pressure Regulating Valves: Wilkins 500 YSBR series. Install where pressure to building exceeds 70 psi.

2.05 HOSE BIBBS

A. HB-1: Interior Hose Bibbs: Zurn #1350VB narrow wall hydrant, encased, with adapter vacuum breaker. Bronze body, replaceable seat washer, screwdriver operated stop valve in supply, key operated control valve. Adjustable stainless steel ox with hinged cover, cylinder lock and "WATER" stamped on cover.

2.06 FLOOR DRAINS

A. Floor Drains: Drains in membrane dampproofed floors shall have flashing flange and membrane clamp

B. FD-1: Jay R. Smith #2005 with adjustable strainer heads, vandal proof screws, nickel bronze strainer. Install trap primers at all floor drains.

2.07 TRAP PRIMERS

A. Trap primers shall be Precision Plumbing Products (model P2-500 or PR-500). Trap Primers shall be pressure drop activated and be of all brass construction including a brass body with ½" male NPS inlet and ½" female NPT discharge. Internal components shall consist of a stainless steel debris screen, brass piston and brass discharge jet. Lubricated O-rings shall be EPDM and seal O-rings shall be nitrile.
1. Trap primers shall be installed on fresh cold water lines of 1 ½" diameter or less and shall be located where they will be subjected to frequent pressure drops of at least 10 psi. Install with shut off valve and access doors in Janitor's closets, Mechanical Rooms and other areas not served by, or in close proximity to, flushometer valve operated water closets.
2. Working pressure shall be 20 to 80 psig.
3. Install in Janitor Closets, Mechanical Rooms and other areas not served, or in close proximity to, flushometer valve operated water closets.

2.08 ACCESS PANELS

A. Where construction is not inherently accessible, provide adequately sized and conveniently located access doors in ceilings, walls, and furring for access to controls and for servicing valves, equipment, etc.
1. Fire Rated walls and ceilings: Milcor, style UFR or equivalent Karp, U.L. Class B, 1½ hour rating, insulated, self closing, self latching, flush key operated cylinder lock, interior latch release. Minimum size shall be 12" x 12". Provide larger sizes where required. Maximum size shall be 24" x 36".

2. Drywall ceilings or walls: Milcor, style DW or equivalent Karp, prime coated steel, flush screwdriver-operated cam lock. Minimum size shall be 12″ x 12″. Provide larger sizes where required. Maximum size shall be 24″ x 36″.
3. Masonry walls: Milcor, style M or equivalent Karp, prime coated steel, flush screwdriver-operated cam lock. Minimum size shall be 12″ x 12″. Provide larger sizes where required. Maximum size shall be 24″ x 36″.
4. Tiled walls: Milcor, style MS or equivalent Karp, stainless steel, flush screwdriver-operated cam lock. Minimum size shall be 12″ x 12″. Provide larger sizes where required. Maximum size shall be 24″ x 36″.
5. Plastered walls and ceilings: Milcor, Style K or equivalent Karp, prime coated steel, flush screwdriver-operated cam lock. Minimum size shall be 12″ x 12″. Provide larger sizes where required. Maximum size shall be 24″ x 36″. Doors shall be delivered to the General Contractor for installation.

2.09 CLEANOUTS

A. Cleanouts in membrane dampproofed floors shall have flashing flange and membrane clamps. Plugs shall be bronze, with cast iron body ferrule for cast iron pipe.

B. Floor Cleanouts (FCO): Zurn ZN1400HD, "Level-trol" adjustable floor cleanouts, dura-coated cast iron with gas and water-tight ABS tapered thread plug, and round scoriated heavy duty top, adjustable to finished floor.

C. Grade (COTG): Zurn Z-1474-N with internal cleanout or equal Jay R Smith. Cleanout housing to be dura-coated cast iron body with integral anchor flange and scoriated cover with lifting device. Cleanouts in un-paved areas shall be set in 18" x 18" x 4" concrete pads.

D. Accessible:
1. Cast iron pipe: Zurn Z-1440, dura-coated with gas and water-tight, bronze, taper thread plug
2. Steel pipe: Zurn Z-1470-A bronze, raised head, cleanout plug.
3. Copper tubing: Nibco figure 816 or 817.

E. Wall Cleanouts (WCO):
1. Copper tubing: Nibco figure 816 or 817, with Zurn Z-1462, 6″ x 6″ polished chrome-plated bronze wall plate and frame.
2. Cast iron pipe: Zurn Z-1441, dura-coated with gas and water-tight bronze, taper thread plug and round smooth stainless steel access cover with securing screw
3. Steel pipe: Zurn ZS1468, round stainless steel wall access cover, complete with securing screw and bronze raised hex head plug for steel pipe.

2.10 PIPE INSULATION

A. Insulate all hot water supply piping, all hot water return piping, all tempered water supply piping and all tempered water return piping with Johns Manville "Micro-Lok HP", or equal, rigid fiberglass one-piece pipe insulation or Knauf Insulation "Earthwool 1000°" or "Earthwool Redi-Klad 1000° rigid glass mineral wool one-piece pipe insulation, or approved equal.

B. Pipe covering shall have factory applied All Service Jackets (ASJ). Jackets shall be constructed of high density, white kraft bonded to aluminum foil with fiber glass yarn, with a pressure sensitive closure system, or of aluminum foil reinforced with a glass scrim bonded to a kraft paper interleaving with an outer film layer leaving no exposed paper. Adhesives or staples shall not be required to seal the jacket and butt strips.

C. All insulation shall have composite (insulation, jacket, tape seal, and adhesive used to adhere the jacket to the insulation) Fire and Smoke Hazard ratings as tested under Procedure ASTM E

84 and NFPA 255, not exceeding: Flame Spread - 25, Smoke Developed - 50. PVC fitting covers, jacketing and accessories such as adhesives, mastics, cements and cloth for fittings should have the same component ratings.

D. Insulation thickness shall conform to Title 24, Part 6 requirements as indicated in the following table:

FLUID TEMPERATURE RANGE (°F)	CONDUCTIVITY RANGE (in Btu-inch per hour per square foot per °F)	INSULATION MEAN RATING TEMPERATURE (°F)	NOMINAL PIPE DIAMETER (in inches)				
			1 and less	1 to <1.5	1.5 to < 4	4 to < 8	8 and larger
			INSULATION THICKNESS REQUIRED (in inches)				
Space Heating, Hot Water Systems (steam, steam condensate and hot water) and Service Water Heating Systems							
Above 350	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350	0.29-0.31	200	3.0	4.0	4.5	4.5	4.5
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.22-0.28	100	1.0	1.5	1.5	1.5	1.5
Space Cooling Systems (chilled water, refrigerant and brine)							
40-60	0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
Below 40	0.20-0.26	50	1.0	1.5	1.5	1.5	1.5

E. Fittings, valves and flanges shall be covered with Manville "Zeston 2000" insulated PVC fitting covers and Hi-Lo Temp insulation inserts or Knauf "Proto LoSmoke". Insulation for all exposed piping and all piping in crawl spaces shall be covered with Zeston PVC jacketing. PVC jackets shall be 20 mils thick and shall be bonded with Zeston Perma-Weld adhesive. In crawl spaces, Knauf Earthwool RediKlad 1000° pipe covering shall serve as an acceptable alternate to standard pipe covering and PVC.

F. All piping exposed to the weather shall be finished with aluminum jacketing with a laminated moisture retarder or Earthwool RediKlad 1000° with Venture Clad embossed jacket. Aluminum jacketing shall be overlapped 2 to 3 inches and held in place with stainless steel bands to form a weather tight system. Elbows and tees shall be fitted with matching aluminum fitting covers. Other fittings in metal-jacketed systems shall be finished with conventional weather-resistant insulating materials with painted aluminum finish.

G. All domestic water piping below grade shall be insulated with Dow Trymer-2000. Pipes shall be sleeved with 30 mil PVC jacket, with glued joints.

2.11 STRAINERS

A. For pipes 1 ½" – 2": Nibco T/S 221/222-A or Wilkins S or YB series strainer, 20 mesh type 304 stainless steel screen, bronze construction 200 psi CWP or approved equal. Provide with hose bibb drain.

B. For pipes 2 ½" & larger: Nibco F-721A or Wilkins F series, flanged, 125 lb., tapped bolted bonnet with plug and stainless steel screen.

2.12 SLEEVES, WALL PLATES

A. Provide sleeves on pipes passing through concrete or masonry. Extend sleeve 1 inch above finished floor. Caulk pipes passing through floor with non-shrinking grout or approved caulking compound.

B. Service pipe through exterior wall, roofs: Sioux Chief or equal, wall and ceiling plates; brass material, chrome plated at finished rooms. Size sufficient to cover pipe opening through wall, floor or ceiling. Set screw or spring to secure to pipe. Provide "Link-Seal" sleeve sealing system for slab on grade or exterior wall penetrations.

C. Pipes through, under footings: 18 gage iron sleeves two diameters larger than pipe, cast in concrete, annular space filled with mastic or plastic bituminous cement.

D. Pipes through fire rated walls shall be protected with fire retardant mastic as detailed on the drawings. Installation shall be in full accordance with the requirements of the UL system number. Hilti or approved equal.

E. Pipes through floors, interior concrete walls, and through fire rated walls and smoke stop partitions: 18 gage iron sleeves, two diameters larger than pipe, annular space filled with 3M Brand Fire Barrier CP-25 caulk.

F. Pipes through 1-hour walls shall be protected with fire retardant mastic as detailed on the drawings. Installation shall be in full accordance with the requirements of the UL system number. Hilti or approved equal.

G. Escutcheons: brass material, chrome plated finish, sized sufficient to cover pipe openings through wall, floor or ceiling. Set screw or spring to secure pipe.

2.13 SHOCK ABSORBERS

A. Zurn, "Shoktrol", or equal Jay R Smith, stainless steel bellows. Install with gate valve shut-off and access door at all flush valves or other automatic valves. A single unit sized in accordance with the manufacturer's recommendations may serve batteries of valves.

2.14 VALVE BOXES

A. Christy #F-08, complete with concrete cover and required extensions. Index all covers "GAS" or "WATER" as required for service use.

2.15 FIXTURES

A. The quantity and location of fixtures shall be taken from the Architectural and Plumbing drawings. Provide adequate supports and all standard trim normally furnished for fixtures. All enamel shall be acid resisting. Traps, unless otherwise noted shall be 17 gauge brass tubing, chrome plated when exposed.

B. Except as otherwise shown, provide ¼" steel backing plates, 36" wide by 12" high minimum size, secured to a minimum of three studs by welding, or with ¼" x 2½" lag screws for all wall hung fixtures for which no other means of support is specified.

C. Stops and supplies: Provide stops in hot and cold water lines serving all fixtures, including hose bibbs. Unless otherwise specified, stops exposed at lavatories and similar fixtures shall be Chicago #1016ABCP, chrome plated, loose key. Concealed stops shall be Chicago #1771ABCP.

D. All fixtures shall be standard white color, unless noted otherwise.

E. Fixture connections:

1. Exposed water supply pipe, tubing and waste piping connections shall be chrome plated brass.
2. Fit supply pipe, tubing, and other connections with chrome-plated brass escutcheons at walls.
3. All nipples from copper water lines to fixture stops shall be red brass. Galvanized nipples are not acceptable.

F. Contractor shall provide spare cartridges to SSFUSD Facilities for all faucets.

1. P-1 – WATER CLOSET

a. Fixture: American Standard #3351 101; "Afwall Millenium Flowise" high efficiency toilet; elongated bowl w/antimicrobial coating; vitreous china; 1.28 gpf or Zurn Z5615-BWL-AM.

b. Flush Valve: Sloan Royal #111-1.28; exposed flushometer; 1.28 gpf.

c. Seat: Olsonite (Bemis) #95SSCT; open front less cover, elongated, heavy-duty; self-sustaining check hinges; stainless steel posts; and "STA-TITE®" commercial fastening system.

d. Carrier: Zurn Z-1201 or 1202, no-hub; 500 lb. capacity with auxiliary inlets as required.

2. P-1A – WATER CLOSET (ADA)

a. Fixture: American Standard #3351 101; "Afwall Millenium Flowise" high efficiency toilet; elongated bowl w/antimicrobial coating; vitreous china; 1.28 gpf or Zurn Z5615-BWL-AM. See Architectural Drawings for ADA mounting height.

b. Flush Valve: Sloan Royal #111-1.28; exposed flushometer; 1.28 gpf (ADA compliant) See Architectural Drawings for ADA mounting height

c. Seat: Olsonite (Bemis) #95SSCT; open front less cover, elongated, heavy-duty; self-sustaining check hinges; stainless steel posts; and "STA-TITE®" commercial fastening system.

d. Carrier: Zurn Z-1201 or 1202, no-hub; 500 lb. capacity with auxiliary inlets as required.

3. P-2 , P-2A (ADA)– LAVATORY

a. Fixture: American Standard "Lucerne" model 0355.012; wall hung; 20" x 18"; front overflow; 5" backsplash; faucet holes 4" o.c.; concealed carrier; vitreous china. ADA compliant. See Architectural drawings for ADA mounting height.

b. Faucet: Chicago Faucets #3400-ABCP; deck mounted; 4" centers; metering; 0.5 gpm (CW only)

c. Drain: McGuire #155A; open grid; P.O. plug

d. P-Trap: McGuire #8902 adjustable trap with cleanout

e. Carrier: Zurn Z-1251

4. P-3 – URINAL

a. Fixture: American Standard #6590.001, "Washbrook FloWise"; vitreous china; wall hung; washout flush action; ¾" top spud; 0.125 gpf. See Architectural Drawings for mounting height.

b. Flush Valve: Sloan Royal 186-0.125; high efficiency; exposed, diaphragm type; ADA compliant; 0.125 gpf

c. Carrier: Jay R Smith #0637 or Zurn #1222

5. P-6A – DRINKING FOUNTAIN

a. Fixture: Elkay #VRCTLDDWSK Bottle Filling Station & Bi-Level Drinking Fountain; stainless steel; wall mounted; non-filtered; non-refrigerated; vandal resistant bubbler w/integral hood guard; push button operation; ADA compliant

6. P-6B – DRINKING FOUNTAIN

a. Fixture: Elkay #VRCDWSK Bottle Filling Station & Single Drinking Fountain; stainless steel; wall mounted; non-filtered; non-refrigerated; vandal resistant bubbler w/integral hood guard; push button operation; ADA compliant

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. This Contractor shall be held to have examined the site and compared it with the Contract Documents, and to have satisfied himself as to the conditions under which the work is to be performed. In the event of discrepancy, he shall notify the Architect and proceed as he directs. He shall be held responsible for all existing conditions, whether or not accurately described, and no allowance shall subsequently be made on his behalf for any error, omission, or extra expense to which he may be put due to failure or neglect on his part to make such examination and notification.

B. Prior to commencing the work of this Section, this Contractor shall inspect the installed work of other trades and verify that their work is sufficiently complete to permit the start of work under this Section and that the completed work will be in complete accordance with the original design. In the event of discrepancy immediately notify the Architect and proceed as he directs.

3.02 ACCESSIBILITY

A. Equipment shall be placed and piping connections made in such a manner that all routine adjustments and maintenance operations may be carried out without inconvenience and so that all code requirements for clearances are maintained.

3.03 VIBRATION AND SOUND CONTROL

A. Make all necessary provisions to prevent the transmission of vibration to the building structure and the passage of noise from the equipment rooms to other rooms. Provisions shall include: vibration isolators for motor driven equipment; flexible pipe connections to motor driven equipment; resilient mounting for piping; sealing off pipe and duct penetrations of walls, floors and ceilings of equipment rooms.

3.04 INSTALLATION, GENERAL

A. Provide all necessary cutting in connection with the work of this Section. NO structural members shall be drilled, bored, or notched in a manner that will impair their structural capacity; all penetrations of concrete or masonry shall be made with core drills; NO cutting shall be done without the approval of the Architect.

3.05 INSULATION

A. Insulation shall be applied in complete accordance with the manufacturer's published installation instructions. All insulation shall be applied on clean, dry surfaces and shall be continuous through wall and ceiling openings and sleeves. All joints shall be firmly butted together and longitudinal jacket laps and butt strips shall be smoothly secured. Specified adhesives, mastics, and coatings shall be applied at the manufacturer's recommended minimum coverage per gallon.

3.06 INSTALLATION, PIPING

A. Soil, Waste, Vent, Drain Piping:
   1. Soil, waste, and vent piping occurring within the building shall be installed to a uniform minimum grade of ¼" per foot unless otherwise noted. Vent piping shall be graded so that all condensation shall flow directly to a soil or waste line.
   2. Exterior soil and waste lines shall be installed to inverts or grades indicated on the drawings.
   3. Bell and Spigot pipe shall be installed with the bell up grade.
   4. Changes in direction of drainage piping shall be accomplished by the use of appropriate drainage and sanitary fittings.
   5. Drilling and tapping of drains, soil, waste, or vent pipes and the use of saddle hubs and bands are prohibited.
   6. Protection against breakage of piping passing under or through walls shall be provided using specified sleeves and caulking. Extend sleeve 1 inch above finished floor.
   7. Adapters shall be installed between threaded iron and soil pipe.
   8. Test tees shall be installed at the foot of all soil, waste, and storm water stacks.
   9. Cleanouts shall be located where indicated on the Drawings; at all horizontal offsets; at ends of waste or sewer branches more than 5' in length; at intervals of 100' in straight runs of piping, or at closer intervals if directed or required by local code. Location of cleanouts in finished spaces shall be approved by the Architect prior to installation.

B. Hot, Cold Water Systems:
   1. Connections from copper pipe to fixture supply fittings shall be made with copper or brass nipples.
   2. Provide 18" high vertical air chambers, of size equal to "local connection schedule" size, at all domestic water connections to fixtures and/or equipment that are not specified to have shock absorbers.
   3. All domestic water piping shall be kept clear of the building structure. Where it is within 1" of the building structure it shall be wrapped with felt (3/16" minimum thickness).
   4. To the greatest extent possible, domestic cold water piping shall be kept separated from hot piping and where there is a choice shall be run in the coolest portion of the available space.

C. Natural Gas Piping Systems:
   1. Natural gas piping shall slope back to meter where possible; bottom of vertical natural gas lines shall be fitted with 6" long capped drip legs.
   2. In addition to main shut-off valve, a natural gas stopcock shall be installed at each natural gas fired piece of equipment.

D. Plumbing Fixtures:
   1. Space between wall mounted fixtures and wall surface shall be neatly pointed up with G.E. silicone rubber compound of color matching fixture.
   2. All exposed bolt heads and nuts used to secure fixtures shall be concealed with vitreous china caps.

E. Flashing:
   1. All roof and wall penetrations shall be flashed and counter-flashed water tight with 26 gauge sheet metal, except as noted.
   2. Vents through roof shall be flashed with Semco #1100-4 lead flashing assemblies. Flashing shall extended over top of pipe and shall be turned down inside top of pipe.

F. Indirect Waste Piping:
   1. Indirect waste piping shall be installed to a uniform minimum grade of ¼" per foot unless otherwise noted.
   2. Changes in direction of indirect waste piping shall be accomplished by the use of appropriate drainage fittings.
   3. Drilling and tapping of indirect waste pipes and the use of saddle hubs and bands are prohibited.
   4. Protection against breakage of piping passing under or through walls shall be provided using specified sleeves and caulking.

3.07 CONNECTION, OWNER FURNISHED EQUIPMENT

A. All electrical wiring and connections for equipment furnished under this Section shall be furnished and installed under the Electrical Sections.

3.08 TESTING, INSPECTIONS

A. General:
   1. This Contractor shall not allow or cause any work of this Section to be covered or enclosed until it has been inspected, tested, and approved by the Architect and the authorities having jurisdiction over the Work. Should any of this work be enclosed or covered up before such inspection, testing, and approval, this Contractor shall uncover the work, have the necessary inspections, tests, and approvals made and, at no expense to the Owner, make all repairs necessary to restore both his work and that of other contractors that may have been damaged, to be in conformity with the Contract Documents.

B. Tests:
   1. This Contractor shall make all tests required by all local, state, and federal laws, codes, ordinances, and regulations having jurisdiction over this work.
   2. Furnish all necessary labor, materials, and equipment for conducting tests, and pay all expenses in connection therewith. Should leaks develop while testing, repairs shall be made, and tests shall be repeated until a satisfactory test is obtained.
   3. Make pipe tests before pipes are concealed. Fill system and remove air from system at least 24 hours before test begins. Correct leaks in screwed fittings by remaking joint. Cut out leaks in welded joints and re-weld; caulking is not permitted.
   4. New Water Piping: Shall be hydrostatically tested for 2 hours at 150 psi with no loss in pressure. All equipment shall be tested water tight at utility pressure.
   5. Drainage and Vent Piping: Shall be tested for 1 hour by plugging all outlets and filling the pipes with water to the top of vertical sections of pipes. No loss of water shall be permitted.
   6. Natural Gas Piping: Shall be tested for 24 hours at a pressure of 50 psig with nitrogen or compressed air. No pressure drop shall be allowed during the last 4 hours of the test. Tests joints of natural gas piping with Leak-Tek or Nupro-Snoop solution while maintaining 10 psig minimum internal pressure.

C. Submit "Certificate of Accessibility" to Owner after water piping testing.

3.09 DOMESTIC WATER SYSTEM STERILIZATION

A. Upon completion of this work, the new domestic water system shall be thoroughly flushed, sterilized and re-flushed. Sterilization and re-flushing shall be performed using the procedure below. All work shall be performed in the presence of the inspector.

B. All domestic water outlets shall have signs posted at their location stating that the water has not been sterilized and shall not be used for human consumption. The signs shall remain until the sterilization process is complete.

C. Procedure
   1. Introduce chlorine or a solution of sodium hypochlorite, filling the lines slowly and supplying the sterilization agent at a rate of 200 parts of chlorine per million. The entire system shall be completely filled with the solution. All valves shall be operated and ends of all branches tested for residual chlorine. Continue to inject the solution until at least 200 ppm of free chlorine is indicated.
   2. After the sterilizing agent has been applied, the system shall be isolated with the solution retained for at least 3 hours. Test for residual chlorine after retention. If less than 200 ppm is indicated, repeat the sterilization procedure.
   3. After satisfactory sterilization, flush the system until all traces of the chemical are removed or until the chlorine content is no greater than that in the existing supply.

D. After a period of 48 hours minimum, bacteriological tests, using samples from at least 3 representative points, shall be made by recognized testing agency, who shall certify to the Architect that the system is bacteriologically safe and at least equal in safety to that of the principal water supply. The laboratory report and certification shall be transmitted to the Architect.

3.10 CLEANING

A. Flush all water piping systems. Remove, clean and replace all strainer baskets prior to final inspection.

B. Blow out all compressible fluid piping with compressed air before connecting with regulators or equipment.

3.11 ADJUSTING

A. Properly adjust all stops, and controls, and demonstrate safe and satisfactory operation of all equipment.

B. Domestic hot water return balancing shall be done in accordance with ASPE Data Book, 2010-2011, Volume 2, Chapter 6.

3.12 CLEANUP

A. Upon completion of the work of this Section, remove all surplus material, debris, and equipment associated with or used in the performance of this work.

END OF SECTION

SECTION 23 0000

HEATING, VENTILATING, AIR CONDITIONING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The requirements of the General Conditions, Supplemental General Conditions, Division 01 Sections and Section 23 0500 General Mechanical applies to all work herein.

1.02 DESCRIPTION

A. This Specification establishes the required standards for all labor, materials, equipment and workmanship in connection with the furnishing, fabrication and installation of complete "Heating, Ventilating, Air Conditioning" systems. Heating, ventilating, air conditioning work includes but is not necessarily limited to the following:
   1. Split system fan coil units;
   2. Exhaust fans;
   3. 4-way multipoise gas furnaces;
   4. Refrigerant piping and appurtenances;
   5. Registers, grilles & diffusers;
   6. Ductwork, inclusive of all air turns, dampers, grilles, diffusers, fire dampers, sound traps, supports, bracing and fresh air/combustion air ducts;
   7. Thermal and sound insulation for all piping and ductwork supplied under this Section;
   8. Flashings, curbs and caps in connection with all equipment and ductwork supplied under this Section;
   9. Start up, adjusting, and balancing.

1.03 RELATED WORK

A. Line voltage wiring, disconnect switches, conduit for temperature control wiring, and final connection of electrical equipment: See Division 26.

B. Finish painting: See Division 09.

C. Condensate drainage piping to points adjacent to equipment: Section 22 0000 - "Plumbing".

D. Natural gas piping to points adjacent to equipment: Section 22 0000 - "Plumbing".

1.04 SUBMITTALS

A. All submittals shall be submitted under the provisions of Section 01 33 00.
   1. Product Data
      a. For all HVAC equipment, include manufacturer's specifications, data sheets, and certified drawings in compliance with specification and/or as scheduled.
      b. Include physical and performance data such as weights, sizes, capacities, required clearances, performance curves, acoustical characteristics, finishes, color selection, and accessories. Include certified drawings on major equipment.
   2. Coordination/Layout Shop Drawings
      a. Prepare complete consolidated and coordinated layout drawings for all new systems, and for existing systems that are in the same areas. Shop drawings shall be prepared using AutoCAD 2012 or newer and shall be drawn at a minimum ¼" = 1' - 0" scale. Sections, details, and diagrams shall be to required scales for specified areas.
      b. All drawings shall be fully coordinated with Plumbing, Fire Protection, Electrical,

Structural, and Architectural work. Drawings shall be coordinated and dimensioned indicating equipment, pipe, duct, fire protection, and electrical in relation to architectural and structural features. Indicate exact locations of valves, piping specialties, access doors, etc. Clearly identify and dimension the proposed locations of the principal items of equipment and adequate clearance for all equipment, piping, pumps, valves and other items. Provide detailed layout of all piping systems showing the proposed routes.

c. Show the access means for all items requiring access for operations and maintenance.
d. Submit shop drawings to Architect for approval, prior to fabrication or installation of any work. Do not install equipment or piping until layout drawings have been approved. Any work installed without prior shop drawing approval shall be removed at the Contractor's expense.
e. Complete and detailed shop drawings shall be maintained throughout the coordination and construction phase indicating all equipment and trades' work clearly. All equipment including piping, etc. shall clearly identify both top and bottom elevations as well as distances from equipment to established building lines. Coordinate with other trades and field conditions and show dimensions and details including building construction and access for servicing.
f. Use of contract documents for shop drawings is not acceptable
g. Any work installed without prior shop drawing approval shall be removed at the Contractors expense.

3. Shop-wiring diagrams of temperature controls and air conditioning unit controls as specified in Section 23 09 23 and/or shown on Drawings.
4. Equipment manufacturer shall design, construct, and certify that his equipment satisfies the special minimum seismic resistance requirements and shall submit calculations or test results supporting his certification.
5. Refer to mechanical equipment specified herein for additional requirements

1.05 AS-BUILT DRAWINGS

A. Comply with the requirements of Section 01 78 39 – PROJECT RECORD DOCUMENTS and the following.
   1. A complete set of Contract Drawings shall be maintained at the work site, and all changes in the work shall be recorded on this set on a daily basis. In addition to changes made during course of work, show the following:
      a. Exact location, type and function of concealed valves and controllers.
      b. Exact size, elevations and location of underground and under floor piping.

B. Submit to Architect for final approval.

1.06 OPERATION & MAINTENANCE DATA (Closeout)

A. Comply with the requirements of Section 01 78 23 – OPERATION AND MAINTENANCE DATA and the following.
   1. Installing contractor shall provide all operating and maintenance instructions provided by the manufacturer, describing proper operation and maintenance of any equipment and devices installed. Operating and maintenance instructions shall cover maintenance, adjustment, and operation of each piece of apparatus.
   2. Contractor shall also provide a parts list of all equipment and component parts for all equipment under this Section. The equipment list shall include manufacturer's name, model number, and local representative, service facilities and normal channel of supply for each item.
   3. Data shall be bound in a hard cover 3-ring binder, with table of contents identifying items therein, and index tabs for each system. Neatly obscure or cross out inapplicable data from

manufacturer's literature. Include the following:

a. Manufacturer's brochures, ratings, certified shop drawings, lubrication charts and data, and parts list with part numbers. Mark each sheet with equipment identification number and actual installed condition or system and location of installation. Specifically identify which options are provided.
b. Description of start-up and operating procedures for each system, including controls diagrams and description of operating sequences.
c. Recommend preventative maintenance schedule and procedures.

B. Submit data to the Architect for approval. Final acceptance of the work will not be made until a satisfactory submission of this material is received and approved by the Architect.

1.07 OPERATING & MAINTENANCE INSTRUCTIONS

A. Comply with the requirements of Division 01 and the following.
1. The Owner's authorized representative shall be instructed in the operation and servicing of all heating, ventilating, and air conditioning systems. Provide a minimum of one man-day of instruction time. All instruction shall be provided at no cost to the Owner.

1.08 POLLUTANT CONTROL

A. At the time of rough installation, or during storage on the construction site, and until final startup of the heating and cooling equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust or debris which may collect in system.

PART 2 PRODUCTS

2.01 GENERAL

A. Only specified materials shall be utilized in the work of this Section unless substitutions have been approved by the Architect and in accordance with Division 01 Sections for Substitutions and Product Options.

B. Provide fan drives rated at 150% of motor horsepower. Drives shall be adjustable sheave type unless specified otherwise. Listed fan speeds are only approximate; select and/or change drives to operate at approximately midpoint of adjustable range after final balancing.

C. Provide guards to enclose exposed moving equipment components in accordance with Title 8, California Administrative Code. Fabricate belt guards with rigid angle iron frame, expanded metal screen, pivoted 4" diameter tachometer opening covers, and in two pieces to permit lubrication or sheave and belt adjustment without removing guard. Provide removable sheet metal guards at shafts and couplings and removable framed wire mesh guards at openings in mechanical systems.

2.02 REFRIGERANT PIPING

A. Refrigerant piping shall be Type "ACR" ASTM B 280, drawn temper, seamless copper tube. Note: Internal pressure shall be as shown in the latest edition of the Copper Tube Handbook for annealed pipe.

B. Mechanical joints on refrigerant piping are prohibited. All refrigerant piping joints shall be brazed. Use lead-free, silver solder, minimum 15% silver content.

C. Pipe fittings shall be wrought-copper with soldered joints; ASME B16.22.

D. Flexible connections shall be bronze, double braided, sweat solder ends.

E. Sight glasses shall be color change moisture indication type, replaceable element, filter screen and pad, sweat solder ends; Sporlan "See-All", Henry, or equal.

F. Charging and purge valves shall be forged brass, diaphragm packless, globe type, angle or straight through, one end solder, one end flare; Henry 623 and 643 series, Sporlan, or equal.

G. Solenoid valves shall be forged brass, extended end connections, solder ends, molded coil; Sporlan "E" series or equal. Comply with ARI 760 & UL 429.

H. Filter driers shall be replaceable media, angle type; Henry "Dri-Cor" or equal; ARI 730.

I. Electronic thermostatic expansion valves shall have stainless steel body and connections, ceramic slide and port, linear flow capacity, continuous modulation, and direct coupling of motor and valve; Emerson "EX" series or equal.

J. Pipe hangers: All refrigerant piping shall be supported 8' on center. Hangers and supports shall be as specified in Section 23 0500 - General Mechanical".

K. Split system fan-coil units and heat pump units shall have brazed sweat-fitting connections on the refrigerant piping between the units with a flexible piping section at the outdoor unit.

2.03 DUCTLESS SPLIT SYSTEM (COOLING ONLY)

A. Daikin "FTK/RK" series, air conditioning system as scheduled on the Drawings or approved equal.
   1. The variable capacity, inverter driven, cooling only, split system shall consist of a wall mounted indoor unit, "FTK12NMVJU" exclusively matched to outdoor model "RK12NMVJU", with air-cooled, Daikin swing, variable speed, inverter driven compressor using R-410A refrigerant. The outdoor unit is a variable speed, single fan unit using a single-phase power supply. The system shall have a factory pre-charge of R-410A adequate for 32 feet of total length.

B. Quality Assurance
   1. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL), in accordance with ANSI/UL 1995 – Heating and Cooling Equipment and bear the Listed Mark.
   2. All wiring shall be in accordance with the National Electric Code (NEC).
   3. Each combination shall be rated in accordance with Air Conditioning Refrigeration Institute's (ARI) Standard 210/240 and bear the ARI label.
   4. The system will be produced in an ISO 9001 and ISO 14001 facility, which are standards set by the International Standard Organization (ISO). The system shall be factory tested for safety and function.
   5. A holding charge of dry nitrogen shall be provided in the evaporator.

C. Installation Requirements
   1. The system shall be installed by a Daikin factory trained contractor/dealer.

D. Performance
   1. The system performance shall be in accordance with ARI 210/240 test conditions
      a. Rated cooling capacity (Btu/hr): 10,000
      b. Cooling input power (kW): 0.870
      c. SEER: 19.00; EER: 12.50
   2. The cooling performance is based on 80°F DB / 67°F WB for the indoor unit and 95°F DB / 75°F WB for the outdoor unit and 25 feet of piping.
   3. The operating range in cooling shall be 50°F DB ~ 115°F DB.
   4. The system shall be capable of maximum refrigerant piping of 66 feet without any oil traps or additional components.

E. Indoor Unit
   1. General:
      a. The 1.0 ton wall mounted indoor unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. Both liquid and suction lines must be individually insulated between the outdoor and indoor units.
   2. Unit Cabinet:
      a. The indoor unit shall have a white, "flat screen" finish.
      b. The drain and refrigerant piping shall be accessible from six (6) positions for flexible installation (right side, right back, and right bottom; and left side, left back, and left bottom.
      c. The cabinet shall be supplied with a mounting plate to be installed onto a wall for securely mounting the cabinet.
   3. Fan:
      a. The evaporator fan shall be an assembly consisting of a direct-driven fan by a single motor.
      b. The fan shall be statically and dynamically balanced and operate on a motor with permanent lubricated bearings.
      c. An auto-swing louver for adjustable air flow (vertically) is standard via the wireless remote control furnished with each system.
      d. The indoor fan shall offer a choice of five speeds, plus quiet and auto settings.
   4. Filter:
      a. The return air filter provided will be a mildew proof, removable and washable filter. Optional photo catalytic, air purifying filters are available.
   5. Coil:
      a. The evaporator coil shall be a nonferrous, aluminum fin on copper tube heat exchanger.
      b. All tube joints shall be brazed with silver alloy or phoscopper.
      c. All coils will be factory pressure tested.
      d. A condensate pan shall be provided under the coil with a drain connection.
   6. Electrical:
      a. The outdoor unit shall be powered with 208-230 volts, 1 phase, and 60 hertz power. The indoor unit shall receive 208-230 volt, 1 phase, 60 hertz power from the outdoor unit.
      b. The allowable voltage range shall be 187 volts to 253 volts.
   7. Control:
      a. The unit shall have a backlit, wireless remote infra-red controller capable to operate the system. It shall have Cooling Operation, Dry Operation and Fan Only Operation.
      b. The infrared remote controller shall consist of an On/Off Power switch, Mode Selector, Fan Setting, Swing Louver, On/Off Timer Setting, Temperature Adjustment, and Powerful Operation.
         i. On/Off switch powers the system on or off.
         ii. Mode selector shall operate the system in cool, fan or dry operation
         iii. Fan setting shall provide five fan speeds, plus quiet and auto settings.
         iv. Swing louver shall adjust the airflow (horizontal) louvers.
         v. On/Off timer is used for automatically switching the unit on or off.
         vi. Temperature adjustment allows for the increase or decrease of the desired temperature.
         vii. Powerful operation allows quick cool down in the desired space to achieve maximum desired temperature in the shortest allowable time period.
      c. The infrared remote control shall perform Fault Diagnostic functions which may be system related, indoor unit or outdoor unit related depending on the fault code.
      d. Temperature range on the remote control shall be 64°F to 90°F in cooling mode.
      e. The indoor unit microprocessor has the capability to receive and process commands via return air temperature and indoor coil temperature sensors enabled by commands from the

remote control.

8. Sound:
   a. Indoor unit sound pressure levels shall not exceed (H/M/L/SL) (dBA): 45/37/30/19.

F. Outdoor Unit
1. General:
   a. The outdoor unit shall be specifically matched to the corresponding indoor unit size (e.g. FTK12NMVJU/RKS12NMVJU). The outdoor unit shall be complete factory assembled and pre-wired with all necessary electronic and refrigerant controls.
2. Unit Cabinet:
   a. The outdoor unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.
3. Fan:
   a. The fan shall be a direct drive, propeller type fan.
   b. The motor shall be inverter drive, permanently lubricated type bearings, inherent.
   c. A fan guard is provided on the outdoor unit to prevent contact with fan operation.
   d. Airflow shall be horizontal discharge.
4. Coil:
   a. The outdoor coil shall be nonferrous construction with corrugated fin tube.
   b. The fins are to be covered with an anti-corrosion acrylic resin and hydrophilic film type E1.
   c. Refrigerant flow from the condenser will be controlled via a metering device.
5. Compressor:
   a. The compressor shall be a Daikin swing, inverter-driven compressor.
   b. The outdoor unit shall have an accumulator, four-way reversing valve.
   c. The compressor shall have an internal thermal overload.
   d. The outdoor unit can operate with a maximum vertical height difference of 39 feet and overall maximum length of 49 feet without any oil traps or additional components.
6. Electrical:
   a. The electrical power requirement is 208-230 volt, 1-phase, and 60 Hz power.
   b. The outdoor shall be controlled by a microprocessor located in the outdoor and indoor units via commands from the infrared remote controller.
   c. Dedicated EEV's shall be provided for capacity control during part load of the indoor unit.
7. Sound:
   a. Outdoor unit sound pressure levels shall not exceed (cooling mode sound level (H) (dBA): 49. Values are based on high fan speed and are measured approximately 3 feet away.

2.04 FURNACES

A. Furnish a Carrier "59 TP6A" series, 4-way multipoise gas-fired condensing furnace for use with natural gas. Provide external media cabinet for use with filters. Filter rack shall have access panel for bottom return.

B. Quality Assurance
1. Unit shall be third party certified by CSA to the current ANSI Z 21.47/CSA 2.3 design standard for gas-fired central furnaces. Unit shall carry the CSA "Blue Star" and "Blue Flame" labels. Unit efficiency testing shall be performed per the current DOE test procedure as listed in the Federal Register.
2. Unit shall comply with NFPA 54.
3. Unit shall be certified for capacity and efficiency and listed in the latest AHRI Consumer's Directory of Certified Efficiency Ratings.
4. Unit shall carry the current Federal Trade Commission Energy Guide efficiency label.

C. Equipment

1. Blower Wheel and ECM Blower Motor
   a. Galvanized blower wheel shall be centrifugal type, statically and dynamically balanced.
   b. Blower motor of ECM type shall be permanently lubricated with sealed ball bearings, and have infinitely variable speed from 600-1200 RPM, operating only when motor inputs are provided.
   c. Blower motor shall be direct drive and soft mounted to the blower housing to reduce vibration transmission.
2. Filters:
   a. Furnace shall have reusable-type filters.
3. Casing:
   a. Casing shall be of .030 in. thickness minimum, pre-painted steel.
4. Draft Inducer Motor:
   a. Draft inducer motor shall be two-speed PSC design.
5. Primary Heat Exchangers
   a. Primary heat exchangers shall be 3-Pass corrosion-resistant aluminized steel of fold-and-crimp sectional design and applied operating under negative pressure.
6. Secondary Heat Exchangers
   a. Secondary heat exchangers shall be of a stainless steel, flow-through, of fin-and-tube design, and applied operating under negative pressure.

D. Controls
   1. Controls shall include a micro-processor-based integrated electronic control board with at least 16 service troubleshooting codes displayed via diagnostic flashing LED light on the control, a self-test feature that checks all major functions of the furnace, and a replaceable automotive-type circuit protection fuse.
   2. Multiple operational settings shall be available, including separate blower speeds for low heat, high heat, low cooling, high cooling, and continuous fan. Continuous fan speed may be adjusted from the thermostat.
   3. Cooling airflow shall be selectable between 325 to 400 CFM per ton of air conditioning.

2.05 DUCTWORK

A. Sheet Metal Ductwork:
   1. Ducts and plenums shall be fabricated and installed in conformance with the latest editions of: NFPA Pamphlet No. 90A; California Building Code; California Mechanical Code and the SMACNA HVAC Duct Construction Standards (Metal & Flexible). Ducts and plenums shall be constructed of hot dipped galvanized mild steel and shall have airtight Class "B" seals at all transverse joints and longitudinal seams. Tables and figures hereinafter referenced are from the 2005 edition of the SMACNA HVAC Duct Construction Standards (Metal and Flexible).
   2. Rectangular duct construction shall conform to Table 2-3. All transverse joints shall be flanged per Table 2-32, with corner closures or "Duct Mate" flanged connections with corner closures per Figure 2-17. Elbows shall be standard radius (Type RE 1) or square throat with vanes (Type RE 2) per Figure 4-2, with double thickness turning vanes per Figures 4-3 and 4-4. Offsets and transitions shall be per Figure 4-7. Supply, return, and exhaust branch connections shall be per Figure 4-5 or 4-6. Splitters SHALL NOT be used.
   3. Round ducts shall be spiral, United McGill or equal. All transverse joints and longitudinal seams shall have Class "B" seals. All branches in round duct systems shall be made with factory fabricated reducing wye branches. Duct turns shall be made with standard, factory fabricated, three-piece elbows.
   4. Lined ducts shall be fabricated such that the net inside dimensions equals the duct sizes shown on the Drawings.
   5. Flexible ducts shall be Flexmaster "9M" or approved equal. Flexible ducts shall be used only

where shown on the Drawings, and maximum length of any given flexible duct shall not exceed 7'. Galvanized sheet metal elbows shall be used for turns greater than 45° on flexible ducts 10" and larger. Connections to rectangular ducts shall be made with "spin-in" fittings with air scoops. The installation of flexible ducts shall conform to Figure 3-10, with the exceptions noted herein.

6. Supports for horizontal ducts and plenums shall be fabricated per Figures 5-5 and 5-6 and Tables 5-1, 5-2 and 5-3. The maximum distance between hangers shall be eight feet for rectangular ducts and twelve feet for round ducts. Attachments to the structure shall be made with adequately sized lag bolts for straphangers and adequately sized machine bolts and side beam brackets for rod hangers. Supports for vertical ducts shall be band iron strap or angle bracket type per Figure 5-8 and 5-9.

B. Fiberglass Ductwork:
   1. Fiberglass ductwork is unacceptable and may not be used on this project.

C. Specialties:
   1. Duct Mounted Access Doors
      a. Including those for removing filters, duct access doors shall be fabricated as detailed in Figure 7-2, with sash locks, piano hinges, and cam latches. Round duct shall be fabricated as detailed in Figure 7-3.
      b. Access doors shall be double wall, rectangular, insulated or uninsulated same as duct. Insulation fill and thickness shall be as indicated for pressure class.
      c. Access doors shall have a vision panel.
      d. Doors shall have an unobstructed full swing.
      e. Fabricate doors airtight and suitable for duct pressure class.
   2. Dampers:
      a. Provide butterfly or multiple blade dampers where indicated on the Drawings or as required for balancing air quantities, to values shown without generating excessive noise. Provide Duro-Dyne " KS-385", or approved equal, locking quadrants on each manual damper. Locate dampers in furred ceilings near access panels where possible.
      b. Butterfly dampers shall be constructed as per Figure 7-4, Figures A, B, and C.
      c. Multi-blade dampers shall conform to Figure 7-5.
      d. Motorized dampers - See Temperature Controls.
      e. Back-draft dampers shall be Air Balance "Air Dynamic" model DY-1002-V, or equal.
   3. Remote Actuators: Young Regulator Company, Round Cable Controlled Dampers Model 5020-CC or 830A-CC (rectangular) and Remote Cable Control System Kit Model 270-301.
   4. Air Extractors: Titus model "AG-45", or equal.
   5. Flexible Duct Connections: Duro-Dyne "Metal-Fab" with Durolon, Ventfabrics "Ventglas", or approved equal. Install at each point where a blower unit is connected to a duct. A minimum clearance of 3" between the duct and the source of vibration shall be maintained. Install per Figure 7-8.
   6. Screens: Install removable bird screens at ALL outside air intakes and exhaust air discharges. Screens shall be fabricated from ½" x 14 gauge mesh secured in full frames. Screens and frames shall be constructed of the same material as the duct, hood, or equipment to which attached.
   7. Access Panels: Milcor, Style M, prime coated steel, or approved equal. Minimum size shall be 10" x 10". Provide larger sizes where required. Locks shall be flush, screwdriver operated. Provide as required for concealed ducts at all fire dampers, electric duct heaters, and automatic dampers except at suspended acoustical ceilings.
   8. Joints: Tape ALL joints airtight using Hardcast - Carlisle, type "DT" pressure-less tape and "RTA 50" sealant, or McGill AirSeal, "Uni-Flex" duct sealer. Install per manufacturer's directions.

2.06 ROOF MOUNTED EXHAUST FANS

A. Greenheck "G" series direct drive roof downblast centrifugal exhaust fans as scheduled on the Drawings or approved equal.

B. Submittals
   1. Provide dimensional drawings and product data on each fan.
   2. Provide fan curves for each fan at the specified operation point, with the flow, static pressure and horsepower clearly plotted.
   3. Provide outlet velocity and fan's inlet sound power readings for the eight octave bands, decibels, and sones.
   4. Strictly adhere to QUALITY ASSURANCE requirements as stated in this specification.
   5. Provide manufacturer's certification that exhaust fans are licensed to bear Air Movement and Control Association (AMCA), Certified Rating Seal for sound and air performance.
   6. Installation, Operation, and Maintenance Manual (IOM): Provide manufacturer's installation, operations, and maintenance manual, including instructions on installation, operations, maintenance, pulley adjustment, receiving, handling, storage, safety information and cleaning. A troubleshooting guide, parts list, warranty and electrical wiring diagrams.

C. Quality Assurance
   1. Performance ratings: Conform to AMCA standard 211 and 311. Fans must be tested in accordance with ANSI/AMCA Standard 210-99 and AMCA Standard 300-96 in an AMCA accredited laboratory. Fans shall be certified to bear the AMCA label for air and sound performance seal.
   2. Classification for Spark Resistant Construction, levels A, B, and C conform to AMCA 99.
   3. Each fan shall be given a balancing analysis which is applied to wheels at the outside radius. The maximum allowable static and dynamic imbalance is 0.05 ounces (Balance grade of G6.3).
   4. Comply with the National Electrical Manufacturers Association (NEMA), standards for motors and electrical accessories.

D. The downblast fan shall be for roof mounted applications, have performance capabilities up to 4,300 cubic feet per minute (cfm) and static pressure to 1 inches of water gauge and have a maximum continuous operating temperature of 180° F. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number.

E. Wheel shall be constructed of aluminum, and be non-overloading, backward inclined centrifugal type, and statically and dynamically balanced in accordance to AMCA Standard 204-05. The wheel cone and fan inlet shall be matched and have precise running tolerances.

F. Electronically Commutated Motor
   1. The motor enclosures shall be of the open type.
   2. The motor shall be a DC electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3 phase induction type motors.
   3. Motors shall be permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase.
   4. Internal motor circuitry to convert AC power supplied to the fan to DC power to operate the motor.
   5. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by a potentiometer dial mounted at the motor. Motor shall be a minimum of 85% efficient at all speeds.

G. Housing:
1. The motor cover, shroud, curb cap, and lower windband shall be constructed of heavy gauge aluminum. The shroud shall have an integral rolled bead and shall be drawn from a disc and direct air downward.
2. The lower windband shall have a formed edge.
3. Motor cover shall be drawn from a disc.
4. All housing components shall have final thicknesses equal to or greater then preformed thickness.
5. Curb cap shall have pre-punched mounting holes to ensure correct attachment
6. The housing shall be leak proof, and have a rigid internal support structure.
7. The drive frame assemblies shall be constructed of heavy gauge steel and mounted on rubber vibration isolators, sized to match the weight of each fan.

H. Disconnect Switches shall be NEMA rated, shall have positive electrical shut-off, and be wired from fan motor to junction box installed within motor compartment.

I. Provide with the following options/accessories:
1. Birdscreen

2.07 INSULATION

A. General
1. All duct insulation materials including jackets, tapes, adhesives and coatings shall meet ASTM E84 25/50 Flame Spread/Smoke Development requirements.

B. Exterior of Ductwork: (Flexible Duct Wrap)
1. Unless specified to be lined, all ductwork shall be wrapped with formaldehyde-free, flexible glass-fiber or mineral-wool, blanket type insulation with factory applied FSK aluminum foil facing. Thickness shall be 2".
   a. Johns Manville "Microlite EQ", Knauf Insulation "Friendly Feel", Owens Corning "SoftR Duct Wrap", or approved equal.

C. Interior of Ductwork: (Duct Liner)
1. All ducts exposed to the weather shall be internally insulated. All other ductwork within 10 feet of a fan (supply and return) shall be internally insulated. Duct liner shall be installed in supply and return ducts and plenums where noted on the Drawings. Exhaust ductwork need not be insulated.
2. Duct liner shall meet the requirements of ASTM C 1071, NFPA 90A or NFPA 90B Type I and Type II. Operating temperature shall meet ASTM C411. Microbial growth shall meet ASTM C1338, G21 and G22.
   a. Type I - Plenum Liner Board: Johns Manville "Permacote Linacoustic R-300" or Knauf "Rigid Plenum Liner", or approved equal. Thickness shall be 1 ½" unless otherwise noted.
   b. Type II - Flexible Duct Liner: Johns Manville "Linacoustic RC" or Knauf "Sonic XP Duct Liner", with fire resistant facing; or approved equal. Thickness shall be 1 ½" unless otherwise noted.

D. Refrigerant Piping
1. Insulate all refrigerant suction lines, fittings, and valves with ¾" thick flexible elastomeric thermal insulation, Resolco Insul-Phen rigid closed cell phenolic foam, or equal, according to manufacturer's suggested insulation thickness and installation procedures.
2. Insulation thickness shall be as follows:

FLUID	CONDUCTIVITY RANGE (in Btu-inch per	INSULATION	NOMINAL PIPE DIAMETER (in inches)

			1 and less	**1 to <1.5**	**1.5 to < 4**	**4 to < 8**	**8 and larger**
			INSULATION THICKNESS REQUIRED (in inches)				
Space Heating, Hot Water Systems (steam, steam condensate and hot water) and Service Water Heating Systems							
Above 350	0.32-0.34	250	4.5	5.0	5.0	5.0	5.0
251-350	0.29-0.31	200	3.0	4.0	4.5	4.5	4.5
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.22-0.28	100	1.0	1.5	1.5	1.5	1.5
Space Cooling Systems (chilled water, refrigerant and brine)							
40-60	0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
Below 40	0.20-0.26	50	1.0	1.5	1.5	1.5	1.5

2.08 ACCESS PANELS

A. Where construction is not inherently accessible, provide adequately sized and conveniently located access doors in ceilings, walls, and furring for access to controls and for servicing valves, equipment, etc.
   1. Fire Rated walls and ceilings: Milcor, Style UFR, or approved equal Karp, U.L. Class B, 1½ hour rating, insulated, self-closing, self-latching, flush key operated cylinder lock, interior latch release. Minimum size shall be 12" x 12". Provide larger sizes where required.
   2. Drywall ceilings or walls: Milcor, Style DW, or approved equal Karp prime coated steel, flush screwdriver-operated cam lock. Minimum size shall be 12" x 12". Provide larger sizes where required.
   3. Masonry walls: Milcor, Style M, or approved equal Karp prime coated steel, flush screwdriver-operated cam lock. Minimum size shall be 12" x 12". Provide larger sizes where required.
   4. Tiled walls: Milcor, Style MS, or approved equal Karp satin finish stainless steel, flush screwdriver-operated cam lock.
   5. Plastered walls and ceilings: Milcor, Style K, or approved equal Karp, prime coated steel, flush screwdriver-operated cam lock. Minimum size shall be 12" x 12". Provide larger sizes where required.

B. Doors shall be delivered to the General Contractor for installation.

2.09 TEMPERATURE CONTROLS

A. The Energy Management System (EMS) at the Parkway Heights Middle School herein specified is to be an extension to the existing Alerton DDC system. The new controls will be fully integrated with the existing Alerton Network and Workstations and shall be installed as a complete package.

B. The System will include all wiring, piping, installation supervision, calibration, adjustments, and checkout necessary for a complete and fully operational system.

C. See Section 23 0900 – Controls.

2.10 THERMOSTATS

A. Alerton "Microset 4" or equal, with a carbon dioxide (CO_2) sensor. The wall sensors shall be customizable, and have a touchscreen user interface with the capacity to display the setpoint, room,

and outside air temperatures.

B. The thermistors shall be integrated and processed by an onboard microcontroller.

2.11 FLUES

A. Flues shall be MetalFab, Duravent, or equal double-wall Type B gas vent system. The vent shall be of the double-wall, factory-built type for use with approved Category I appliances burning natural or LP gas, which produce flue gases exhausted at temperatures not exceeding 550º F.

B. B-Vent products shall be listed to UL-441 and carry the appropriate UL listing mark or label. The installation of B-Vent products shall conform to the requirements of NFPA-54, NFPA-211 and the manufacturer's installation instructions.

C. The vent shall be constructed of an outer wall of galvanized steel, .018" thick G-90 for sizes 3" to 14" diameter, and .024" thick G-90 for sizes 16" to 30" diameter. The inner wall shall be constructed of aluminum alloy, .012" thick for sizes 3" to 8" diameter and .018" thick for sizes 10" to 30" diameter.

D. The vent shall include an integral, annular insulating air space, 1/4" thick for sizes 3" to 6" diameter and 1/2" thick for sizes 7" to 30" diameter.

E. Edges of inner and outer walls shall be hemmed prior to final assembly to prevent pipe and fittings from having exposed sharp edges. Walls shall be attached to maintain spacing and prevent separation of inner and outer walls.

F. The vent pipe shall incorporate a push-tab locking system to prevent disassembly of vent during or after installation.

G. All fittings, flashing, storm collar, cap, and appliance adapter required to install the vent shall be included.

H. Vent shall be tested and listed for a minimum clearance to combustibles of 1" for sizes 3" to 24" diameter and 2" for sizes 26" to 30" diameter.

I. Vent shall terminate as required by code.

J. B-Vent shall be installed in accordance with the vent manufacturer's installation instructions, UL listing and state or local codes.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Provide all necessary cutting in connection with the work of this Section. No cutting shall be done without the approval of the Architect. Comply with requirements specified in Cutting and Patching Section.

B. No structural members shall be drilled, bored, or notched in a manner that will impair their structural capacity.

C. All penetrations of concrete or masonry shall be made with core drills.

3.02 AIR CONDITIONING EQUIPMENT

A. All units shall be set with curbs plumb, level, and securely attached through framed opening with bolts and/or lag screws as noted on the Drawings. Connections to ductwork shall be secured, filter racks shall be aligned, enclosures and ductwork connections shall be fully waterproofed, and all utility and control connections shall be complete.

B. Split system Fan Coil Units and Heat Pump Units shall have brazed sweat-fitting connections on the refrigerant piping between the units with a flexible piping section at the outdoor unit.

3.03 FLUE INSTALLATION

A. Store delivered materials inside, out of the weather. Protect materials from accidental damage or vandalism.

B. Installation shall conform to the manufacturer's installation instructions, UL listing and state or local codes.

C. Support chimney from building structure using rigid structural shapes for attachment of fixed point supports (Plate Support Assembly). Anchor supports to structure by welding, bolting, steel expansion anchors, or concrete inserts. Size of structural shapes shall be in accordance with manufacturer's recommendations.

D. Coordinate installation of dampers or fans. Dampers or fans shall be supported independently from the chimney sections. Protect chimney from twist or movement due to fan torque or vibration.

E. Protect incomplete chimney installations by attaching temporary closures over open ends of sections.

F. Clean all chimneys and breechings of dust and debris prior to final connection to appliances.

3.04 FILTERS

A. During construction, protect all filters upstream of air handling units with blankets of 2" fiberglass filter media or 2" disposable panel filters. UL Class 2 listed.

B. Systems shall not be operated without properly installed filters. Filters used during construction shall be removed and replaced with new filters after construction is completed and the systems are ready for final acceptance by the owner.

3.05 EXHAUST FAN INSTALLATION

A. Install fans in accordance with manufacturer's instructions and as indicated in the Installation, Operation and Maintenance Manual (IOM) and the contract Drawings.

B. Examine areas to receive fans. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of fans. Do not proceed with installation until unsatisfactory conditions are corrected.

C. Preparation
   1. Ensure roof openings are square, accurately aligned, correctly located, and in tolerance.
   2. Ensure duct is plumb, sized correctly, and to proper elevation above roof deck. Install duct as specified in "Ductwork".

D. Install fans system as indicated on the Installation, Operation and Maintenance Manual (IOM) and Drawings. Install fans in accordance with manufacturer's instructions.

E. Adjusting
   1. Adjust exhaust fans to function properly
   2. Adjust Belt Tension
   3. Lubricate bearings
   4. Adjust drive for final system balancing
   5. Check wheel overlap

F. Clean as recommended by manufacturer. Do not use material or methods which may damage

finish surface or surrounding construction

G. Protect installed product and finished surfaces from damage during construction. Protect installed exhaust fans to ensure that, except for normal weathering, fans will be without damage or deterioration at time of substantial completion.

3.06 INSULATION INSTALLATION

A. Exterior Ductwork:
   1. Duct wrap shall be cut in a manner to meet the manufacturers' stretch-out guideline to provide a 2" staple lap and have minimum compression at the corners. All joints shall be lapped 2" and stapled with outward clinching staples 2" on center. The insulation shall be mechanically fastened to the underside of all ducts 24" wide or more using cup-head pins, weld pins, or stick pins with speed clips 18" on center. Insulation shall not be compressed to comply with required installed R-value. All joints and penetrations of the vapor barrier jacket shall be sealed with a minimum 3" wide matching pressure sensitive tape. Pressure-sensitive tape shall be firmly rubbed in place immediately after application using a "squeegee" type tool.
   2. When a vapor seal is required, two coats of vapor retarder mastic reinforced with one layer of 4" wide, open weave glass fabric may be used in lieu of pressure-sensitive tape. Mastic shall be brushed onto joint and glass fabric imbedded in it. A second coat of mastic shall be brushed over the glass fabric until the fabric is filled. Mastics shall be applied in accordance with application instructions on the container.

B. Interior Duct Liner
   1. Apply to the inside face of ducts, coated side facing air stream. Fasten using fire retardant adhesive and secure with mechanical fasteners at 12" maximum o.c., both directions, for velocities up to 2,500 fpm .Velocities over 2,500 fpm shall have fastener spacing of 6" o.c.
   2. Exposed edges must be factory or field coated with adhesive. Metal nosing shall be installed in all liner leading edges facing the airstream at fan discharge, at access doors, and at any interval of lined duct preceded by unlined duct.
   3. Insulation with torn or broken coatings shall be removed and replaced. Loose corners, edges, and butt joints will not be accepted.
   4. Maximum velocity: 5,000 ft/min.

C. Refrigerant Piping:
   1. The insulation shall be installed in accordance with the manufacturer's instructions. All joints and seams shall be sealed with waterproof vapor retarder adhesive. All pipes exposed to the weather shall be coated to protect the insulation from ultra-violet radiation in accordance with the manufacturer's published instructions.

3.07 REFRIGERANT PIPING INSTALLATION

A. Piping installation shall comply with all federal, state, and local regulations and industry guidelines. In addition, the following practices shall be followed.
   1. All piping shall be stored with ends sealed to prevent entry of moisture and debris.
   2. A pipe cutter specific to the piping material applied shall be used.
   3. All factory and field cut tube ends shall be de-burred and cleaned.
   4. Flared fittings shall be formed using tools recommended by the equipment manufacturer.
   5. Flare nuts shall be tightened with torque wrench furnished by the equipment manufacturer.
   6. Piping shall be continuously purged with dry nitrogen while soldering. Care shall be taken when soldering near valves or other equipment that may be damaged by extreme heat.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss,

expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

C. Install refrigerant piping according to ASHRAE 15.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Install piping adjacent to machines to allow service and maintenance.

H. Install piping free of sags and bends. Install fittings for changes in direction and branch connections. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

I. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection

J. Install refrigerant piping in protective conduit where installed belowground. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

K. Slope refrigerant piping as follows:
   1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
   2. Install horizontal suction lines with a uniform slope downward to compressor.
   3. Use double-suction riser for maximum compressor efficiencies if load variation is expected.
   4. Install traps and double risers to entrain oil in vertical runs.
   5. Liquid lines may be installed level.

L. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

M. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

N. All refrigerant piping and valves shall be identified.

O. Mechanical joints in refrigerant piping systems are unacceptable. All refrigerant piping joints shall be brazed. Use silver solder, minimum 15% silver content.

3.08 TESTS, INSPECTIONS

A. In any test, proper safety procedures and equipment should be used, including personal protective equipment such as protective eyewear and clothing. Installers should always consider local conditions, codes and regulations, manufacturer's installation instructions, and project specifications in any installation.

B. Make all necessary control adjustments and balancing of air and water flows. Operate the entire system for a period of time not less than three (3) working days for the purpose of proving satisfactory performance. During this period, instruct such persons as the Owner and/or Architect may designate in the proper operation of the systems. Should further adjustment prove necessary, operating tests shall be repeated until a satisfactory test is obtained.

C. This Contractor shall not allow or cause any work of this Section to be covered or enclosed until it has been inspected, tested, and approved by the Architect and the authorities having jurisdiction over the Work. Should any of this work be enclosed or covered up before such inspection, testing, and approval, this Contractor shall uncover the work, have the necessary inspections, tests, and approvals made and, at NO expense to the Owner, make all repairs necessary to restore both his work and that of other contractors which may have been damaged to be in conformity with the Contract Documents.

D. Furnish all necessary labor, materials, and equipment for conducting tests, and pay all expenses in connection therewith. Should leaks develop while testing, repairs shall be made, and tests shall be repeated until a satisfactory test is obtained.

3.09 REFRIGERANT PIPING TESTING

A. Prior to charging with refrigerant, piping shall be tested for leaks under 650 psi pressure using a mixture of 90% nitrogen and 10% hydrogen gas. (WARNING! OXYGEN OR ACETYLENE SHALL NOT BE USED IN PLACE OF DRY NITROGEN. A VIOLENT EXPLOSION MAY RESULT!).

B. Be sure that all controls, relief valves or rupture discs that could be damaged by test pressure are removed before beginning pressure test.

C. All joints shall be tested for leaks using an electronic hydrogen leak detector. Pressure and leak tests on refrigeration piping and equipment shall be done in accordance with local code requirements and the American Standard Safety Code for Mechanical Refrigeration (ASA B9.1).

D. Piping shall be continuously purged with dry nitrogen while soldering. Care shall be taken when soldering near valves or other equipment that may be damaged by extreme heat.

E. Precautions shall be taken to keep moisture out of the system, and a drier shall be used.

F. After successful completion of pressure tests, the entire system shall be blown out and evacuated with a standard vacuum pump to remove all air and moisture. Three evacuations shall be required, and shall be down to 500 microns absolute pressure. Break the first two vacuums with dry nitrogen. Charge with refrigerant after third evacuation.

G. The contractor shall notify the Architect 48 hours prior to the time and date of the evacuation.

H. The refrigerant charge shall be calculated and weighed into the system.

I. Service technicians shall be certified in the use of CFC and HCFC refrigerant recovery and recycling equipment and shall use UL listed and labeled recovery equipment when discharging refrigerant.

3.10 CLEANING OF PIPING

A. All new piping shall be thoroughly cleaned of rust, scale, etc., prior to enclosing and placing in operation. Water shall be forced through pipes until the systems are free from foreign substances.

3.11 CLEANUP

A. Upon completion of the work of this Section, remove all material, debris, and equipment associated with or used in the performance of this work.

END OF SECTION

SECTION 23 0500

GENERAL MECHANICAL

PART 1 GENERAL

1.01 SUMMARY

A. The requirements of this Section apply to all work of Divisions 22 and 23.

B. Furnish and install any incidental work not shown or specified, which can be reasonably inferred as part of the work necessary to provide complete functional systems. When an item not shown or listed is clearly necessary for proper operation of equipment which is shown or listed, provide an item that will allow the system to function properly, at no increase in Contract Sum.

1.02 QUALITY ASSURANCE

A. Regulatory compliance: All work performed under Divisions 21, 22 & 23 shall comply with the latest currently adopted editions of all codes and regulations and all requirements of all Authorities having Jurisdiction. The following references and standards are hereby made a part of these sections and work shall conform to applicable requirements herein, except as otherwise specified herein or shown on the Drawings.

B. Codes, Standards: Conform to all applicable codes and standards as stated herein and as described in Division 01 of the Specifications, including the following:
   1. AB 1953, Amendments to Section 116875 of the Health and Safety Code relating to lead plumbing.
   2. American Gas Association (AGA)
   3. American National Standards Institute (ANSI)
   4. American Society of Mechanical Engineers (ASME)
   5. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standards 55 and 62.1
   6. American Society for Testing and Materials (ASTM)
   7. California Building Code (CBC)
   8. California Code of Regulations Titles 8, 17, 19, 20, 21 & 22
   9. California Electric Code (CEC)
   10. California Energy Conservation Code (Title 24)
   11. California Fire Code (CFC)
   12. California Mechanical Code (CMC)
   13. CAL Green Building Standards
   14. California Plumbing Code (CPC)
   15. City Fire Marshal requirements
   16. National Electrical Manufacturers Association (NEMA)
   17. National Fire Protection Association (NFPA)
   18. NSF/ANSI 61 Standard, Drinking Water System Components – Health Effects for fixture materials that will be in contact with potable water.
   19. Office of Statewide Health Planning and Development (OSHPD)
   20. Sheet Metal and Air Conditioning Contractors Nation Association (SMACNA) Standards
   21. Underwriters Laboratories (UL)
   22. Comply with all ADA requirements for disabled access.
   23. Comply with the latest edition of all applicable standards, including AWWA, PDI and OSHA

C. Minimum requirements: The requirements of these are the minimum that will be allowed unless such requirements are exceeded by applicable codes or regulations, in which the regulatory codes

or regulation requirements shall govern.

D. When the Contract Documents call for materials or construction of a higher standard than is required by the above, the Contract Document requirements shall take precedence over the requirements of the said laws, rules, and/or regulations, accepting that nothing in the Contract Documents shall be interpreted as permitting work in violation of said laws, rules, and/or regulations. The Contractor for this work shall furnish any additional materials and/or labor as may be required for compliance with these laws, rules, and/or regulations though such materials and/or labor are not specifically set forth in the Contract Documents, with no additional charges to Owner.

E. Seismic construction and restraints shall be in accordance with the requirements of Title 17 and Title 24 of the California Code of Regulations. All equipment mounts, isolators, and hanging systems must meet local authority approval requirements.

F. Comply with the Safety Orders issued by Cal-OSHA and any other regulations of the State of California and any districts having jurisdictional authority.

1.03 GUARANTEE

A. This Contractor shall guarantee that all work under this Section is free from defects in material and workmanship for a period of two years from date of filing the Notice of Completion. Replacement of defective work and damage caused to the work of other trades as a result of such defective work shall be the responsibility of the Contractor, and shall be made at no cost to the Owner.

1.04 LICENSES, PERMITS, FEES

A. The Contractors shall provide, procure and pay for all licenses, permits, fees, etc. as required to carry on and complete their work.

1.05 LICENSING REQUIREMENTS

A. All work of Divisions 22 & 23 shall be performed by an appropriately licensed contractor. The licenses shall be current, valid through the term of the contract and in the name of the contractor.

B. All HVAC work, which includes warm air heating systems and water heating pumps, ventilating systems, air conditioning systems, and ductwork, registers, flues, humidity, and thermostatic controls in connection with these systems, shall be performed by a C-20 - Warm-Air Heating, Ventilating and Air-Conditioning Contractor.

C. All hydronic piping systems shall be performed by a C-4 - Boiler, Hot Water Heating and Steam Fitting Contractor.

D. All plumbing systems shall be installed by a C-36 Plumbing Contractor. Plumbing systems include: waste removal and connection of on-site waste disposal systems; piping, storage tanks, and venting for supply of gases and liquids for any purpose; all gas appliances, flues, and gas connections; water and gas piping from the owner's side of utility meter to the structure or fixed works; installation of any type of equipment to heat water or fluids to a suitable temperature; and maintenance and replacement of the items described above, including health and safety devices.

1.06 CONTRACT DRAWINGS

A. The Contract Drawings indicate diagrammatically the general layout of the mechanical systems and other related work. Field verification of scaled dimensions taken from the Drawings is required. The Contractors shall review and compare the Architectural, Structural, Plumbing, Mechanical and Electrical Drawings and all Owner supplied equipment Drawings, and adjust their work to be in conformity with the conditions indicated thereon. Discrepancies between different Drawings, between Drawings and actual field conditions, or between Drawings and Specifications,

shall be brought to the attention of the Architect promptly for a determination of the modifications to be effected.

1.07 SUBMITTALS

A. General:
1. All submittals shall be in accordance with the requirements of the General Conditions and Division 01 Sections for Submittal Procedures and Product Requirements.
2. Before any fixtures, materials, or equipment are purchased, the Contractor shall submit to the Architect for approval, a complete list of materials, fixtures, and equipment, giving the manufacturers' names, catalog number, capacity, size, power requirements, and other pertinent data. Submittal lists and drawings shall be specifically applicable to this project, shall include identifying marks assigned by Specifications and Drawings, and shall not contain extraneous material or optional choices.
3. The Contractor shall submit for the approval of the Architect, shop drawings of proposed material and equipment that differ from the specified materials and equipment, and of any specified materials and equipment with special conditions and/or arrangements. These drawings shall show necessary modifications of Owner, plumbing, electrical and mechanical work required by the proposed materials and equipment.
4. Submittal of substitutions shall be limited to one (1) proposal for each type or kind of item, unless otherwise permitted by the Architect. If the first proposed product submittal is rejected, the Contractor shall then submit the first named or scheduled product.
5. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements. Review of drawings and other material submitted shall not be construed as a complete check or constitute a waiver of the requirements of the Drawings and Specifications, but will indicate that the material submitted is acceptable in quality and utility. This review shall not relieve the Contractor of the responsibility to fit the proposed materials to the spaces provided, and to effect necessary rearrangement or construction of other work.

1.08 WARRANTIES

A. Equipment warranties shall be provided for all equipment, with all necessary information filled in, except purchase date, in favor of the Owner.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall be responsible for delivery, storage, protection and placing of all equipment and materials.

B. Contractor shall protect the work and materials from damage during construction. Equipment stored at the jobsite shall be protected from dust, water or other damage, and be covered if equipment is exposed to weather. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.

C. Any items damaged shall be repaired or replaced, at no additional cost to the Owner.

D. Cleanliness of Piping and Equipment Systems:
1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading and welding of piping.
2. Piping systems shall be flushed, blown or pigged as necessary to deliver clean systems.
3. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.10 COOPERATION WITH OTHER TRADES

A. Cooperate fully with other trades doing work on the project as may be necessary for the proper completion of the project. Refer to the Structural, Plumbing, and Electrical Drawings for details of the building structure and equipment installation that will tend to overlap, conflict with, or require coordination with their work, and schedule this work accordingly.

B. Priority of right of way in space shall be as follows, in decreasing order of authority:
   1. Electrical lights, electrical panels and drain piping.
   2. Ductwork.
   3. Fire protection piping, domestic hot water, domestic cold water and condenser water piping.

C. Any work done without regard for other trades shall be moved, replaced, or redone as required, without extra charges to Owner.

1.11 VERIFICATION OF EXISTING CONDITIONS AND DEMOLITION:

A. Before installation of any new work, verify the location, size and other conditions at all points of connection to services or other existing piping, and at all locations where new work will cross or pass near existing piping, electrical, or other facilities.

B. Information shown relative to existing services is based upon available records and data during preparation of the Drawings, but shall be verified. Make reasonable deviations found necessary to conform with actual locations and conditions, without extra charge.

C. Remove piping, controls, fixtures, and equipment that is not to remain in service as shown on the Drawings or as required. This includes the removal of associated appurtenances and supports.

D. Patch, cap, or repair existing works affected by this demolition in concealed spaces within 6" of a live main or branch.

E. Deliver removed material to the Owner as directed by the Architect. Dispose of all other removed material offsite.

1.12 ACCURACY OF DATA

A. The data given herein and on the Drawings are as exact as could be reasonably secured, but absolute accuracy is not guaranteed. Exact locations, distances, elevations, etc. will be governed by shop drawings, the building itself, and actual field conditions.

1.13 UTILITY CONNECTIONS

A. Arrange for all utility connections, determine their exact requirements, and pay all costs incurred.

B. Send proper notices, make necessary arrangements, and perform other services required for care and maintenance of all utilities and assume all responsibility concerning same. Observe all rules and regulations of the respective utilities in executing the work.

1.14 DAMAGE BY LEAKS

A. Contractor shall be responsible for any damage to work of other Contractors that is caused by leaks in any temporary or permanent piping systems due to pipe rupture, disconnected pipes or fittings, or by overflow of equipment.

PART 2 PRODUCTS

2.01 PRODUCTS CRITERIA

A. All materials, appliances, and equipment shall be new and best of their respective kinds, free from

defects, and of the make, brand or quality specified or as accepted by the Architect.

B. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.

C. Apply and install all items in accordance with the manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to the Architect for resolution.

D. All fixtures, materials, and equipment equal in quality and utility to these herein mentioned will be accepted. When specific names are used in describing fixtures, materials, and equipment they are mentioned as standards only, but this implies no right on the part of the Contractor to use other fixtures, materials and equipment, or methods, unless approved as equal in quality and utility by the Architect. The decision of the Architect shall govern as to what fixtures, materials, and equipment are equals to those mentioned, but the burden of proof as to the quality of any proposed fixtures, materials, or equipment shall be upon the Contractor. If any tests are necessary to determine the quality of proposed fixtures, materials, or equipment, an unbiased laboratory shall make such tests at the expense of the Contractor satisfactory to the Architect.

2.02 SEISMIC FORCE RESISTANCE: MECHANICAL, PLUMBING

A. All mechanical systems and plumbing piping systems shall adhere to the SMACNA "Seismic Restraint Manual: Guidelines for Mechanical Systems", 2009 Edition with OSHPD amendments.

B. Equipment:
1. Each piece of equipment installed shall be constructed and anchored to structural supports to resist a seismic force and displacement in accordance with CBC Section 1616A1.17 through 1616A.1.26 and ASCE 7-10 Chapter 13, Sections 13.1 – 13.4 & 13.6. Supports, anchors and braces shown shall be minimum.
2. Equipment manufacturer shall construct and certify that his equipment satisfies the special minimum seismic resistance requirements.

C. Piping:
1. Flexibility of piping systems must be maintained by the use of flexible devices at critical points at junctions of separate building structures. Braces or anchors shall be designed to damp oscillations or check excessive movement. Flexible devices for piping of gas shall be loops or offsets. Flexible devices for other piping may be loops, Victaulic grooved, or roustabout couplings.
2. Piping at tops and bottoms of risers are critical points where flexibility is required, as well as at changes in direction on long runs of piping 4" and larger.
3. Tops of risers shall be restrained from motion in horizontal direction, and midpoints shall be anchored in all directions.
4. All piping systems bracing shall be designed to resist a seismic force and displacement in accordance with CBC Section 1615A1.12 through 1615A.1.22 and ASCE 7-10 Section 13.6.8 & 13.6.9.
5. The following table shows maximum lengths of shapes used for sway bracing:

TYPE/SIZE Angle	**MAX. LENGTH (l/r=200)**	**TYPE/SIZE Flat Bar**	**MAX. LENGTH (l/r=200)**
1½ x 1½ x ¼"	4'-10"	1½ x ¼"	1'-2"
2 x 2 x ¼"	6'-6"	2 x ¼"	1'-2"
2½ x 2½ x ¼"	8'-2"	2 x ⅜"	1'-9"
3 x 3 x ¼"	9'-10"		

Threaded Rod		**Pipe (Schedule 40)**	
⅜"	1'-7"	1"	7'-0"
½"	2'-1"	1¼"	9'-0"
⅝"	2'-7"	1½"	10'-4"
¾"	3'-1"	2"	13'-1"
1"	4'-2"		

2.03 HANGERS, SUPPORTS

A. Pipe supports shall be manufactured by Thomas & Betts, "Superstrut" or equivalent Cooper B-Line, Nibco (Tolco), or Anvil International.

B. All hangers shall be electro-chromate finished. Hanger rods shall have electro-galvanized finish.

C. Copper tubing:
   1. C-711 copper tube hanger complete with C-716 isolator.
   2. Copper pipe shall be attached to channels with A-716 "Cush-A-Clamp".

D. Insulated pipe:
   1. C-711 pipe hanger fitted to outside of insulation with C-790 galvanized shields.

E. Trapeze hangers:
   1. Grouped pipes may be supported by A-1200 channel bolted to rods.

F. Point of support connectors:
   1. Wood construction:
      a. Stationary pipes: 540 side beam hanger
      b. Pipes subject to movement: S541
   2. New concrete construction: 452 inserts.
   3. Existing concrete construction: Phillips "Red-Head" 3-piece concrete anchors or Hilti "Quik-Bolt", drilled-in, concrete anchors.
   4. Steel beams: Series 500 beam brackets.
   5. Plywood decks: machine bolts, nuts and washers.

G. Vertical pipe risers:
   1. Vertical pipe risers shall be securely supported with C-720 pipe clamps anchored to construction.
   2. C-720P for bare cold water pipe, anchored to construction.

H. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

I. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

J. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

K. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

L. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

M. Trapeze and Riser Supports:
   1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

N. Pipes through studs or joists shall be isolated from structure with properly sized Hubbard "Hold-Rite" suspension clamps or LSP "Acousto-Plumb" system.

2.04 PIPE LABELS

A. Brady, Seton or approved equal pipe labels. Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

D. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.

E. Label Sizes (per ANSI A13.1 / ASME A13.1-2007 Standards):
1. For pipes or covering with outside diameter ¾ to 1¼ inches, minimum length of label: 8 inches, minimum height of letters: ½ inch.
2. For pipes or covering with outside diameter 1½ to 2 inches, minimum length of label: 8 inches, minimum height of letters: ¾ inch.
3. For pipes or covering with outside diameter 2 ½ to 6 inches , minimum length of label: 12 inches, minimum height of letters: 1¼ inch.
4. For pipes or covering with outside diameter 8 to 10 inches, minimum length of label: 24 inches, minimum height of letters: 2½ inches.
5. For pipes or covering with outside diameter over 10 inches, minimum length of label: 32 inches, minimum height of letters: 3½ inches.

2.05 ELECTRICAL MOTORS

A. With exception of motors in AGA or UL labeled equipment, motors for HVAC blowers and fans, pumps, and other general purpose applications using an adjustable speed drive shall be Baldor Premium Efficient Super-E®, three phase, foot mounted, Class H insulated motor with AEGIS shaft grounding ring installed internally, regreasable ball bearings, dynamically balanced rotors.

B. Motors shall be certified for quiet operation and shall bear a label so stating. Motors shall be drip-proof frame, 1.15 minimum service factor in 40°C, ambient windings specially impregnated and epoxy coated for outdoor service.

C. Torque characteristics of motors shall be as required to accelerate machine to 100% full load speed within 10 seconds. Motors shall be dynamically balanced to maximum deflection as follows:
1. 15 HP and larger: 0.0003 inches.
2. 10 HP and smaller: 0.0002 inches.

D. Motors shall be Inverter duty, meet NEMA MG-1 and part 30 and 31, and shall be guaranteed to satisfactorily operate at ± 10% voltage shown on Drawings. Transformers of adequate capacity shall be provided if necessary to satisfy this requirement.

E. All 3-phase motors shall be provided with phase and brown-out protection to shut down all motors in the unit if the phases are more than 10% out of balance on voltage or the voltage is more than 10% under design voltage.

F. Fractional horsepower fan motors (¼ hp, ½ hp, ¾ hp) shall be Greenheck Vari-Green series motors, DC electronic commutation type, specifically designed for fan applications. Motors shall be permanently lubricated with heavy duty ball bearings to match the fan load and pre-wired to the

specific voltage and phase. Internal motor circuitry shall convert AC power supplied to the fan to DC power to operate the motor. Motor shall be controllable down to 20% of full speed (80% turndown). Speed shall be controlled by either a potentiometer dial mounted at the motor or by a 0-10 VDC signal. Motor shall be a minimum of 85% efficient at all speeds.

EXECUTION

2.06 INSTALLATION, GENERAL

A. Provide all necessary cutting in connection with scope of work. No cutting shall be done without the approval of the Architect. Comply with requirements specified in Cutting and Patching Section.

B. No structural members shall be drilled, bored, or notched in a manner that will impair their structural capacity.

C. All penetrations of concrete or masonry shall be made with core drills.

2.07 EQUIPMENT

A. Equipment shall operate quietly and without objectionable vibration. Such problems, other than from equipment operating at optimum conditions, shall be the Contractor's responsibility and shall be eliminated at the direction of the Architect.

B. Install equipment to provide good appearance, easy access, and adequate space to allow replacement and maintenance. Provide bases, supports, anchor bolts, and other items required to achieve this. Installation shall be level, above moisture level, and adequately braced.

C. Extend ¼" schedule 40 black steel lubrication pipes from hard-to-reach locations to front of equipment or to access doors. Terminate with proper lubrication fittings.

D. Move equipment into building through available openings. Dismantle equipment where necessary to accomplish this. After reassembly, test equipment to verify its satisfactory operating condition.

E. Thoroughly lubricate equipment before operating. Repair of damage resulting from failure to comply with this requirement shall be the Contractor's responsibility.

F. Connections to piping shall be secured and properly aligned and all utility and control connections shall be properly isolated from the building structure by means of vibration isolators and flexible connections. Any equipment not meeting this requirement will be modified and properly reinstalled at no expense to the Owner.

2.08 CONCRETE EQUIPMENT BASES

A. Concrete work that is part of the mechanical installations, as such is shown and/or detailed on the Drawings, shall conform to the requirements of the Concrete Section of these Specifications.

B. Bases shall be neatly finished, have rounded corners and smooth trowel finish.

2.09 ELECTRICAL REQUIREMENTS

A. Electrical work shall conform to the requirements of Division 26. Equipment shall conform to the standards of the National Electric Manufacturer's Association. Electrical equipment shall bear the label of Underwriters' Laboratories, Inc., where examination and listing service is available for such materials. Motors and motor control equipment shall be as specified below.
   1. The work shall include the furnishing of:
      a. Motor controls mounted as integral part of equipment assemblies.
      b. Pre-wired control panels as described and shown.

c. Electronic control panels and their components.
d. Wiring for low voltage controls and "interlock work" except where specifically shown otherwise.

2. Installing of:
   a. All motors.
   b. All control panels and their components.
   c. Low voltage wiring, line voltage "interlock" wiring, control wiring for safety devices, alarms, and refrigeration.

B. Wiring includes all connections to devices, and all wiring shall be installed in conduit.
1. Conduit fittings and devices shall be as specified in the basic electrical materials section of Division 26 - Electrical.
2. Line voltage work (in equipment assemblies) shall be as specified in Division 26 - Electrical.
3. Devices shall be installed in NEMA enclosures of type required for location.
   a. Flush enclosures: Keystone "Telephone Cabinets" type PF with pull box knockouts.
   b. Surface enclosures: Keystone LJC.

C. Electrical Controls:
1. Submit shop-wiring diagrams of temperature controls and air conditioning unit controls for approval. Furnish approved wiring diagrams and assistance to Electrician.
2. Refer to Electrical, Fire Protection, Plumbing and Mechanical documents for work and devices required. All wiring required by plumbing and heating, ventilating and air conditioning work shall be performed by the Controls Contractor.

D. The following work will be furnished and installed under the Electrical Section of these Specifications:
1. Disconnect switches, remote switches, motor starters, relays and test switches not mounted as integral part of equipment assemblies or in temperature control panels.
2. All line voltage controls and interlocks, all other controls, circuits from electric panel board to disconnect switches, starters, motors, switches and/or other motor controls, to temperature controls and safety devices.

2.10 PAINTING

A. Properly prepare work to be painted under Painting Section, except preservative and special painting as described herein.

B. Priming as required herein, shall conform to Painting Section requirements and be of a material compatible with paint for finish painting.

C. All equipment and materials shall be cleaned of grease, wax, oil, rust or dirt in preparation for finish painting. Any prime coated surfaces showing signs of rust before being finish painted shall be thoroughly cleaned and a new prime coat applied.

D. Prime paint both sides of flashings prior to installation.

E. Furnish can of touch-up paint with each factory finished piece of equipment.

F. Paint all piping in mechanical rooms. Color as selected by the Architect.

G. Black steel piping exposed to the environment shall be painted with rust-inhibiting paint. Color as selected by Architect.

2.11 IDENTIFICATION OF SYSTEMS

A. Piping
1. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces;

machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

a. Adjacent to all valves and flanges
b. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
c. At both sides of wall or floor penetrations.
d. Before and after all wall, floor and ceiling penetrations and inaccessible enclosures.
e. Adjacent to changes in direction.
f. At access doors, manholes, and similar access points that permit view of concealed piping.
g. Near major equipment items and other points of origination and termination.
h. Spaced at maximum intervals of 25 feet along each run. Reduce intervals in areas of congested piping and equipment.
i. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

2. All piping shall be identified.
3. Pipe Label Color Schedule: (per ANSI A13.1 / ASME A13.1-2007)
   a. Potable, Cooling, Boiler Feed and other Water Piping:
      1) Background Color: Green.
      2) Letter Color: White.
   b. Fire Quenching Fluids:
      1) Background Color: Red.
      2) Letter Color: White.
   c. Toxic and Corrosive Fluids
      1) Background Color: Orange.
      2) Letter Color: Black
   d. Flammable Fluids:
      1) Background Color: Yellow.
      2) Letter Color: Black.
   e. Combustible Fluids:
      1) Background Color: Brown.
      2) Letter Color: White
   f. Compressed Air:
      1) Background Color: Blue.
      2) Letter Color: White.

B. Valves
1. For identification and Owner's maintenance records, all valves shall be numbered and identified with clearly stamped 1¼" diameter brass tags, in accordance with drawings and service performed.
2. Control valves shall be also marked whether normally open (N.O.) or normally closed (N.S.).
3. Affix Underwriter's standard porcelain enameled identification signs to all fire protection sprinkler control valves, drain valves, and flow switches.

C. Equipment
1. All equipment shall be labeled with 1" high stencils showing identifying mark noted on drawings, and usage.
2. Warning signs shall be placed on machines driven by electrical motors that are controlled by fully automatic starters, per California Code of Regulations, Title 8, Subchapter 7 - General Industry Safety Orders, Article 7, Section 3320.
3. A typewritten schedule of all stencils and valve tags used, with identification, shall be framed and posted in mechanical rooms, at locations as directed.

2.12 INSTALLATION, HANGERS AND SUPPORTS

A. Hanger rod sizes shall be no smaller than 3/8-inch for pipe and tube sizes ½ to 4 inches and ½ inch for sizes 5 - 8 inches.

B. Pipe supports shall be spaced sufficiently close to support pipes properly without formation of pockets. Hangers shall be installed at ends of mains and branches. Maximum horizontal support spacing shall be as follows:
   1. Steel Pipe for water or DWV: 10 feet for pipe sizes ¾ inch and smaller and 12 feet for sizes 1 inch and larger.
   2. Steel and Tinned Copper Pipe for gas: 6 feet for ½ inch pipe; 8 feet for sizes ¾ to 1 inch, and 10 feet for sizes 1 ¼ inch and larger.
   3. Copper Tube and Pipe, soldered or brazed: 6 feet for pipe sizes 1 ½ inches and smaller and 10 feet for sizes 2 inches and larger.
   4. Hubless Cast-Iron shall be supported at every other joint, unless over 4 feet, then support each joint. Support adjacent to joint, not to exceed 18 inches, brace at not more than 40 foot intervals to prevent horizontal movement. Support at each horizontal branch connection. Hangers shall not be placed on the coupling.
   5. Schedule 40 PVC and ABS DWV shall be 4 feet for all sizes. Allow for expansion every 30 feet.
   6. CPVC: 3 feet for pipe sizes 1 inch and smaller, 4 feet for sizes 1 ¼ inch and larger.
   7. Polypropylene: 32 inches for pipe sizes 1 inch and smaller, 4 feet for sizes 1 ¼ inch and larger

C. Provide resilient mounting for domestic water piping. Thermal insulation may serve as resilient mounting for insulated piping.

D. Suspended water piping shall be anchored with steel struts installed at midpoint of each run.

E. No valve or piece of equipment shall be used to support piping.

2.13 INSTALLATION, PIPING

A. Installation of piping shall be such that damage cannot result through loading, expansion or contraction of piping. Anchors shall be installed to obtain uniformity of pipe movement.

B. Rough in shall proceed as rapidly as general construction will permit. All rough-in shall be complete, at locations verified by Architect and Owner, and tested and inspected prior to installation of concrete, lath, plaster, gypsum wallboard, or other finishes.

C. All piping shall be concealed in finished rooms, installed in furred walls and partitions. Where furred or suspended ceilings occur, piping shall be installed in the concealed space at points adjacent to beams and/or other structural members, and coordinated with ductwork and equipment. Where exposed piping occurs, it shall be installed parallel to or at right angles to building walls, unless specifically shown otherwise on the Drawings.

D. Installation of piping shall be such that damage cannot result, through thermal expansion or contraction, to piping, building, or pipe hangers and supports. Anchors shall be installed at midpoints of all runs in main piping for the purpose of localizing pipe expansion or prevention of creepage.

E. All pipe lines shall be installed free from traps and air pockets, true to line and grade, with suitable supports properly spaced. All piping shall be installed without undue stresses and with provision for expansion and contraction.

F. All piping shall be new and free from foreign substances. American standard pipe threads shall be used for IPS threaded work. Joints in threaded piping shall be made up with Teflon tape applied to the male threads only. No screwed pipe joints shall be caulked or packed with rope or other packing materials. Pipe shall be free from tool marks, threads cut accurately with not more than

two (2) threads showing beyond fitting. Friction wrenches shall not be used with plated, polished, or soft metal piping. All changes in pipe size shall be made with reducing fitting. Bushings will not be permitted.

G. Protect unattended openings in piping during construction.

H. Welding procedures, welders and operators shall be qualified in accordance with ANSI B31.9 for shop and project site welding of piping work. Welding materials shall comply with Section 2-C of ASME Boiler Code, as applicable.

I. No water or drainage piping shall pass over electrical equipment unless adequate protection is provided to prevent damage by leaks or condensation.

J. All copper tubing shall be formed in a workmanlike manner, in accordance with the Pipe and Tube Bending Handbook of the Copper and Brass Research Association. A tube bender giving support to the periphery of the tube shall be used. The tubing shall be protected against flatting or other injury.

K. All copper connections and joints shall be made in accordance with the Copper Tube Handbook, Copper and Brass Research Association. No swaged connections will be permitted. All valves, pumps, and similar equipment shall be connected to copper piping through union or flange adapter fittings.

L. All underground hydronic piping shall be installed per manufacturer's installation instructions. Provide protection of piping from damage due to expansion. Provide thrust blocks where required as indicated by the manufacturers installation instructions.

M. Install air vents at all water piping high points when direction of flow is downward.

N. Install sediment drain faucets at all low points.

O. Valves, cocks, etc., shall be installed to allow convenient accessibility and operation.

P. Unions and flanges shall be installed to allow convenient replacement of all equipment and cleaning tubes.

Q. A union connection shall be installed downstream from all valves, at equipment connections and at other locations as required or directed.

R. Shut off valves shall be provided in all main services, and where required to permit proper servicing of equipment. Valves of one type shall be of one manufacturer.

S. All valves shall be of the same size as the pipelines in which they are installed, unless specifically sized on the Drawings. All hand controlled line valves shall be ball valves, except where throttling control or frequent operation is required, in which case globe or angle valves shall be used. Globe valves in horizontal lines shall be installed with stem in horizontal to permit line draining. All globe and angle valves shall be installed to close against pressure. Disc valves shall have discs suitable for the services for which they are to be used.

T. All valves shall be accessible and shall not be installed with the stems below the horizontal plane. Provide access panels at walls, ceilings, or floors.

U. Provide prime coated escutcheon plates at all points where exposed piping penetrates finished wall ceilings or floors.

V. Cutting or boring of joists or other structural members shall be done only when alternative routing is impossible and only upon written approval of the Architect or Owner.

2.14 CLEANING OF PIPING

A. All new piping shall be thoroughly cleaned of rust, scale, etc., prior to enclosing and placing in operation. Water shall be forced through pipes until the systems are free from foreign substances.

2.15 CLEANUP

A. Upon completion of the work, remove all material, debris, and equipment associated with or used in the performance of this work.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Balancing Air Systems
   2. Additional Tests
      a. Duct leakage testing
      b. Controls verification

1.03 SCOPE

A. The T&B Agency will provide the following services:
   1. Provide all supervision, personnel, instruments, calibration equipment, and all other materials necessary to perform balancing and testing, and compile test data including calculations and services necessary for the heating, ventilating, and air conditioning systems for this project, all in accordance with the project Drawings and Specifications and as specified herein.
   2. The T&B Agency shall be responsible for inspecting, balancing, adjusting, testing, and logging the data of the performance of fans, all dampers in the duct systems, all air distribution devices or heat exchangers, and the flows of water through all coils.
   3. The T&B Agency shall balance, test, and adjust the systemic components to obtain optimum conditions in each conditioned space in the building. If construction deficiencies are encountered which preclude obtaining optimum conditions, the deficiencies will be recorded and given to the Owner's Representative. The T&B Agency is advised that deficiencies in the HVAC construction are often encountered during final T&B services, and should include in the bid an amount deemed advisable to compensate for time in identifying the deficiencies.

B. During construction, the T&B Contractor shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems. Inspections shall be conducted a minimum of three times. Typically this is performed when 60% of the ductwork and piping are installed and again when 90% of the total system is installed and prior to insulation. A copy of the written report is to be issued to the Mechanical Engineer for review.

1.04 SUBMITTALS

A. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit T&B strategies and step-by-step procedures.

B. System Readiness Checklists: Within 30 days of Contractor's Notice to Proceed, submit system readiness checklists for use by systems installers in verifying system readiness for T&B. Examination Report: Within 30 days of Contractor's Notice to Proceed, provide a summary report of the examination review required in Part 3 "Examination", if issues are discovered that may preclude the proper testing and balancing of the systems.

C. Examination Report: Provide a summary report of the examination review if issues are discovered that may preclude the proper testing and balancing of the systems.

D. Certified T&B reports: Within 30 days of completion of balancing work, submit AABC-certified T&B report.
   1. Submit one copy of the final T&B Report directly to the design professional of record. Provide five additional copies to the contractor.

1.05 QUALITY ASSURANCE

A. T&B Contractor Qualifications:
   1. General Contractor will employ a T&B Agency that is certified by the Associated Air Balancing Council (AABC). The T&B Agency will have experience in the field of air and hydronic system balancing, possess calibrated instruments, and employ qualified Supervisors and skilled Technicians to perform all required tests. The T&B Agency shall have a minimum of ten years experience in the Testing, Adjusting, and Balancing field.

B. T&B technician shall perform the following:
   1. Review field data reports to validate accuracy of data and to prepare certified T&B reports.
   2. Certify that the T&B team complied with the approved T&B plan and the procedures specified and referenced in this Specification.
   3. Certify the T&B report

C. T&B Conference: If requested by the Owner or Construction Manager after approval of the T&B Agency's submittals, meet to develop a mutual understanding of the details
   1. Agenda Items:
      a. The examination report.
      b. The Strategies and Procedures plan.
      c. Systems readiness checklists.
      d. Coordination and cooperation of trades and subcontractors.
      e. Coordination of documentation and communication flow.

D. Approved Test and Balance agencies in the area:

RS Analysis, Inc.
1035 Suncast Lane, Suite 130
El Dorado Hills, CA 95762
(916) 358-5672

National Air Balance Company, Inc.
4171 Business Center Drive
Fremont, CA 94538
(510) 623-7000

Raglen System Balance, Inc.
1121 University Terrace
Reno, NV 89502
(775) 747-0100

Pacific Test & Balance, Inc.
724 California Blvd.
Napa, CA 94559
(707) 696-2444

E. T&B Report Forms: Use standard T&B contractor's forms.

F. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in "AABC National Standards for Total Systems Balance."

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONTRACTOR RESPONSIBILITIES

A. Provide T&B agency one complete set of contract documents, change orders, and approved submittals in digital and hard copy formats. Project Schedule and Mechanical Contractor's Shop Drawings and Temperature Control Drawings shall be provided as issued or received.

B. Controls contractor shall provide required BAS hardware, software, personnel and assistance to T&B agency as required to balance the systems. Controls contractor shall also provide trending report to demonstrate that systems are complete.

C. Coordinate meetings and assistance from suppliers and contractors as required by T&B agency.

D. Provide additional valves, dampers, sheaves and belts to properly test and balance, which shall be installed by the Mechanical Contractor as directed by T&B agency, at no additional cost to owner.

E. Mechanical Contractor shall install test holes where indicated by the T&B Agency. Test holes shall be complete with removable and replaceable plugs

F. Flag all manual volume dampers with fluorescent or other high-visibility tape.

G. Provide access to all dampers, valves, test ports, nameplates and other appurtenances as required by T&B agency.

H. Replace or repair insulation as required by T&B agency.

I. Have the HVAC systems at complete operational readiness for T&B to begin. As a minimum verify the following:
   1. Airside:
      a. All ductwork is complete with all terminals installed.
      b. All volume, smoke and fire dampers are open and functional.
      c. Clean filters are installed.
      d. All fans are operating, free of vibration, and rotating in correct direction.
      e. VFD start-up is complete and all safeties are verified.
      f. System readiness checklists are completed and returned to T&B agency.

J. Promptly correct deficiencies identified during T&B.

K. Maintain a construction schedule that allows the T&B agency to complete work prior to occupancy.

L. Before testing or balancing is started, the Mechanical Contractor shall adjust belts and sheaves; align all parts; oil and grease bearings in accordance with manufacturer's instructions; clean exterior surfaces of coil tubes and fins; flush interior of coil tubes, pull until clean; and check mixing damper operation to insure free operation and activation by the correct thermostat

M. The Mechanical Contractor shall be responsible for certifying in writing that the system, as scheduled for balancing, is operational and complete. Completeness shall include not only the physical installation, but the Mechanical Contractor's certification that the prime movers are installed in good working order, and that full load performance has been preliminary tested under the certification of the Mechanical Contractor. Before any testing and balancing is started, a complete report shall be sent to the T&B Agency by the Mechanical Contractor.

N. The Mechanical Contractor shall be responsible for making all modifications to rectify discrepancies reported by the T&B Contractor as indicating non-compliance with the Contract Documents. By completing the work on time, the Mechanical Contractor shall provide sufficient time before the completion date so that balancing can be accomplished.

3.02 EXAMINATION & REVIEW

A. Review the Contractor shop drawing submittals for their effect on the test and balance process and overall performance of the HVAC system. Submit recommendations for enhancements or changes to the system.

B. Review location and type of volume damper inlet conditions to air terminals, air valves, and HVAC equipment.

C. Review location, type, and size of balancing valves, flow metering stations, and automatic control valves in the water flow station.

D. Review location of pressure sensors in the air and water distribution system.

E. Review automatic control systems as they affect the test and balance procedure.

F. Review sheet metal and piping shop drawings to verify the installation of flow control devices.

G. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Note the locations of devices that are not accessible for testing and balancing.

H. Review the approved submittals for HVAC systems and equipment.

I. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas.

J. Review equipment performance data including fan and pump curves.

K. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, clean permanent filters are installed, and controls are ready for operation.

L. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected, configured by the controls contractor and functioning.

M. Examine strainers to verify that Mechanical Contractor has replaced startup screens with permanent screens and that all strainers have been cleaned.

N. Examine two-way valves for proper installation and function.

O. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

P. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

Q. Examine air vents to verify that mechanical contractor has removed all air from all hydronic systems.

3.03 PREPARATION

A. Prepare a T&B plan that includes:
   1. Equipment and systems to be tested.
   2. Strategies and step-by-step procedures for balancing the systems.
   3. Instrumentation to be used.
   4. Sample forms with specific identification for all equipment.

B. Prepare system-readiness checklists, as described in the *AABC National Standards for Total System Balance*, for use by contractors in verifying system readiness for T&B. These shall include, at a minimum:
   1. Airside:
      a. All ductwork is complete with all terminals installed.
      b. All volume, smoke and fire dampers are open and functional.
      c. Clean filters are installed.
      d. All fans are operating, free of vibration, and rotating in correct direction.
      e. VFD start-up is complete and all safeties are verified.
      f. Automatic temperature-control systems are operational.
      g. Ceilings are installed.
      h. Windows and doors are installed.
      i. Suitable access to balancing devices and equipment is provided.

3.04 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for T&B procedures.

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.05 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain approved submittals and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare single-line schematic diagram of systems for the purpose of identifying HVAC components.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Verify that motor starters are equipped with properly sized thermal protection.

G. Check condensate drains for proper connections and functioning.

H. Check for proper sealing of air-handling-unit components.

3.06 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
   1. Measure total airflow.
      a. Set outside air, return air and relief air dampers for proper position that simulates minimum outdoor air conditions.

   b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
   c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
   d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
2. Measure fan static pressures as follows:
   a. Measure static pressure directly at the fan outlet or through the flexible connection.
   b. Measure static pressure directly at the fan inlet or through the flexible connection.
   c. Measure static pressure across each component that makes up the air-handling system.
   d. Report any artificial loading of filters at the time static pressures are measured.
3. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
1. Measure airflow of submain and branch ducts.
2. Adjust sub-main and branch duct volume dampers for specified airflow. Re-measure each sub-main and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.
1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure airflow at all inlets and outlets.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after all have been adjusted.

D. Verify final system conditions.
1. Re-measure and confirm minimum outdoor air, return and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust, if necessary.
6. Measure and record all operating data.

E. Record final fan-performance data

3.07 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:
1. Verify that the system static pressure sensor is located 2/3 of the distance down the duct from the fan discharge.
2. Verify that the system is under static pressure control.
3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control setpoint so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows

a. Adjust controls so that terminal is calling for maximum airflow (note some controllers require starting with minimum airflow. Verify calibration procedure for specific project).
b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
d. Adjust controls so that terminal is calling for minimum airflow.
e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
f. When in full cooling or full heating, ensure that there is no mixing of hot deck and cold deck airstreams unless so designed.
g. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.

5. After all terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.
   a. Set outside air, return air and relief air dampers for proper position that simulates minimum outdoor air conditions.
   b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.
   c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
   d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
   e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
6. Measure fan static pressures as follows:
   a. Measure static pressure directly at the fan outlet or through the flexible connection.
   b. Measure static pressure directly at the fan inlet or through the flexible connection.
   c. Measure static pressure across each component that makes up the air-handling system.
   d. Report any artificial loading of filters at the time static pressures are measured.
7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
   a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
   b. Verify all terminal units are meeting design airflow under system maximum flow.
8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure setpoint to the most energy-efficient setpoint to maintain the optimum system static pressure. Record setpoint and give to controls contractor.
9. Verify final system conditions as follows:
   a. Re-measure and confirm minimum outdoor air, return and relief airflows are within design. Readjust to design if necessary.
   b. Re-measure and confirm total airflow is within design.
   c. Re-measure all final fan operating data, rpms, volts, amps, static profile.
   d. Mark all final settings.
   e. Test system in economizer mode. Verify proper operation and adjust, if necessary. Measure and record all operating data.
   f. Verify tracking between supply and return fans.

3.08 PROCEDURES FOR CONDENSING UNITS

1. Verify proper rotation of fans.
2. Measure entering- and leaving-air temperatures.
3. Record fan and motor operating data.

3.09 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
   1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
   2. Air Outlets and Inlets: Plus or minus 10 percent.
   3. Heating-Water Flow Rate: Plus or minus 10 percent.
   4. Cooling-Water Flow Rate: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.10 ADDITIONAL TESTS

A. Duct Leakage Test
   1. All ductwork shall be tested for leaks, using necessary instruments before insulating any ductwork. Conduct test as follows and as recommended in SMACNA Balancing Manual.
      a. Seal all openings in duct section and plenum to be tested.
      b. Connect test apparatus to test section of cuts, using a flexible duct connection or hose (fitting provided by Mechanical Contractor).
      c. Close damper on blower suction side, to prevent excessive build-up of pressure.
      d. Start blower and gradually open damper on suction side of blower.
      e. Determine amount of air leakage and make repairs as required.
      f. Leakage factor allowable shall be 5% based on the total operating cfm of the section of duct under testing.
      g. Tested sections of ductwork shall be visually marked with certification sticker and initials of field test inspector. Tests shall be made before duct sections are concealed.
   2. Witness the duct pressure testing performed by the mechanical/installing contractor.
   3. Verify that proper test methods are used and that leakage rates are within specified tolerances.
   4. Report any deficiencies observed.

B. Controls Verification
   1. In conjunction with system balancing perform the following:
      a. Work with the temperature control contractor to ensure the system is operating within the design limitations, and gain a mutual understanding of intended control performance.
      b. Verify the integrity of valves and dampers in terms of tightness of close-off and full-open position. This includes dampers in multi-zone units.
      c. Check that all valves are properly installed in the piping system in relation to direction of flow and location.
      d. Verify the proper application of all normally open and normally closed valves.
      e. Check the locations of all thermostats and humidistats for potential erratic operation from outside influences such as sunlight, drafts or cold walls.
      f. Check the locations of all sensors to determine whether their position will allow them to sense only the intended temperatures, humidities, or pressures. Control Contractor will relocate as deemed necessary by the TAB Agency.
      g. Check the sequence of operation for any control mode is in accordance with approved shop drawings. Verify that only minimum simultaneous heating and cooling occurs. Observe that heating cannot take place until the cooling zone of valve is completely closed.
      h. Verify that all controller set points meet the design intent.

i. Verify the operation of all interlock systems.
j. Verify that controllers are calibrated and function as intended.
k. Verify that controller setpoints are as specified.
l. Verify the operation of lockout or interlock systems.
m. Verify the operation of all valve and damper actuators.
n. Verify that all controlled devices are properly installed and connected to the correct controller.
o. Verify that all controlled devices travel freely and are in the position indicated by the controller: open, closed, or modulating.
p. Perform all system verification to assure the safety of the system and its components.

2. Reporting
   a. The report shall include a summary of verifications performed, remaining deficiencies, and any variations from specified conditions.
3. A systematic check of the above requirements shall be included in the final TAB report.

3.11 FINAL TEST AND BALANCE REPORT

A. The report shall be a complete record of the HVAC system performance, including conditions of operation, items outstanding, and any deviations found during the T&B process. The final report also provides a reference of actual operating conditions for the owner and/or operations personnel. All measurements and test results that appear in the reports must be made on site and dated by the AABC technicians or test and balance engineers.

B. The report must be organized by systems and shall include the following information as a minimum:
   1. Title Page:
      a. AABC certified company name
      b. Company address
      c. Company telephone number
      d. Project identification number
      e. Location
      f. Project Architect
      g. Project Engineer
      h. Project Contractor
      i. Project number
      j. Date of report
      k. AABC Certification Statement
      l. Name, signature, and certification number of AABC TBE
   2. Table of Contents.
   3. AABC National Performance Guaranty.
   4. Report Summary:
      a. The summary shall include a list of items that do not meet design tolerances, with information that may be considered in resolving deficiencies.
   5. Instrument List:
      a. Type.
      b. Manufacturer.
      c. Model.
      d. Serial Number.
      e. Calibration Date.
   6. T&B Data:

a. Provide test data for specific systems and equipment as required by the most recent edition of the "AABC National Standards."

7. Print or sketch, reduced in size, showing all supply, return and exhaust air outlets for easy reference to report data.

C. One copy of the final test and balance report shall be sent directly to the Mechanical Engineer of record. Provide five additional copies to the contractor.

D. An approved copy of the balancing report shall be included in the maintenance manual submittal.

3.12 FINAL ACCEPTANCE

A. At the time of final inspection, the T&B Agency shall recheck, in the presence of the Owner's Representative, specific and random selections of data, i.e. water and air quantities, recorded in the Certified Report.

B. Points and areas for recheck shall be selected by the Owner's Representative.

C. Measurement and test procedures shall be the same as approved for work forming basis of Certified Report.

D. Selections for recheck, specific plus random, will not normally exceed 25% of the total number tabulated in the report, except that special air systems may require a complete recheck for safety reasons.

E. If random tests elicit a measured flow deviation of 10% or more from that recorded in the Certified Report listings, by 10% or more of the selected recheck stations, the report shall be automatically rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, new Certified Report submitted, and new inspection tests made, all at no additional cost to the Owner.

F. Following final acceptance of the Certified Report by the Owner's Representative the settings of all valves, splitters, dampers, and other adjustment devices shall be permanently marked by the T&B Agency, so that adjustment can be restored if disturbed at any time. Devices shall not be marked until after final acceptance.

END OF SECTION

SECTION 23 09 23

DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish an Alerton BACnet Energy Management System (EMS) as specified herein, to tie into and match the South San Francisco Unified School District's (SSFUSD) current Energy Management System Standard. The operator's workstation, all building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135-2008, BACnet. In other words, all workstations and controllers, including unitary controllers, shall be native BACnet devices. No gateways shall be used for communication to controllers installed under this section. Gateways may be used for communication to existing systems or to systems installed under other sections.

B. The native BACnet EMS shall be as specified herein and consist of a high-speed, peer-to-peer local area network of DDC controllers connected to a dedicated Server PC and other client workstation PC's and Lap Top computers as specified. All HVAC and/or Electrical system points monitored and controlled by the EMS, including the building floor plans as well as all control devices, will be depicted by point-and-click graphics.

C. Provide all necessary BACnet-compliant hardware and software to meet the system's functional specifications. Provide Protocol Implementation Conformance Statement (PICS) for Windows-based control software and every controller in system, including unitary controllers. All controller devices must be BTL tested and listed by the official BACnet Testing Laboratory, having the BTL approval mark issued.

D. All devices in this new project facility location shall be accessible from a single graphical user interface.

E. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.

F. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.

G. Furnish and install the required software to produce a complete and operational native BACnet EMS as specified herein.

H. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.

I. Provide supervisory specialists, including a dedicated project manager, and technicians throughout the duration of the project to assist in all phases of EMS system installation, startup, and commissioning.

J. Provide a comprehensive operator and technician training program as described herein.

K. Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.

1.02 SYSTEM DESCRIPTION

A. A distributed logic control system complete with all software and hardware functions shall be provided and installed. System shall be completely based on ANSI/ASHRAE Standard 135-2008, BACnet and achieved listing under the BACnet Testing Laboratories BACnet - Advanced Workstation Software (B-AWS). This system is to control all mechanical equipment, including all unitary equipment such as heat pumps, fan-coils, AC units, etc., and all air handlers, boilers, cooling towers, and any other listed equipment using native BACnet-compliant components. Non-BACnet-compliant or proprietary equipment or systems (including gateways) shall not be acceptable and are specifically prohibited.

B. Operator's workstation software shall be 64-bit operating system running Windows 7, Windows 8, Windows 8.1 or Windows Server 2012 or SQL Server 2008 R2 as the computer operating system. The Energy Management System (EMS) application program shall be written to communicate specifically utilizing BACnet protocols. Software functions delivered on this project shall include password protection, scheduling (including optimum start), alarming, logging of historical data, full graphics including animation, after-hours billing program, demand limiting, and a full suite of field engineering tools including graphical programming and applications. Systems using operating systems other than that described above are strictly prohibited. All software required to program EMS application specific controllers and all field level devices and controllers will be left with the SSFUSD. All software passwords required to program and make future changes to the system will also become the property of the owner. All software required to make any program changes anywhere in the system, along with scheduling and trending applications, will be left with the SSFUSD. All software passwords required to program and make future changes to schedules, trends and related program changes will also become the property of the SSFUSD. All software required for all field engineering tools including graphical programming and applications will be left with the SSFUSD. All software passwords required to program and make future changes to field engineering tools, including graphical programming and applications will be left with the SSFUSD.

C. Building controllers shall include complete energy management software, including scheduling building control strategies with optimum start and logging routines. All energy management software and firmware shall be resident in field hardware and shall not be dependent on the operator's terminal. Operator's terminal software is to be used for access to field-based energy management functions only. Provide zone-by-zone direct digital logic control of space temperature, scheduling, runtime accumulation, equipment alarm reporting, and override timers for after-hours usage.

D. Room sensors shall be architecturally pleasing, sense temperature and allow tenant to override system (as indicated on plan documents).

E. All application controllers for every terminal unit (HP, UV, etc.), air handler, all central plant equipment, and any other piece of controlled equipment shall be fully programmable. Application controllers shall be mounted next to controlled equipment and communicate with building controller through BACnet LAN.

F. System Architecture
   1. EMS Contractor shall utilize SSFUSD's IT WAN for connection from BACnet Server to all Global Controllers furnished and installed as part of this project. Connection shall be by way of BACnet/IP as defined in Addendum A (Annex J) of the ANSI/ASHRAE Standard for BACnet. Connection between all Integration Level Global Controllers, the BACnet Server and any client work stations (PC's or Lap Tops) shall be high-speed, peer-to-peer

Ethernet as per Standard IEEE802.3. SSFUSD shall furnish and maintain IT WAN infrastructure.

2. EMS Contractor shall provide and install a dedicated MS/TP LAN extending from all Global Controller's to distributed field level controller BACnet devices.
3. Distributed field level controllers are responsible for directly controlling and monitoring HVAC and Electrical system points throughout the facility.
4. The BACnet Server hosts system configurations, programming databases and stores all trendlog data. The Server maintains all backup files for system configuration and programming located on Global Controller's and field level controllers and is capable of directly uploading or downloading information from the controllers.
5. An operator's workstation and/or any designated portable operator's terminal (if specified) shall be used as a graphical user interface to provide system supervision, management report generation and alarm annunciation.

1.03 APPROVED MANUFACTURERS

A. Approved Control Manufacturers:
   1. Alerton; no substitution – Contact Torrey Plana at Syserco: 510-673-5610 or e-mail: t.plana@syserco.com for further bid coordination.

1.04 QUALITY ASSURANCE

A. The Contractor shall be regularly engaged in the manufacturing, installation and maintenance of EMS systems and shall have demonstrated technical expertise and experience in the manufacture, installation and maintenance of EMS systems similar in size and complexity to this project.

B. The EMS system shall be designed, installed, commissioned, and serviced by manufacturer-authorized and trained personnel. System provider shall have an in-place support facility within 50 miles of the site with technical staff, spare parts inventory and necessary test and diagnostic equipment.

C. To provide the level of support and response required by the Owner, the Energy Management System Contractor shall have a fully staffed service department with the following minimum personnel and service offerings:
   1. Minimum of (1) Dedicated Support Technician located at a fixed location with access to a network for remote access to the site.
   2. Minimum of (1) Dedicated Service Dispatcher to route calls and prioritize service response.
   3. Minimum of (5) Dedicated Field Service Technicians. To ensure that there are personnel available to respond to service requests in a timely manner, these technicians are to be dedicated to service and not used on construction projects.
   4. Maintain a 24/7 Service Call Center staffed by live operators enabling immediate response to SSFUSD's critical emergency EMS concerns.

D. The EMS Contractor shall provide an on-site, experienced project manager for this work who is responsible for direct supervision of the installation, start up and commissioning of the EMS system.

E. EMS Contractor shall have a proven record of successful native BACnet installations and maintenance of equivalent native BACnet systems for a minimum period of 5 years utilizing the same native BACnet manufacturer's product line that the Contractor proposes to use on this project.

F. Materials and equipment shall be manufacturer's latest standard design that complies with the specification requirements.

G. All BAS peer-to-peer network controllers, central system controllers and local user displays shall be UL Listed under Standard UL 916, category PAZX.

H. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference and be so labeled.

1.05 REFERENCE STANDARDS

A. The latest edition of the following standards and codes in effect and amended as of supplier's proposal date, and any applicable subsections thereof, shall govern design and selection of equipment and material supplied:
   1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
   2. ANSI/ASHRAE Standard 135-2008, BACnet.
   3. Uniform Building Code (UBC), including local amendments.
   4. UL 916 Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
   5. National Electrical Code (NEC).
   6. FCC Part 15, Subpart J, Class A.
   7. EMC Directive 89/336/EEC (European CE Mark).
   8. UL-864 UUKL listing for Smoke Controls for any equipment used in smoke control sequences.

B. City, county, state, and federal regulations and codes in effect as of contract date.

C. Except as otherwise indicated, the system supplier shall secure and pay for all permits, inspections, and certifications required for his work, and arrange for necessary approvals by the governing authorities.

1.06 SUBMITTALS

A. Drawings
   1. The system supplier shall submit engineered drawings, control sequence, and bill of materials for approval.
   2. Drawings shall be submitted in the following standard sizes: 11" x 17" (ANSI B).
   3. (8) complete sets (copies) of submittal drawings shall be provided.
   4. Drawings shall be available on CD-ROM.

B. System Documentation
   1. Include the following in submittal package:
      a. System configuration diagrams in simplified block format.
      b. All input/output object listings and an alarm point summary listing.
      c. Electrical drawings that show all system internal and external connection points, terminal block layouts, and terminal identification.
      d. Complete bill of materials, valve schedule and damper schedule.
      e. Manufacturer's instructions and drawings for installation, maintenance, and operation of all purchased items.
      f. Overall system operation and maintenance instructions—including preventive maintenance and troubleshooting instructions.
      g. For all system elements—operator's workstation(s), building controller(s), application controllers, routers, and repeaters—provide BACnet Protocol Implementation Conformance Statements (PICS) as per ANSI/ASHRAE Standard 135-2001.

h. Provide complete description and documentation of any proprietary (non-BACnet) services and/or objects used in the system.
i. A list of all functions available and a sample of function block programming that shall be part of delivered system.

1.07 WARRANTY

A. Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of 1-year from completion of system acceptance.

B. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the vendor.

C. This warranty shall apply equally to both hardware and software.

1.08 RELATED WORK IN OTHER SECTIONS

A. Refer to General and Supplemental Conditions and Division 01 sections for related contractual requirements.

B. Refer to Section 23 00 00 for General Mechanical Provisions.

C. Refer to Section 26 00 00 for General Electrical Provisions.

PART 2 PRODUCTS

2.01 ADVANCED WORKSTATION

A. General structure of workstation interaction shall be a standard client/server relationship. Server shall be used to archive data and store system database for the BACnet network as specified in these contract document Specifications and project Plan Drawings. Thick and Web Clients shall access server for all archived data. Server shall support a minimum of 20 simultaneous clients.

B. BACnet Conformance
1. Operator workstation shall be approved by the BTL as meeting the BACnet Advanced Workstation (AWS) requirements.
2. Please refer to Section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
3. Standard BACnet object types accessed by the workstation shall include as a minimum: Analog Value, Analog Input, Analog Output, Binary Value, Binary Input, Binary Output, Calendar, Device, Event Enrollment, File, Notification Class, Program, and Schedule object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
4. The AWS shall comply with Annex J of the BACnet specification for IP connections. Must support remote connection to server using a thick client application. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN. Must support interoperability on wide area networks (WANs) and campus area networks (CANs). Workstation shall support Foreign Device Registration to allow temporary workstation connection to IP network.

C. Data Displays
   1. Data displays shall render all data associated with project as called out on drawings and/or object type list supplied. Graphic files shall be created using digital, full color photographs of system installation, AutoCAD or Visio drawing files of field installation drawings and wiring diagrams from as-built drawings.
   2. Data displays shall render all data using iconic graphic representations of all mechanical equipment. System shall be capable of displaying graphic file, text, and dynamic object data together on each display and shall include animation. Information shall be labeled with descriptors and shall be shown with the appropriate engineering units. All information on any display shall be dynamically updated without any action by the user.
   3. Data display frame shall allow user to change all field-resident AWS functions associated with the project, such as setpoints, weekly schedules, exception schedules, etc., from any screen, no matter if that screen shows all text or a complete graphic display. This shall be done without any reference to object addresses or other numeric/mnemonic indications.
   4. Analog objects shall be displayed with operator modifiable units. Analog input objects may also be displayed as individual graphic items on the display screen as an overlay to the system graphic.
   5. All displays and programming shall be generated and customized by the local EMS Contractor. Systems requiring factory development of graphics or programming of DDC logic are specifically prohibited.
   6. AWS shall be supplied with a library of standard graphics, which may be used unaltered or modified by the operator. AWS shall include a library of equipment graphic components to assemble custom graphics. Systems that do not allow customization or creation of new graphic objects by the operator (or with third-party software) shall not be allowed.
   7. Data display frame shall include customizable and persistent tree navigation for building, equipment and system diagnostic centric display organization.
   8. Each display may be protected from viewing unless operator credentials have the appropriate access level. An access level may be assigned to each display and system object. The menu label shall not appear on the graphic if the operator does not have the appropriate security level.
   9. Data displays shall have the ability to link to content outside of the BAS system. Such content shall include but is not limited to: Launching external files in their native applications (for example, a Microsoft Word document) and launching a Web browser resolving to a specified Web address.
   10. Data displays shall support:
       a. Graphic items with custom geometry that offer both color gradient shading and variable opacity in scale to system variables and range set points.
       b. Clear and custom geometry navigation buttons to provide intuitive navigation.
       c. Graphic files in jpg, png, and .gif file types.
       d. Viewing of 1,024 system data points in a single screen.
   11. All graphical user interface screens developed for Thick or Web Client devices on this project shall be seamlessly integrated to the existing Alerton Ascent Compass Server PC by the EMS Contractor. Graphical user interface screens for this project requiring software enabling/support beyond Alerton Ascent Compass are specifically prohibited.
   12. EMS Contractor shall be solely responsible for seamlessly integrating all graphical user interface screens developed for Thick or Web Client devices on this project with the existing Alerton Ascent Compass Server PC.

D. Password Protection

1. Provide security system that prevents unauthorized use unless operator is logged on. Access shall be limited to operator's assigned functions when user is logged on. This includes displays as outlined above.
2. AWS shall provide security for a minimum of 200 users. Each user shall have an individual User ID, User Name, and Password. Entries are alphanumeric characters only and are case sensitive (except for User ID). User ID shall be 0–8 characters, User Name shall be 0–29 characters, and Password shall be 4–8 characters long.
3. Each user shall be allowed individual assignment of only those control functions, menu items, and user specific system start display, as well restricted access to *discrete BACnet devices* to which that user requires access.
4. All passwords, user names, and access assignments shall be adjustable online at the operator's terminal.
5. Users shall also have a set access level, which defines access to displays and individual objects the user may control. System shall include 10 separate and distinct access levels for assignment to users.
6. System shall include an Auto Logout Feature that shall automatically logout user when there has been no keyboard or mouse activity for a set period of time. Time period shall be adjustable by system administrator. Auto Logout may be enabled and disabled by system administrator. Operator terminal shall display message on screen that user is logged out after Auto Logout occurs.
7. The system shall permit the assignment of an effective date range, as well as an effective time of day, that the User IDs are permitted to authenticate.

E. Operator Activity Log
1. Operator Activity Log that tracks all operator changes and activities shall be included with AWS. System shall track what is changed in the system, who performed this change, date and time of system activity, and value of the change before and after operator activity. Operator shall be able to display all activity, sort the changes by user and also by operation. Operator shall be able to print the Operator Activity log display.
2. Log shall be gathered and archived to hard drive on AWS as needed. Operator shall be able to export data for display and sorting in a spreadsheet..

F. Scheduling
1. AWS and Web Client shall show all information in easy-to-read daily format including calendar of this month and next. All schedules shall show actual ON/OFF times for day based on scheduling priority. Priority for scheduling shall be events, holidays and daily, with events being the highest.
2. Holiday and special event schedules shall display data in calendar format. Operator shall be able to schedule holidays and special events directly from these calendars.
3. Operator shall be able to change all information for a given weekly or exception schedule if logged on with the appropriate access privileges.
4. AWS shall include a Schedule Wizard for set up of schedules. Wizard shall walk user through all steps necessary for schedule generation. Wizard shall have its own pull-down selection for startup or may be started by right-clicking on value displayed on graphic and then selecting Schedule.
5. Scheduling shall include optimum start based on outside air temperature, current heating/cooling setpoints, indoor temperature and history of previous starts. Each and every individual zone shall have optimum start time independently calculated based on all parameters listed. User shall input schedules to set time that occupied setpoint is to be attained. Optimum start feature shall calculate the startup time needed to match zone

temperature to setpoint. User shall be able to set a limit for the maximum startup time allowed.

6. Schedule list shall show all schedules currently defined. This list shall include all standard, holiday and event schedules. In addition, user shall be able to select a list that shows all scheduled points and zones.
7. Display of all three schedules must show all ON times for standard, holiday and event schedules in different colors on a given day. In addition, OFF times for each must also be shown in additional colors. User shall be able to select from standard calendar what days are to be scheduled and same display shall show all points and zones affected. User shall be able to set time for one day and select all days of the week that shall be affected as a recurrence of that same schedule for that given day.
8. Any displayed data that is changeable by the operator may be selected using the right mouse button and the schedule shall then be selectable on the screen. Selection of the schedule using this method shall allow the viewing of the assigned schedule allow the point to be scheduled.
9. Schedule editor shall support Drag-n-drop events and holidays onto the schedule calendar.
10. Schedule editor shall support Drag-n-drop events default to a 2hr period; which can then be adjusted by the user.
11. Schedule editor shall support Drag-n-drop holidays are defaulted for OFF all day and can be edited for multiple-day holidays.
12. Schedule editor shall support the View of affected zones when adding or editing timed events of a schedule.

G. Alarm Indication and Handling
1. AWS shall provide visual, printed, and email means of alarm indication. Printout of alarms shall be sent to the assigned terminal and port. Alarm notification can be filtered based on the User ID's authorization level.
2. Web client shall display a persistent alarm state for the system regardless of the data view including points in alarm but not acknowledged, and points that have gone into alarm and returned to normal without being acknowledged.
3. Alarm History shall provide log of alarm messages. Alarm log shall be archived to the hard disk of the AWS. Each entry shall include a description of the event-initiating object generating the alarm. Description shall be an alarm message of at least 256 characters in length. Entry shall include time and date of alarm occurrence, time and date of object state return to normal, time and date of alarm acknowledgment, and identification of operator acknowledging alarm.
4. Alarm messages shall be in user-definable text (English or other specified language) and shall be delivered either to the operator's terminal, client or through remote communication using email (Authenticated SMTP supported).
5. AWS shall include an Alarm Wizard for set up of alarms. Wizard shall walk user through all steps necessary for alarm generation. Wizard shall have its own pull-down selection for startup or may be started by right-clicking on value displayed on graphic and then selecting alarm setup.
6. AWS shall support color-coded indication of current alarms as follows:
    a. Red indicator shows number of active alarms that have not been acknowledged.
    b. Yellow indicator shows number of alarms that are still active but have been acknowledged.
    c. Blue indicator shows number of alarms that have returned to normal but have not been acknowledged.
    d. Color-coded indicators, when selected by the user, navigate to a pre-filtered view of Alarm History.

e. Alarm history can be filtered by color-coded indicator states.
7. Alarm annunciation includes navigation link to a user selected display or URL.
8. User can silence audible annunciation for the current session.
9. User can disable auto-refresh of alarm annunciation for current session.
10. Any displayed data that is changeable by the operator may be selected using the right mouse button and the alarm shall then be selectable on the screen. Selection of the alarm using this method shall allow the viewing of the alarm history or allow the creation of a new alarm.

H. Trendlog Information
1. AWS shall periodically gather historically recorded data stored in the building controllers and store the information in the system database. Stored records shall be appended with new sample data, allowing records to be accumulated. Systems that write over stored records shall not be allowed unless limited file size is specified. System database shall be capable of storing up to 50 million records before needing to archive data. Samples may be viewed at the web client. Operator shall be able to view all trended records, both stored and archived. All trendlog records shall be displayed in standard engineering units.
2. AWS shall be capable of trending on an interval determined by a polling rate, or change-of-value.
3. AWS shall be able to change Trendlog setup information. This includes the information to be logged as well as the interval at which it is to be logged. All operations shall be password protected. Viewing may be accessed directly from any and all graphics on which a trended object is displayed.
4. AWS shall include a Trendlog Wizard for setup of logs. Wizard shall walk user through all necessary steps. Wizard shall have its own pull-down selection for startup, or may be started by right-clicking on value displayed on graphic, and then selecting Trendlogs from the displayed menu.
5. AWS shall be capable of using Microsoft SQL as the system database.
6. Any displayed data that is changeable by the operator may be selected using the right mouse button and the trendlog shall then be selectable on the screen. Selection of the trendlog using this method shall allow the viewing of the trendlog view.
7. Trendlog viewer shall provide:
   a. Software that is capable of graphing the trend logged object data shall be included.
   b. Access and ability to create, edit and view are restricted to users by user account credentials
   c. Specific and repeatable URL defines the trendlog(s) that comprise the view
   d. Call out of trendlog value at intersection of trend line and mouse-over vertical axis.
   e. Trend log and companion logs can be configured to display on one of two independent vertical scales.
   f. Click zoom for control of data set viewed along either graph axis.
   g. User specifiable start and end dates as well as a fast scroll features that that supports click zoom of macro scale view of the data for quickly finding data set based on visual signature.
   h. User export of the viewed data set to MS Excel.
   i. Web browser based help
   j. Optional min/max ranges (Upper Control Limits, Lower Control Limits) for each value.

I. Energy Log Information – As Scheduled
1. AWS shall be capable of periodically gathering energy log data stored in the field equipment and archive the information. Archive files shall be appended with new data,

allowing data to be accumulated. Systems that write over archived data shall not be allowed unless limited file size is specified. Display all energy log information in standard engineering units.

2. All data shall be stored in database file format for direct use by third-party programs. Operation of system shall stay completely online during all graphing operations.
3. AWS Operator shall be able to change the energy log setup information as well. This includes the meters to be logged, meter pulse value, and the type of energy units to be logged. All meters monitored by the system may be logged. System shall support using flow and temperature sensors for BTU monitoring.
4. AWS shall display archived data in tabular format form for both consumption and peak values. Data shall be shown in hourly, daily, weekly, monthly and yearly formats. In each format, the user shall be able to select a specific period of data to view.

J. Demand Limiting – As Scheduled
1. AWS shall include demand limiting program that includes two types of load shedding. One type of load shedding shall shed/restore equipment in binary fashion based on energy usage when compared to shed and restore settings. The other type of shedding shall adjust operator selected control setpoints in an analog fashion based on energy usage when compared to shed and restore settings. Shedding may be implemented independently on each and every zone or piece of equipment connected to system.
2. Binary shedding shall include minimum of five (5) priority levels of equipment shedding. All loads in a given priority level shall be shed before any loads in a higher priority level are shed. Load shedding within a given priority level shall include two methods. In one, the loads shall be shed/restored in a "first off-first on" mode, and in the other the loads are just shed/restored in a "first off-last on" (linear) fashion.
3. Analog shed program shall generate a ramp that is independently used by each individual zone or individual control algorithm to raise the appropriate cooling setting and lower appropriate heating setting to reduce energy usage.
4. AWS shall be able to display the status of each and every load shed program. Status of each load assigned to an individual shed program shall be displayed along with English description of each load.

K. Tenant Activity – As Scheduled
1. AWS shall include program that monitors after-hours overrides by tenants, logs that data, and generates a bill based on usage and rate charged for each tenant space. Tenant Activity program shall be able to assign multiple zones, from a list of every zone connected to system, to a particular tenant. Every zone is monitored for after-hour override usage and that data logged in AWS. Operator may then generate a bill based on the usage for each tenant and the rate charged for any overtime use.
2. Configuration shall include entry of the following information for use in logging and billing:
    a. Tenant's contact name and address
    b. One or multiple tenant zones that make up a total tenant space, including a separate billing rate for each separate zone
    c. Minimum and maximum values an event duration and event limit
    d. Property management information
    e. Overall billing rate
    f. Seasonal adjustments or surcharge to billing rate
    g. Billing notification type such including, but not limited to printer, file and email
    h. Billing form template
3. Logging shall include recording the following information for each and every tenant event:

a. Zone description
b. Time the event begins
c. Total override time
d. Limits shall be applied to override time

4. A tenant bill shall be generated for a specific period using all the entered configuration data and the logged data. User with appropriate security level shall be able to view and override billing information. User shall be able to select a billing period to view and be able to delete events from billing and edit a selected tenant activity event's override time.

L. Reports
1. AWS shall be capable of periodically producing reports of trendlogs, alarm history, tenant activities, device summary, energy logs, and override points. The frequency, content, and delivery are to be user adjustable.
2. All reports shall be capable of being delivered in multiple formats including text- and comma-separated value (CSV) files. The files can be printed, emailed, or saved to a folder, either on the server hard drive or on any network drive location.

M. Configuration/Setup
1. Provide means for operator to display and change system configuration. This shall include, but not be limited to, system time, day of the week, date of daylight savings set forward/set back, printer termination, port addresses, modem port and speed, etc. Items shall be modified using understandable terminology with simple mouse/cursor key movements.

N. Field Engineering Tools
1. AWS shall include field engineering tools for programming all controllers supplied. All controllers shall be programmed using graphical tools that allow the user to connect function blocks on screen that provide sequencing of all control logic. Function blocks shall be represented by graphical displays that are easily identified and distinct from other types of blocks. Graphical programming that uses simple rectangles and squares is not acceptable.
2. User shall be able to select a graphical function block from menu and place on screen. Provide zoom in and zoom out capabilities. Function blocks shall be downloaded to controller without any reentry of data.
3. Programming tools shall include a real-time operation mode. Function blocks shall display real-time data and be animated to show status of data inputs and outputs when in real-time operation. Animation shall show change of status on logic devices and countdown of timer devices in graphical format.
4. Field engineering tools shall also include a database manager of applications that include logic files for controllers and associated graphics. Operator shall be able to select unit type, input/output configuration and other items that define unit to be controlled. Supply minimum of 250 applications as part of workstation software.
5. Field engineering tool shall include Device Manager for detection of devices connected anywhere on the BACnet network by scanning of the entire network. This function shall display device instance, network identification, model number, and description of connected devices. It shall record and display software file loaded into each controller. A copy of each file shall be stored on the computer's hard drive. If needed, this file shall be downloaded to the appropriate controller using the mouse.
6. AWS automatically notify the user when a device that is not in the database is added to the network.
7. AWS shall include backup/restore function that will back up entire system to selected medium and then restore system from that media. The system shall be capable of creating a backup for the purpose of instantiating a new client PC.

8. The system shall provide a means to scan, detect, interrogate, and edit third-party BACnet devices and BACnet objects within those devices.

O. Workstation Hardware – As Scheduled
1. Provide operator's workstation(s) at location(s) noted on the plans.
2. AWS Server
   a. 64-bit OS.
   b. Windows 7, Windows 8, Windows 10, Windows Server 2012.
   c. 2 GHz (or better), one or more dual-core or quad-core processors.
   d. 8 GB RAM or higher.
   e. 3 GB of hard drive space required for base installation without application data.
   f. Network interface card (10/100/1000 Mbps).

P. Software
1. At the conclusion of project, contractor shall leave with SSFUSD, a CD ROM that includes the complete software operation system and project graphics, setpoints, system parameters, etc. This backup shall allow SSFUSD to completely restore the system in the case of a computer malfunction.

Q. WEB Client
1. BAS supplier shall provide an HTML5 based browser access to the AWS as part of standard installation. User must be able to access all displays of real-time data that are part of the AWS using a standard Web browser. Web browser shall tie into the network through SSFUSD-supplied Ethernet network connection. The AWS must be able to support 20 concurrent web client users at a minimum.
2. Browser shall be standard version of Microsoft Internet Explorer v10.0 or later, Firefox v19.0 or later and Chrome v24.0 or later. No special vendor-supplied software shall be needed on computers running browser. Data shall be displayed in real-time and update automatically without user interaction.
3. Web pages shall be automatically generated using HTML 5 from the data display files that reside on the AWS. Any system that requires use of an HTML editor for generation of Web pages shall not be considered.
4. Access through web client or thick client shall utilize the same hierarchical security scheme as the AWS. User shall be asked to log on once the client makes connection to the AWS. Once the user logs in, any and all changes that are made shall be tracked by the AWS. The user shall be able to change only those items he or she has authority to change. A user activity report shall show any and all activity of the users who have logged in to the system, regardless of whether those changes were made using a web client, thick client or through the AWS.

2.02 CONTROL PROGRAMMING SOFTWARE

A. All DDC programming throughout the EMS network shall adhere to the following standards:
1. Programming on all controllers must be completely operator definable and modifiable and must use a single common programming language for all control devices. Use of pre-canned, factory burned-in DDC programming on controllers is not acceptable and is grounds for rejection of EMS system.
2. Programming shall be developed in an object-oriented graphical programming environment. Line by line code programming is specifically prohibited and is not acceptable.
3. Programming must accommodate all written sequences of operations.
4. Programming shall be modifiable from any server PC, operator console PC and/or portable laptop PC workstation without requiring the burning of new chips or having to directly

access the local controller. Software shall accommodate the downloading of programming via established network Ethernet or modem connections.

5. Programming must support the use of virtual software points in the same manner as all physical points are supported.
6. All programming points, virtual or real, for any specific device in the entire EMS network shall be accessible to all other network devices at any given time, regardless of physical location.
7. All programming shall adhere to the BACnet protocols for Standard Command Priorities.
8. Programming software must include a pre-developed cohesive PID (proportional-integral-derivative) algorithm whereby a user can adjust gain and anti-windup coefficients accordingly to effectively accomplish advanced sequence of operation requirements.

2.03 BUILDING (GLOBAL) CONTROLLER

A. General Requirements
   1. BACnet Conformance
      a. Building Controller shall be approved by the BTL as meeting the BACnet Building Controller requirements.
      b. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
   2. Building controller shall be of scalable design such that the number of trunks and protocols may be selected to fit the specific requirements of a given project.
   3. The controller shall be capable of panel-mounted on DIN rail and/or mounting screws.
   4. The controller shall be capable of providing global control strategies for the system based on information from any objects in the system, regardless if the object is directly monitored by the building controller module or by another controller.
   5. The controller shall be capable of running up to 6 independent control strategies simultaneously. The modification of one control strategy does not interrupt the function or runtime others.
   6. The software program implementing the DDC strategies shall be completely flexible and user-definable. All software tools necessary for programming shall be provided as part of project software. Any systems utilizing factory pre-programmed global strategies that cannot be modified by field personnel on-site, using a WAN or downloaded through remote communications are not acceptable. Changing global strategies using firmware changes is also unacceptable.
   7. Programming shall be object-oriented using control function blocks, and support DDC functions. All flowcharts shall be generated and automatically downloaded to controller. Programming tool shall be supplied and be resident on workstation. The same tool shall be used for all controllers.
   8. Programming tool shall provide means to graphically view inputs and outputs to each program block in real-time as program is executing. This function may be performed using the operator's workstation or field computer.
   9. Controller shall have 6000 Analog Values and 6000 Binary Values
   10. Controller IP configuration can be done via a direct USB connect with an operator's workstation or field computer.
   11. Controller shall have at a minimum a Quad Core 996Ghz processor to ensure fast processing speeds.

12. Global control algorithms and automated control functions shall execute using a 64-bit processor.
13. Controller shall have a minimum of 1 GB of DDR3 SDRAM on a 533Mhz bus to ensure high speed data recording, large data storage capacity and reliability.
14. Controller shall support two on-board EIA-485 ports capable of supporting various EIA-485 protocols including but not limited to BACnet MS/TP and Modbus.
    a. Ports are capable of supporting various EIA-485 protocols including but not limited to BACnet MS/TP and Modbus.
15. Controller shall support two gigabit speed Ethernet (10/100/1000) ports.
    a. Ports are capable of supporting various Ethernet protocols including but not limited to BACnet IP, FOX, and Modbus.
16. All ports shall be capable of having protocol(s) assigned to utilize the port's physical connection
17. The controller shall have at a minimum four onboard inputs, two universal inputs and two binary inputs.
18. Schedules
    a. Building controller modules shall provide normal seven-day scheduling, holiday scheduling and event scheduling.
    b. Each building controller shall support a minimum of 480 BACnet Schedule Objects and 480 BACnet Calendar Objects.
19. Logging Capabilities
    a. Each building controller shall log as minimum 1920 objects at 15 min intervals. Any object in the system (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
    b. Logs may be viewed both on-site or off-site using WAN or remote communication.
    c. Building controller shall periodically upload trended data to networked operator's workstation for long-term archiving if desired.
    d. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.
20. Alarm Generation
    a. Alarms may be generated within the system for any object change of value or state (either real or calculated). This includes things such as analog object value changes, binary object state changes, and various controller communication failures.
    b. Each alarm may be dialed out as noted elsewhere.
    c. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site using remote communications.
    d. Controller must be able to handle up to 1920 alarm setups stored as BACnet event enrollment objects, with system destination and actions individually configurable.
21. Demand Limiting
    a. Demand limiting of energy shall be a built-in, user-configurable function. Each controller module shall support shedding of up to 1200 loads using a minimum of two types of shed programs.
    b. Load shedding programs in building controller modules shall operate as defined in section 2.1.J of this specification.
22. Tenant Activity Logging
    a. Tenant Activity logging shall be supported by building controller module. Each independent module shall support a minimum of 480 zones.
    b. Tenant Activity logging shall function as defined in section 2.1.K of this specification.

B. BACnet MS/TP
    1. BACnet MS/TP LAN must be software-configurable from 9.6 to 115.4Kbps

a. Each BACnet MS/TP LAN shall support 64 BACnet devices at a minimum
b. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. BACnet IP
1. The building controller shall comply with Annex J of the BACnet specification for IP connections. This device shall use Ethernet to connect to the IP internetwork, while using the same Ethernet LAN for non-IP communications to other BACnet devices on the LAN.
2. Must support interoperability on WANs and CANs and function as a BACnet Broadcast Management Device (BBMD).
3. Each controller shall support at a minimum 128 BBMD entries
4. BBMD management architecture shall support 3000 subnets at a minimum
5. Shall support BACnet Network Address Translation
6. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

D. Expansion ports
1. Controller shall support two expansion ports.
   a. Combining the two on-board EIA-458 ports with fully loaded expansion ports the controller shall support 6 EIA-485 trunks simultaneously
2. Expansion cards that mate to the expansion ports shall include:
   a. Dual port EIA-485 card
   b. LON network card

E. Niagara framework
1. Controller shall utilize the Tridium Niagara Framework
   a. Niagara Framework shall be version 3.8 or newer
   b. All Niagara licensing shall be stored on a removable MicroSD card for fast in field replacement of controller
   c. The controller shall be programmable via Niagara Workplace programming tool.
   d. The controller shall be programmable via a Niagara embedded Workplace programming tool.

F. Power Supply
1. Input for power shall accept between 17–30VAC, 47–63Hz.
2. Optional rechargeable battery for shutdown of controller including storage of all data in flash memory
3. On-board capacitor will ensure continuous operation of real-time clocks for minimum of 14 days.

G. Controller shall be in compliance with the following
1. UL 916 for open energy management
2. FCC Class B
3. ROHS
4. IEC 60703
5. C-Tick Listed

H. Controller shall operate in the following environmental conditions:
1. -4° to 149°F without optional battery, or 32 to 122°F with optional battery
2. 0 to 95% RH, non-condensing.

2.04 ADVANCED APPLICATION CONTROLLERS

A. Provide one or more native BACnet advanced application controllers for HVAC equipment requiring DDC standalone control independent of building control module operation. All controllers shall interface to building controller through either MS/TP LAN using BACnet protocol, or Ethernet LAN using BACnet over Ethernet or BACnet TCP/IP. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of units. Controllers shall be fully programmable using graphical programming blocks. Programming tool shall be resident on operator workstation and be the same tool as used for the building controller. No auxiliary or non-BACnet controllers shall be used.

B. BACnet Conformance
   1. Application controllers shall be approved by the BTL as meeting the BACnet Advanced Application Controller requirements.
   2. Please refer to section 22.2, BACnet Functional Groups, in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
   3. Standard BACnet object types supported shall include, as a minimum, Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Multi-state Values, Device, File, and Program object types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 12-bit resolution that accept 3K and 10K thermistors, 0–10VDC, Platinum 1000 Ohm RTD, 0–5VDC, 4–20mA and dry contact signals. Any input on a controller may be either analog or digital with a minimum of (3) inputs that accept pulses. Controller shall also include support and modifiable programming for interface to intelligent room sensor with digital display. Controller shall include binary and analog outputs on board. Analog outputs with 12-bit resolution shall support either 0–10VDC or 0–20mA. Binary outputs shall have LED indication of status. Software shall include scaling features for analog outputs. Application controller shall include 20VDC voltage supply for use as power supply to external sensors.
   1. All outputs must have on-board Hand-Off-Auto (HOA) switches and a status indicator light. HOA switch position shall be monitored. Each analog output shall include a potentiometer for manually adjusting the output when the HOA switch is in the Hand position. The position of each and every HOA switch shall be available system wide as a BACnet object property.

D. All program sequences shall be stored on board application controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller up to 20 times per second (minimum of 10 times per second) and capable of multiple PID loops for control of multiple devices. All calculations shall be completed using floating-point math and system shall support display of all information in floating-point nomenclature at operator's terminal.
   1. The following control blocks shall be supported:
      a. Natural Log
      b. Exponential
      c. Log base 10
      d. X to the power of Y
      e. Nth square root of X

f. 5th Order Polynomial Equations
g. Astronomical Clock (sunrise/sunset calculation)
h. Time-based schedules

E. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely using modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using programming tools as described in operator's terminal section.

F. Application controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on intelligent room sensor shall be programmable at application controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode, based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent room sensor.

G. Schedules
1. The controller shall support a minimum of three (3) BACnet Schedule Objects and have a real-time clock on board with battery backup to maintain time through a power loss.

H. Logging Capabilities
1. Controller shall support a minimum of 50 trendlogs. Any object in the controller (real or calculated) may be logged. Sample time interval shall be adjustable at the operator's workstation.
2. Controller shall periodically upload trended data to system server for long-term archiving if desired. Archived data stored in (MS Jet Database or SQL) database form and shall be available for use in third-party spreadsheet or database programs.

I. Alarm Generation
1. Alarms may be generated within the controller for any object change of value or state (either real or calculated). This includes things such as analog object value changes, and binary object state changes.
2. Alarm log shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site using remote communications.
3. Controller must be able to handle up to 25 alarm setups stored as BACnet event enrollment objects, with system destination and actions individually configurable.

J. The controller processor shall be a 32-bit processor.

K. The packaging of the controller shall provide operable doors to cover the terminals once installation is complete. The housing of the controller shall provide for DIN rail mounting and also fully enclose circuit board.

2.05 APPLICATION SPECIFIC CONTROLLERS

A. Provide (1) native BACnet application controller for each piece of unitary mechanical equipment that adequately covers all objects listed in object list for unit. All controllers shall interface to building controller through MS/TP LAN using BACnet protocol. No gateways shall be used. Controllers shall include input, output and self-contained logic program as needed for complete control of unit.

B. BACnet Conformance
1. Application controllers shall, as a minimum, support MS/TP BACnet LAN types. They shall communicate directly using this BACnet LAN at 9.6, 19.2, 38.4 and 76.8 Kbps, as a native BACnet device. Application controllers shall be approved by the BTL as meeting the

BACnet Application Specific Controller requirements and support all BACnet services necessary to provide the following BACnet functional groups:
   a. Files Functional Group
   b. Reinitialize Functional Group
   c. Device Communications Functional Group
2. Please refer to Section 22.2, BACnet Functional Groups in the BACnet standard, for a complete list of the services that must be directly supported to provide each of the functional groups listed above. All proprietary services, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.
3. Standard BACnet object types supported shall include, as a minimum, Analog Input, Analog Output, Analog Value, Binary Input, Binary Output, Binary Value, Device, File, and Program Object Types. All proprietary object types, if used in the system, shall be thoroughly documented and provided as part of the submittal data. All necessary tools shall be supplied for working with proprietary information.

C. Application controllers shall include universal inputs with 10-bit resolution that can accept 3K and 10K thermistors, 0–5VDC, 4–20mA, dry contact signals and a minimum of three (3) pulse inputs. Any input on controller may be either analog or digital. Controller shall also include support and modifiable programming for interface to intelligent room sensor. Controller shall include binary outputs on board with analog outputs as needed.

D. All program sequences shall be stored on board controller in EEPROM. No batteries shall be needed to retain logic program. All program sequences shall be executed by controller 10 times per second and shall be capable of multiple PID loops for control of multiple devices. Programming of application controller shall be completely modifiable in the field over installed BACnet LANs or remotely through modem interface. Operator shall program logic sequences by graphically moving function blocks on screen and tying blocks together on screen. Application controller shall be programmed using same programming tools as building controller and as described in operator workstation section. All programming tools shall be provided and installed as part of system.

E. Application controller shall include support for intelligent room sensor (see Section 2.9.B.) Display on room sensor shall be programmable at controller and include an operating mode and a field service mode. All button functions and display data shall be programmable to show specific controller data in each mode based on which button is pressed on the sensor. See sequence of operation for specific display requirements at intelligent room sensor.

2.06 AUXILIARY CONTROL DEVICES

A. Temperature Sensors
   1. All temperature sensors to be solid-state electronic, interchangeable with housing appropriate for application. Wall sensors to be installed as indicated on drawings. Mount 48 inches above finished floor. Duct sensors to be installed such that the sensing element is in the main air stream. Immersion sensors to be installed in wells provided by control contractor, but installed by mechanical contractor. Immersion wells shall be filled with thermal compound before installation of immersion sensors. Outside air sensors shall be installed away from exhaust or relief vents, not in an outside air intake, and in a location that is in the shade most of the day.

B. Intelligent Room Sensor with LCD readout
   1. Hardware
      a. Room sensor shall include:
         1) Backlit touch screen LCD digital display

2) Temperature sensor
3) Humidity Sensor
4) Programmable Status Light indicator
5) CO2 Sensor (as scheduled on prints)

b. Temperature sensor shall be a Uni-Cuve Type II thermstor with an accuracy of +/- 0.36 °F at calibration point over the range of 32-158 °F or better.
c. Humidity sensor shall have an accuracy of +/-3% from 10-90% relative humidity or better.
d. The intelligent room sensor's Smart Light shall have a minimum of (4) colors (Blue, Red, Amber and Green) that will cast a glow onto the wall below the sensor to be used as visual indicator to the occupants of the condition of the system. The color and on/off state of smart light shall be fully programmable.
e. CO2 Sensor shall have an accuracy of +/- 30 ppm over the range of 0-5000 ppm or better.
f. CO2 sensor shall utilize Automatic Baseline Correction to maintain sensor calibration without need for manual calibration.
g. The user shall interact with the smart sensor using a touch screen, with no buttons allowed.
h. The intelligent room sensor shall have provisions for a tamper proof installation requiring tools to be removed from the wall.
i. The touch screen shall have a surface hardness of Mohs 7 or greater to prevent being easily scratched.
j. Controller shall function as room control unit and allow occupant to raise and lower setpoint, and activate terminal unit for override use—all within limits as programmed by building operator.

2. Display Content
   a. The intelligent room sensor shall simultaneously display room setpoint, room temperature, and outside temperature at each controller.
   b. The intelligent room sensor shall have the ability to add or remove from the display time-of-day, room humidity, and indoor air temp to customize the view for the customer.
   c. The intelligent room sensor must have the capability to show temperatures in degrees Fahrenheit or degrees Centigrade.
   d. A communication loss or improper communications wiring shall be displayed on the LCD screen to aid in trouble shooting.
   e. Information about the version of firmware shall be displayable on the LCD screen.
   f. A cleaning mode will be provided to allow for the touch screen to be cleaned without inadvertently making changes to system parameters.
   g. The intelligent room sensor shall have the ability to display the status of a lighting zone status and control the on/off state of the zone from the touch screen using a tenant accessible display page.
   h. The intelligent room sensor shall have the ability to display the status of a window zone (e.g. blinds) and control the on/off state of the zone from the touch screen using a tenant accessible display page.
3. After Hours Override shall:
   a. Override time may be set and viewed in 30 minute increments.
   b. Override time countdown shall be automatic, but may be reset to zero by occupant from the sensor.
   c. Time remaining shall be displayed.

d. Display shall show the word "OFF" in unoccupied mode unless a function button is pressed.

4. Other Modes
   a. The intelligent room sensor shall also allow service technician access to hidden functions for advanced system configuration. This functionality shall be accessed protected with a configurable pin number.
   b. Field service mode shall allow access to common parameters as dictated by the application's sequence of operations. The parameters shall be viewed and set from the intelligent room sensor with no computer or other field service tool needed.
   c. Balance mode shall, if intelligent room sensor is connected to VAV controller, allow a VAV box to be balanced and all air flow parameters viewed. The balancing parameters shall be viewed and set from the intelligent room sensor with no computer or other field service tool needed.
5. Intelligent Room Sensor shall be in compliance of the following:
   a. UL Standard for Safety 916
   b. FCC Part 15.107 & 109, Class B, CFR47-15
   c. EMC Directive 89/336/EEC (European CE Mark).

C. Wall Sensor
1. Standard wall sensor shall use solid-state sensor identical to intelligent room sensor and shall be packaged in aesthetically pleasing enclosure. Sensor shall provide override function, warmer/cooler lever for set point adjustment and port for plug-in of Field Service Tool for field adjustments. Override time shall be stored in controller and be adjustable on a zone-by-zone basis. Adjustment range for warmer/cooler lever shall also be stored in EEPROM on controller. All programmable variables shall be available to field service tool through wall sensor port.

2.07 ELECTRONIC ACTUATORS AND VALVES

A. Quality Assurance for Actuators and Valves
1. UL Listed Standard 873 and C.S.A. Class 4813 02 certified.
2. NEMA 2 rated enclosures for inside mounting, provide with weather shield for outside mounting.
3. 5-year manufacturer's warranty. 2-year unconditional and 3-year product defect from date of installation.

B. Execution Details for Actuators and Valves
1. VAV box damper and reheat valve actuation in addition to Fan Coil primary valve actuation shall be floating type or analog (2–10 VDC, 4–20 mA).
2. Primary valve control on Air Handling Units shall be analog (2–10 VDC, 4–20 mA).

C. Actuators for damper and control valves 0.5–6 inches shall be electric unless otherwise specified, provide actuators as follows:
1. UL Listed Standard 873 and Canadian Standards Association Class 481302 shall certify actuators.
2. NEMA 2 rated actuator enclosures for inside mounting. Use additional weather shield to protect actuator when mounted outside.
3. 5-year manufacturer's warranty. 2-year unconditional and 3-year product defect from date of installation.
4. Mechanical spring shall be provided when specified. Capacitors or other non-mechanical forms of fail-safe are not acceptable.

5. Position indicator device shall be installed and made visible to the exposed side of the actuator. For damper short shaft mounting, a separate indicator shall be provided to the exposed side of the actuator.
6. Overload Protection: Actuators shall provide protection against actuator burnout by using an internal current limiting circuit or digital motor rotation sensing circuit. Circuit shall insure that actuators cannot burn out due to stalled damper or mechanical and electrical paralleling. End switches to deactivate the actuator at the end of rotation are acceptable only for butterfly valve actuators.
7. A pushbutton gearbox release shall be provided for all non-spring actuators.
8. Modulating actuators shall be 24 VAC and consume 10 VA power or less.
9. Conduit connectors are required when specified and when code requires it.

D. Damper Actuators
1. Economizer actuators shall utilize analog control 2–10 VDC; floating control is not acceptable.
2. Electric damper actuators (including VAV box actuators) shall be direct shaft-mounted and use a V-bolt and toothed V-clamp causing a cold weld effect for positive gripping. Single bolt or set-screw type fasteners are not acceptable.
3. (1) electronic actuator shall be direct shaft-mounted per damper section. No connecting rods or jackshafts shall be needed. Small outside air and return air economizer dampers may be mechanically linked together if (1) actuator has sufficient torque to drive both and damper drive shafts are both horizontal installed.
4. Multi-section dampers with electric actuators shall be arranged so that each damper section operates individually. (1) electronic actuator shall be direct shaft-mounted per damper section. (See below execution section for more installation details.)

E. Valve Actuators 0.5 – 6 inches
1. All zone service actuators shall be non-spring return unless otherwise specified.
2. The valve actuator shall be capable of providing the minimum torque required for proper valve close-off for the required application.
3. All control valves actuators shall have an attached 3-foot cable for easy installation to a junction box.
4. Override handle and gearbox release shall be provided for all non-spring return valve actuators.

F. Control Valves 0.5 – 6 inches
1. The BAS contractor shall furnish all specified motorized control valves and actuators. BAS contractor shall furnish all control wiring to actuators. The plumbing contractor shall install all valves. Equal percentage control characteristic shall be provided for all water coil control valves. Linear valve characteristic is acceptable for 3-way valves that are 2.5 inches and above.
2. Characterized control valves shall be used for hydronic heating or cooling applications and small to medium AHU water-coil applications to 100GPM. Actuators are non-spring return for terminal unit coil control unless otherwise noted. If the coil is exposed to the outside air stream, see plans for spring return requirement.
    a. Leakage is 0% (zero percent), close-off is 200 psi, maximum differential is 30 psi; rangeablity is 500:1.
    b. Valves 0.5 – 2 inches shall be nickel-plated forged brass body, NPT screw type connections.
    c. Valves 0.5 – 1.25 inches shall be rated for ANSI Class 600 working pressure. Valves 1.5 and 2 inches shall be rated for ANSI Class 400 working pressure.
    d. The operating temperature range shall be 0–250° F.

e. Stainless steel ball and stem shall be furnished on all modulating valves.
f. Seats shall be fiberglass reinforced Teflon.
g. 2-way and 3-way valves shall have an equal percentage control port. Full stem rotation is required for maximum flow to insure stable BTU control of the coil.
h. 3-way valve shall be applicable for both mixing and diverting.
i. The characterizing disc is made of TEFZEL and shall be keyed and held secure by a retaining ring.
j. The valves shall have a blow-out proof stem design.
k. The stem packing shall consist of 92) lubricated O-rings designed for on-off or modulating service and require no maintenance.
l. The valves shall have an ISO type, 4-bolt flange for mounting actuator in any orientation parallel or perpendicular to the pipe.
m. A non-metallic thermal isolation adapter shall separate valve flange from actuator.
n. (1) fastening screw shall secure the direct coupling of the thermal isolation adapter between the actuator and the valve. This will prevent all lateral or rotational forces from affecting the stem and its packing O-rings.

3. Globe valves 0.5 – 2 inches shall be used for steam control or water flow applications.
   a. Valves shall be bronze body, NPT screw type, and shall be rated for ANSI Class 250 working pressure.
   b. Valves 0.5 inches (DN15) through 2 inches (DN50) with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (0.1%).
   c. The operating temperature range shall be 20–280 degrees F.
   d. Spring loaded TFE packing shall protect against leakage at the stem.
   e. 2-way valves shall have an equal percentage control port.
   f. 3-way valves shall have a linear control and bypass port.
   g. Mixing and diverting valves must be installed specific to the valve design.
4. Globe Valves 2.5 – 6 inches
   a. Valves 2.5 inches (DN65) through 6 inches (DN50) shall be iron body, 125 lb. flanged with Class III (0.1%) close-off leakage at 50 psi differential.
   b. Valves with spring return actuators shall close off against 50 psi pressure differential with Class III leakage (0.1%).
   c. Flow type for two-way valves shall be equal percentage. Flow type for three-way valves shall be linear.
   d. Mixing and diverting valves must be installed specific to the valve design.

G. Butterfly valves
1. Butterfly valves shall be sized for modulating service at 60–70 degree stem rotation. Isolation valves shall be line-size. Design velocity shall be less than 12 feet per second when used with standard EPDM seats.
   a. Body is cast iron.
   b. Disc is aluminum bronze standard.
   c. Seat is EPDM standard.
   d. Body Pressure is 200 psi, -30º– 275º F.
   e. Flange is ANSI 125/250.
   f. Media Temperature Range is -22 º– 240º F.
   g. Maximum Differential Pressure is 200 psi for 2- to 6- inch size.

H. Butterfly Valve Industrial Actuators
1. Actuators shall be approved under Canadian Standards Association or other Nationally Recognized Testing Laboratory to UL standards. CSA Class 4813 02 or equal. Enclosure shall be NEMA 4 (weatherproof) enclosure and will have an industrial quality coating.

a. Actuator shall have a motor rated for continuous duty. The motor shall be fractional horsepower; permanent split capacitor type designed to operate on a 120 VAC, 1pH, 60 Hz supply. Two (2) adjustable cam-actuated end travel limit switches shall be provided to control direction of travel. A self-resetting thermal switch shall be imbedded in the motor for overload protection.
b. Reduction gearing shall be designed to withstand the actual motor stall torque. Gears shall be hardened alloy steel, permanently lubricated. A self-locking gear assembly or a brake shall be supplied.
c. Actuator shall have a 6-foot wiring harness provided for ease in field wiring (above 1500 in-lbs). (2) adjustable SPDT cam-actuated auxiliary switches, rated at 250 VAC shall be provided for indication of open and closed position. Actuator shall have heater and thermostat to minimize condensation within the actuator housing.
d. Actuator shall be equipped with a hand wheel for manual override to permit operation of the valve in the event of electrical power failure or system malfunction. Hand wheel must be permanently attached to the actuator and when in manual operation electrical power to the actuator will be permanently interrupted. The hand wheel will not rotate while the actuator is electrically driven.
e. The actuator shall be analog, floating, or two position as called out in the control sequence of operation. All Analog valves shall be positive positioning, and respond to a 2–10 VDC, 4-20 mA, or adjustable signal as required. Analog actuators shall have a digital control card allowing any voltage input for control and any DC voltage feedback signal for position indication.

2. Performance Verification Test
   a. Control loops shall cause productive actuation with each movement of the actuator and actuators shall modulate at a rate that is stable and responsive. Actuator movement shall not occur before the effects of previous movement have affected the sensor.
   b. Actuator shall have capability of signaling a trouble alarm when the actuator Stop-Go Ratio exceeds 30%.
3. Actuator mounting for damper and valve arrangements shall comply with the following:
   a. Damper actuators shall not be installed in the air stream.
   b. A weather shield shall be used if actuators are located outside. For damper actuators, use clear plastic enclosure.
   c. Damper or valve actuator ambient temperature shall not exceed 122 degrees F through any combination of medium temperature or surrounding air. Appropriate air gaps, thermal isolation washers or spacers, standoff legs, or insulation shall be provided as necessary.
   d. Actuator cords or conduit shall incorporate a drip leg if condensation is possible. Water shall not be allowed to contact actuator or internal parts. Location of conduits in temperatures dropping below dew point shall be avoided to prevent water from condensing in conduit and running into actuator.
   e. Damper mounting arrangements shall comply to the following:
      1) The ventilation subcontractor shall furnish and install damper channel supports and sheet metal collars.
      2) No jack shafting of damper sections shall be allowed.
      3) Multi-section dampers shall be arranged so that each damper section operates individually. (1) electronic actuator shall be direct shaft mounted per section.
   f. Size damper sections based on actuator manufacturer's specific recommendations for face velocity, differential pressure and damper type. In general:
      1) Damper section shall not exceed 24 ft-sq. with face velocity >1500 FPM.

2) Damper section shall not exceed 18 ft-sq. with face velocity > 2500 FPM.
3) Damper section shall not exceed 13 ft-sq. with face velocity > 3000 FPM.

g. Multiple section dampers of (2) or more shall be arranged to allow actuators to be direct shaft mounted on the outside of the duct.

h. Multiple section dampers of three or more sections wide shall be arranged with a 3-sided vertical channel (8 inches wide by 6 inches deep) within the duct or fan housing and between adjacent damper sections. Vertical channel shall be anchored at the top and bottom to the fan housing or building structure for support. The sides of each damper frame shall be connected to the channels. Holes in the channel shall allow damper drive blade shafts to pass through channel for direct shaft-mounting of actuators. Open side of channel shall be faced downstream of the airflow, except for exhaust air dampers.

i. Multiple section dampers to be mounted flush within a wall or housing opening shall receive either vertical channel supports as described above or sheet metal standout collars. Sheet metal collars (12-inch minimum) shall bring each damper section out of the wall to allow direct shaft-mounting of the actuator on the side of the collar.

4. Valve Sizing for Water Coil
   a. On/Off control valves shall be line-size.
   b. Modulating control valve body size may be reduced, at most, two (2) pipe sizes from the line size or not less than half the pipe size. The BAS contractor shall size all water coil control valves for the application as follows:
      1) Booster-heat valves shall be sized not to exceed 4–9psi differential pressure. Size valve for 50% valve authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.
      2) Primary valves shall be sized not to exceed 5–15psi differential pressure. Size valve for 50% valve authority. Valve design pressure drop is equal to the sum of coil drop plus the balance valve drop.
      3) Butterfly valves shall be sized for modulating service at 60–70 degree rotation. Design velocity shall be 12 feet per second or less when used with standard EPDM seats.
   c. Valve mounting arrangements shall comply with the following:
      1) Unions shall be provided on all ports of two-way and three-way valves.
      2) Install three-way equal percentage characterized control valves in a mixing configuration with the "A" port piped to the coil.
      3) Install 2.5 inches and above, three-way globe valves, as manufactured for mixing or diverting service to the coil.

2.08 ENCLOSURES

A. All controllers, power supplies and relays shall be mounted in enclosures.

B. Enclosures may be NEMA 1 when located in a clean, dry, indoor environment. Indoor enclosures shall be NEMA 12 when installed in other than a clean environment. Outdoor enclosures must be either NEMA 3R or NEMA 4.

C. All temperature control panels shall be fabricated in a UL-listed panel shop. Field assembled temperature control panels are not allowed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this section may properly commence.

B. Notify the SSFUSD's representative in writing of conditions detrimental to the proper and timely completion of the work.

C. Do not begin work until all unsatisfactory conditions are resolved.

3.02 INSTALLATION (GENERAL)

A. Install in accordance with manufacturer's instructions.

B. Provide all miscellaneous devices, hardware, software, interconnections, installation, and programming required to ensure a complete operating system in accordance with the sequences of operation and point schedules.

3.03 LOCATION AND INSTALLATION OF COMPONENTS

A. Locate and install components for easy accessibility; in general, mount 48 inches above floor with minimum (3) feet of clear access space in front of units. Obtain approval on locations from SSFUSD's representative prior to installation.

B. All instruments, switches, transmitters, etc., shall be suitably wired and mounted to protect them from vibration, moisture, and high or low temperatures.

C. Identify all equipment and panels. Provide permanently mounted tags for all panels.

D. Provide stainless steel or brass thermowells suitable for respective application and for installation under other sections, and sized to suit pipe diameter without restricting flow.

3.04 INTERLOCKING AND CONTROL WIRING

A. Provide all interlock and control wiring associated with the EMS system. All wiring shall be installed neatly and professionally, in accordance with all national, state and local electrical codes.

B. Provide wiring as required by functions as specified and as recommended by equipment manufacturers, to serve specified control functions. Provide shielded low capacitance wire for all communications trunks.

C. Control wiring shall not be installed in power circuit raceways. Magnetic starters and disconnect switches shall not be used as junction boxes. Provide auxiliary junction boxes as required. Coordinate location and arrangement of all control equipment with the owner's representative prior to rough-in.

D. Provide auxiliary pilot duty relays on motor starters as required for control function.

E. Provide power for all control components from nearest electrical control panel or as indicated on the electrical drawings; coordinate with electrical contractor.

F. All control wiring in mechanical, electrical, telephone and boiler rooms to be installed in raceways. Exposed control wiring may be installed neatly and inconspicuously on top of ductwork or in drop ceilings if applicable, otherwise control wiring shall be installed in raceways.

3.05 DDC OBJECT TYPE SUMMARY

A. Provide all database generation.

B. Displays
   1. System displays shall show all analog and binary object types within the system. They shall be logically laid out for easy use by the owner. Provide outside air temperature indication on all system displays associated with economizer cycles.

C. Run Time Totalization
   1. At a minimum, run time totalization shall be incorporated for each monitored supply fan, return fan, exhaust fan, hot water and chilled water pumps. Warning limits for each point shall be entered for alarm and or maintenance purposes.

D. Trendlog
   1. All binary and analog object types (including zones) shall have the capability to be automatically trended.

E. Alarm
   1. All analog inputs (High/Low Limits) and selected binary input alarm points shall be prioritized and routed (locally or remotely) with alarm message per owner's requirements.

F. Database Save
   1. Provide backup database for all standalone application controllers on disk.

3.06 FIELD SERVICES

A. Prepare and start logic control system under provisions of this section.

B. Start up and commission systems. Allow sufficient time for startup and commissioning prior to placing control systems in permanent operation.

C. Provide the capability for off-site monitoring at control contractor's local or main office. At a minimum, off-site facility shall be capable of system diagnostics and software download. SSFUSD shall provide phone line for this service for (1) year or as specified.

D. Provide SSFUSD's representative with spare parts list. Identify equipment critical to maintaining the integrity of the operating system.

3.07 TRAINING

A. Provide application engineer to instruct SSFUSD in operation of systems and equipment.

B. Provide system operator’s training to include (but not be limited to) such items as the following: modification of data displays, alarm and status descriptors, requesting data, execution of commands and request of logs. Provide this training to a minimum of (3) persons.

C. Provide on-site training above as required, up to 8 hours, as part of this contract.

3.08 DEMONSTRATION

A. Demonstrate complete operating system to SSFUSD's representative.

B. Provide certificate stating that control system has been tested and adjusted for proper operation.

END OF SECTION

SECTION 26 05 00
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the Electrical Work as shown on the drawings and as specified hereinafter, including, but not limited to the following:
   1. Electrical service provisions as outlined on the drawings, including temporary power for construction.
   2. Distribution panel, panels, transformers, and feeders.
   3. Branch circuit wiring, wiring devices and connections to all equipment requiring electrical service.
   4. Lighting fixtures completely lamped, including switches, raceways and wiring.
   5. Emergency egress/exit illumination system.
   6. Telecommunications system.
   7. Fire Alarm system.
   8. Mechanical equipment power connections, and motor starters where noted.
   9. Low voltage lighting control system and programming.
   10. Clock, Speaker, and IP Telephone system.
   11. Classroom Audio-visual system, including all conduit, wiring, outlets, speakers, and devices.
   12. All required incidental work, such as roof flashing, electrical testing, title 24 acceptance testing, and temporary power.
   13. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.
   14. It is the intent of the drawings and specifications that systems be complete and, except as otherwise noted, be ready for operation.

1.02 RELATED WORK

A. Division 1 - General Requirements

B. Division 9 - Finishes

C. Division 23 - Mechanical

D. Section 07270 - Firestopping

1.03 INCORPORATED DOCUMENTS

A. Requirements of the General Conditions, Supplementary Conditions, and Division 1 Sections apply to all work in this Section, unless modified herein.

B. Published specifications, standard tests or recommended methods of trade, industry or government organizations apply to work of this Section where cited by abbreviations noted below, unless modified herein.
   1. 2016 California Code of Regulations.
   2. 2016 California Building Standards Administrative Code, Part 1, Title 24, C.C.R.
   3. 2016 California Building Code (CBC), Part 2, Title 24, C.C.R..
   4. 2016 California Electrical Code (CEC), Part 3, Title 24, C.C.R.

5. 2016 California Mechanical Code (CMC), Part 4, Title 24, C.C.R.
6. 2016 California Plumbing Code (CPC), Part 5, Title 24, C.C.R.
7. California Energy Code, Part 6, Title 24, C.C.R.
8. 2016 California Fire Code (CFC), Part 9, Title 24, C.C.R.
9. 2016 California Green Building Standards (CALGreen) Code, Part 11.
10. American Society of Civil Engineers 7-10 (ASCE/SEI), Minimum Design Loads for Buildings and Other Structures.
11. Underwriters' Laboratories, Inc. (UL).
12. Local Utility Company regulations.

C. All State and Municipal Codes and Ordinances.

1.04 CONDITIONS AT SITE:

A. Visit to site is required of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.

B. Lines of other services that are damaged as a result of this work shall promptly be repaired at no expense to the Owner to the complete satisfaction of the Owner.

1.05 QUALITY ASSURANCE

A. Conformance:
1. All work shall conform to the applicable requirements of Article 1.3 above.
2. The Contractor shall notify the Architect, prior to submission of bid, about any part of the design, which fails to comply with abovementioned requirements.
3. If after contract is awarded, minor changes and additions are required by aforementioned authorities, even though such work is not shown on drawings or covered in the specifications, they shall be included at Contractor's expense.

B. Coordination:
1. The Contractor shall become familiar with the conditions at the job site, and with the drawings and specifications and plan the installation of the electrical work to conform with the existing conditions and that shown and specified so as to provide the best possible assembly of the combined work of all trades.
2. The Contractor shall work out in advance all "tight" conditions, involving all trades and if found necessary, supplementary drawings shall be prepared by this Contractor, for the Architect's approval, before work proceeds in these areas. No additional costs will be considered for work, which must be relocated due to conflicts with the work of other trades.
3. The Contractor shall coordinate and verify all backbox, device, lighting fixture, or equipment mounting requirements with the devices or equipment to be installed, prior to rough in.

1.06 SUBMITTALS

A. Product Data:
1. Comply with the provisions of Section 01 33 00 - Submittals.
2. Within 15 days after award of the Contract, submit:

a. Complete electrical, lighting, and signal systems material list of all items proposed to be furnished and installed under this Division. Provide manufacturers data sheets for all devices, raceways, fixtures, equipment, and related products to be used for the Division 26, 27, and 28 work.
b. Manufacturers' specifications and other data required demonstrating compliance with the specified requirements.
c. Manufacturers' recommended installation procedures which, when approved by the Architect, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.

3. Shop Drawings: Furnish shop drawings and/or equipment cuts for the following:
   a. Light fixtures including lamps and ballasts
   b. Panel boards, and transformers. Panel board submittals shall include diagrams of the circuit breaker arrangements in the panels. Arrange circuit breakers in panels exactly as shown on the panel schedules in the construction documents.
   c. Fire alarm system
   d. Clock system
   e. Telecommunications system
   f. Disconnect switches
   g. Motor starters
   h. Low voltage lighting control system
4. Test Reports:
   a. Factory Tests: As specified for specific equipment.
   b. Field Tests: Performance tests as specified for specific equipment.
   c. Megger Tests: As specified under TESTING.
   d. When series rated circuit breakers are used, provide a letter from the manufacturer of the equipment confirming that U.L. series rating exists for all protective devices. State the available fault current from the Utility Company and indicate that the overcurrent devices exceed the available fault current at the respective point of protection.
   e. Special Seismic Certification documentation as per CBC Section 1616A and ASCE/SEI 7-10 requirements for all equipment defined as 'critical' with an importance factor of 1.5 in Paragraph 1.10.M.3 of this Section.
   f. Manufacturer's Seismic Certification or Project-Specific Design of Supports and Attachments for all other equipment and fixtures as per CBC Section 1616A and ASCE/SEI 7-10 requirements.
5. Maintenance and Operating Manuals:
   a. Systems Description: Description of operating procedures.
   b. Controls: Diagrams and description of operation of each system.
   c. Equipment: Manufacturer's brochures, ratings, certified shop drawings, maintenance data, and parts lists with part numbers. Mark each sheet with equipment identification number and actual installed condition.
   d. Materials and Accessories: Manufacturer's brochures, parts lists with part numbers, and maintenance data where applicable. Mark each sheet with identification number of system and location of installation.

e. The Maintenance and Operation Manual shall be presented in a three ring binder that has tabbed sections as stated below. Provide all information in each section as stated below.
   1) 26 2400:
      (a) Insert the approved submittals for the panelboards.
      (b) Provide the names, addresses and telephone numbers of the manufacturer and the two closest manufacturer's representatives of the equipment.
   2) 26 5101:
      (a) Insert the approved submittals for the light fixtures.
      (b) Highlight the lamp type that was installed for each light fixture.
      (c) Provide the names, address and telephone numbers of the manufacturer and the closest manufacturer's representative for each light fixture.
   3) 26 5101:
      (a) Insert the approved submittals for the motion sensing light control equipment.
      (b) Insert all operating instructions.
      (c) Provide the names, address and telephone number of the manufacturer and the closest manufacturer's representative of the equipment.
      (d) Include the manufacturer's recommended maintenance of the equipment.
   4) 26 5700:
      (a) Insert the approved submittals for the low voltage lighting control equipment.
      (b) Insert all operating instructions.
      (c) Provide the names, address and telephone number of the manufacturer and the closest manufacturer's representative of the equipment.
      (d) Include the manufacturer's recommended maintenance of the equipment.
   5) 27 0000:
      (a) Insert the approved submittals for the telephone/data system.
      (b) Provide the names, address and telephone number of the manufacturer and the closest manufacturer's representative of the equipment.
      (c) Include the manufacturer's recommended maintenance of the equipment.
   6) 28 3101:
      (a) Complete the "Record Of Completion" entirely.
      (b) In the "Download File" indicate the exact equipment that the Monitor Modules are monitoring. i.e. fire sprinkler flow switches, tamper switches, etc..
      (c) Simplify the Download File so that it coincides with the submitted and approved fire alarm single line diagram.

(d) Provide the names, address and telephone number of the manufacturer and the closest manufacturer's representative of the equipment.
(e) Include the manufacturer's recommended maintenance of the equipment.
(f) Insert an abbreviated data sheet that states how to test, reset and silence the fire alarm system.
(g) Insert the name and telephone number of the Central Station that receives the alarms, and the proper sequence to follow during an alarm.

7) 26 0800:
(a) Insert all feeder and data system testing results.

8) 27 5102:
(a) Insert the approved submittals for the clock and speaker system and equipment.
(b) Insert all operating instructions.
(c) Provide the names, address and telephone numbers of the manufacturer, the closest manufacturer's representative of the equipment and the telephone company contact.
(d) Include the manufacturer's recommended maintenance of the equipment including the UPS.

6. Record Documents: "As-builts": As specified under Paragraph 3.2 of this Section.

1.07 DELIVERY, STORAGE AND HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all trades.

B. Delivery and Storage: Deliver all materials to the job site in their original containers with all labels intact and legible at time of use. Store in strict accordance with approved manufacturers' recommendations.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

D. This Contractor shall personally, or through an authorized representative, check all materials upon receipt at jobsite for conformance with approved shop drawings and/or plans and specifications.

1.08 SCHEDULING/SEQUENCING

A. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet the construction schedule, together with any special handling charges, shall be borne by this Contractor.

B. The Contractor shall coordinate production and delivery schedule for all Owner-supplied equipment with the equipment suppliers to ensure that all Owner-supplied equipment is delivered to site in coordination with the construction

schedule and in such a manner as to cause no delays in completion of the Contract as scheduled.

1.09 REQUIREMENTS

A. The contract drawings indicate the extent and general arrangements of the conduit wiring systems, etc. If any departures from the contract drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted as soon as practicable, and within thirty-five (35) days after award of the electrical contract.

B. Unless material list and data is received as a complete and all inclusive submittal within the stipulated time all items shall be provided as specified, with no deviations permitted.

C. Any and all additional costs incurred by the substitution of electrical material or equipment, or installation thereof, whether architectural, structural, plumbing, mechanical or electrical, shall be borne by the Contractor under this Section.

D. Burden of proof of equality of any substitution for a specified product is the responsibility of this Contractor.

E. Where required by Architect to ascertain equality of substitute product, Contractor may be requested to provide the specified item and the submitted substitution for comparison, at no additional cost to the Owner.

1.10 SEISMIC CERTIFICATION AND INSTALLATION OF EQUIPMENT

A. See Architectural and Structural Drawings and Specifications for description of Occupancy Group and Seismic Design Category applicable to this project.

B. Provide Special Seismic Certification per CBC Section 1616A and ASCE/SEI 7-10 for all equipment and components defined as critical with an importance factor 1.5 in Paragraph 1.10.M.3 of this Section.

C. Special Seismic Certification shall require either certification through approved analytical method or approved shake table testing in accordance with Section 13.2.5 of ASCE/SEI 7-10 or experience data in accordance with Section 13.2.6 of ASCE/SEI 7-10.

D. Manufacturer's Seismic Certification or Project-Specific Design of Supports and Attachments for all other equipment and fixtures as per CBC Section 1616A and ASCE/SEI 7-10 requirements.

E. Provide seismic restraints per applicable code and as specified or indicated. Design restraints to prevent permanent displacement in any direction caused by lateral motion, overturning, or uplift.

F. Rigidly Supported Equipment, Conduits, and Raceways.

G. Lighting:
   1. Fasten lighting fixtures in suspended ceilings to ceiling grid system or otherwise support from the structures as specified herein and as per details indicated on the Drawings. Comply with National Electric Code (NEC) Article 410.
   2. Suspension systems for light fixtures shall allow fixtures to swing a minimum of 45 degrees from the vertical in all directions without contacting obstructions.

3. Free-swinging suspension systems shall have a safety wire or cable attached to the fixture and structure at each support. The wire shall be capable of supporting four times the weight of the lights.
4. Point-source fixtures: provide slack wires to structure at two diagonal corners.
5. Troffer fixtures: provide hold-down clip at each fixture corner, and slack wires to structure at two diagonal corners.
6. Supports for pendants: Provide diagonal seismic wire restraints per Code.

H. Components supported by chains or simply suspended from above are not required to meet lateral seismic force requirements and seismic relative displacement requirements provided that they cannot be damaged or cannot damage any other component when subject to seismic motion. They must have ductile or articulating connections to the structure at the point of attachment.

I. Electrical Cabinets:
1. Electrical cabinet design shall conform to National Electrical Manufacturers Association (NEMA) 250 and NEMA ICS6 standards. Cutouts in the lower shear panel that do not appear to have been made by the manufacturer and significantly reduce the strength of the cabinet are not permitted unless analysis demonstrates that the remaining strength is sufficient.
2. Single freestanding cabinets shall have a minimum of four anchor bolts designed and specified with one anchor located at each corner.
3. Multiple sections of cabinets or enclosures located adjacent to each other shall be bolted together. Minimum acceptable bolting is three bolts in the front and back along the adjacent vertical faces - 6 bolts total.
4. Multiple cabinets bolted together to form a section or line-up shall have at a minimum two anchors specified for each cabinet, one at the front and one at the rear.
5. Base anchorage shall be installed through anchor points designated by the Manufacturer. The largest bolt diameter for the anchor hole provided in the equipment shall be provided.
6. A latch or fastener to prevent opening during an earthquake event and damaging the cabinet and internal components shall secure all doors.
7. Slide-out components in electrical control panels, etc., shall have a latching mechanism to hold contents in place.
8. Attached cabling shall have adequate slack or flexibility between the cabinets and surrounding structure supporting the conduit to preclude severing of the cabling due to differential seismic displacements.

J. The design load shall include the effects of loading on the equipment imposed by attached utility or service lines that are also attached to separate structures.

K. The attachment of additional external items is not permitted unless such items have either been provided by the Manufacturer, or analysis shows that their effects are supported by design.

L. Conduit and their connections shall be constructed of ductile materials unless otherwise approved by the Architect. Conduits and their connections constructed of non-ductile materials (e.g., cast iron, no-hub pipe and plastic) shall have brace lengths reduced to one-half that allowed for ductile material.

1. All trapeze assemblies supporting conduit shall be braced to resist CBC design forces considering the total weight of the elements on the trapeze.
2. Seismic restraint spacing shall be in accordance with hanger spacing.

M. Critical Equipment:
1. Design with importance factor of 1.5.
2. Provide Special Seismic Certification for all equipment and components and their installation per CBC and ASCE/SEI requirements.
3. Critical Equipment shall include the following:
   a. Fire Alarm system equipment.
   b. Lighting System Inverter.
   c. Distribution Panels, Panels, and Transformers on Emergency Power.
   d. Telecommunications System Racks and Cabinets

N. Seismic Design Submittals: For all Critical Equipment included in paragraph 26 05 00.1.10.M.3.
1. The Manufacturer of each item of critical equipment shall arrange for the testing or analysis by an approved agency of each component and assembly and its mounting system or anchorage.
2. The Manufacturer shall submit a Certificate of Compliance for each item for approval by the Architect and by the Authority Having Jurisdiction.
3. Based on Manufacturer's approved submittal, Contractor shall retain the services of a State of California registered Structural Engineer to prepare final installation details and drawings for equipment supports and attachments.
4. Submit drawings of the equipment showing dimensions, support equipment, connections, and the proper anchorage locations.
5. Equipment weight and weight distribution (e.g., center of gravity in elevation and plan).
6. Thickness of sheet metal bases.
7. Seismic Vibration Isolation Devices: Manufacturer's product information indicating class and type. Indicate load ratings as published manufacturer's data or shop drawings. Indicate proper orientation of devices on plan.
8. Inertia bases and support frames.
9. Specific details of restraints including anchor bolts and welds and maximum load at each location.

O. Independent Supports: An independent means of secure support shall be provided for all wiring methods in non-fire-rated assemblies. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means.

1.11 DESCRIPTION OF WORK

A. This project involves the renovation of an existing building. As such, the project scope for this contractor will include all associated electrical, lighting, and signal system upgrades and demolition/removal work at the existing site. The intent is that all systems will be complete and functional at the completion of this contract and that all old systems, equipment, feeders, circuits, wiring, and related devices (no longer used) be completely and neatly removed. Where discrepancies between the drawings and

existing conditions are noted, the project manager shall be notified immediately for resolution.

B. As with every renovation project, the electrical work will include (and require) exploration and other field work on a daily basis to complete the new designed equipment and connections within the constraints of the existing building and existing site conditions.

C. The contractor shall include as part of the base bid, sufficient labor hours to provide such exploration and field work throughout the duration of the project. Change orders for misc. coordination of existing conditions will not be approved unless specific and latent conditions are uncovered that warrant such additional compensation or require additional work not shown on the plans or implied by the designed conditions.

D. New raceways and wiring to new and renovated equipment are to be installed unless otherwise noted. Where raceways are installed in accessible concealed locations (i.e. unfinished spaces or electrical / mechanical / attic spaces), EMT with wire shall be used. Where new wiring is required to be routed through existing walls and ceilings that can not easilly be accessible for new conduit, MC cable or flex conduit and wiring may be installed, fished through and secured in each space as required by code. Non-metallic sheathed cable shall not be utilized on this project.

E. All new raceways shall be installed concealed and all new equipment installed flush, unless otherwise noted on the plans or in these specifications.

1.12 GUARANTEE

A. This Contractor shall guarantee that all work executed under this Section will be free from defects of materials and workmanship for a period of one (1) year or as per the General Conditions of this project, whichever is longer. Dates shall be from the date of final acceptance of the building. The contractor shall further guarantee that he will, at his own expense, repair and replace all such defective work, and all other work damaged thereby, which becomes defective during the term of the guarantee. Such repair or replacement shall be guaranteed for one (1) year from the date of repair or replacement.

1.13 PERMITS AND INSPECTIONS

A. This Contractor shall arrange for and obtain all required inspections.

B. Do not allow or cause any of the work to be covered or enclosed until it has been tested and/or inspected.

1.14 IDENTIFICATION

A. Switchboards, feeder circuit breakers in switchboards, panels, disconnect switches, motor starters, transformers, motor disconnect switches, cabinets, and other apparatus used for the operation of, or control of circuits, appliances or equipment, shall be properly identified by means of engraved laminated plastic descriptive nameplates mounted on apparatus using stainless steel screws. Nameplates shall have white letters with black background and be submitted to the Architect for approval. Cardholders in any form are not acceptable.

B. Provide p-touch style labeling of circuit designations for all receptacles on the project.

C. Each branch circuit of panel boards to have a permanently fixed number with load directory, mounted under celluloid on inside of cabinet door, showing circuit numbers and typewritten description of equipment supplied by breakers.

D. Provide label on all motors: "Caution. Automatic equipment. May start at any time."

E. Provide silk-screened or engraved identification labels on all switch box covers identifying specific loads that are not readily apparent to the user, including electroshades, projection screens, exhaust fans, etc.. Submit proposed labels to Architect for approval prior to manufacture of labels.

F. Provide identification of all pull boxes, junction boxes, and conduit stub-ups on the project as outlined below:
   1. For Power Feeders:
      a. Stencil cover with identifying circuit number.
      b. Lettering 1" high.
      c. Color of lettering black.
      d. Place lettering on cover in neat manner; run parallel to long sides of box.
   2. For branch circuits, grounding, communication, signal, and control systems boxes and blank conduit stub-outs:
      a. Paint inside back of each j-box, front of each cover, and ends of each blank conduit stub-out with identifying system color as listed below:

1)	120/208-volt	Blue
2)	Telephone/Data	Grey
3)	Ground system	Green
4)	Clock	Brown
5)	Fire Alarm	Red
6)	Audio/Visual	Yellow
7)	Security	White
8)	Lighting control	Orange/White

PART 2 - PRODUCTS

2.01 GENERAL

A. Refer to applicable Division 26, 27, and 28 Sections for complete products specifications.

2.02 MATERIALS

A. Materials of the same type or classification, used for the same purpose, shall be the product of the same manufacturer.

2.03 ACCEPTABLE MANUFACTURERS

A. Materials shall be of make mentioned elsewhere in this specification. All materials shall be the best of their several kinds, perfectly new and approved by the Underwriters' Laboratories.

B. Where material, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish standards of desired quality, style and utility and shall be the basis of the bid. Materials so specified shall be furnished under the contract unless changed by written

approval of the Architect. Where two or more designations are listed, choice shall be optional with this Contractor, but this Contractor must submit his choice for final approval.

2.04 POSTED OPERATING INSTRUCTIONS

A. Furnish approved operating instructions for systems and equipment where indicated in the technical sections for use by operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions as directed. Attach or post operating instructions adjacent to each principal system and equipment including startup, proper adjustment, operating, lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each system or equipment. Provide weather-resistant materials or weatherproof enclosures for operating instruction exposed to the weather. Operating instruction shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

2.05 CATALOGED PRODUCTS/SERVICE AVAILABILITY

A. Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The 2-year period shall be satisfactorily completed by a product for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished. The equipment items shall be supported by service organizations which are reasonable convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which the work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Drawings:
   1. The general arrangement and location of wiring and equipment is shown on the electrical drawings and shall be installed in accordance therewith, except for minor changes required by conflict with the work of other trades.
   2. The Contractor shall coordinate and verify all backbox, device, lighting fixture, or equipment mounting requirements with the devices or equipment to be installed, prior to rough in.
   3. Drawings indicate the circuit and panel which supplies each device or fixture. Provide and install conduit and conductors to make all connections from panel to

nearest device and from first device to additional devices on same circuit. Conduit size and fill shall satisfy NEC requirements. Two or three different phases supplied by a 3-phase panel may share a single neutral only if circuit positions are adjacent in the panel. Do not exceed 4 #12 or 3 #10 conductors in a ½" conduit, 7 #12 or 5 #10 in a 3/4" conduit, and 11 #12 or 9 #10 in a 1" conduit, unless otherwise noted. Provide common handle-tie on breakers for multi-wire branch circuits (with common neutral), per NEC. If more than three current carrying conductors are installed in one conduit, conductor size shall be increased as required per NEC. Do not share neutrals for branch circuit runs to electronic equipment or where noted on the drawings.

4. Drawings indicate the location of all light switches. Where fixtures in a room are controlled by more than one switch, the same lower case letter is drawn adjacent to a switch and each fixture controlled by that switch. Where no lower case letter is adjacent to a switch, all fixtures in the room are controlled by that switch. Provide and install conduit and wire from fixture to switch and between fixtures as required to accomplish switching shown. Do not route branch circuit wiring for light fixtures through switch boxes.
5. Drawings indicate location of all signal outlet boxes. Provide and install conduit system as required as required and complete system wiring, unless otherwise noted.
6. Control wiring is generally not shown on the plans. Contractor shall refer to control diagrams and provide and install all wiring and raceways required to make all interconnections.
7. All branch circuit wiring No. 12 or No. 10 as noted, all control wiring No. 14, except as noted next to "slash marks" on drawings, or as noted under "Wire," as specified herein.
8. All dimensions, together with locations of doors, partitions, etc. are to be taken from the Architectural Drawings, verified at site by this Contractor.
9. Maintain "as-built" records at all times, showing the exact location of concealed conduits and feeders installed under this contract, and actual numbering of each circuit. Upon completion of work and before acceptance can be considered, this Contractor must forward to the Architect, updated CAD plans, corrected to show the electrical work as actually installed.
10. Branch circuit conductors shall be #12 minimum and #10 minimum for runs longer than 150 feet.

B. Measurements: Before ordering any material or closing in any work, verify all measurements on the job. Any differences found between dimensions on the drawings and actual measurements shall be brought to the Architect's attention for consideration before proceeding.

3.03 FIELD QUALITY CONTROL

A. All workmanship shall be first class and carried out in a manner satisfactory to and approved by the Architect.

B. This Contractor shall personally, or through an authorized and competent representative, constantly supervise the work and so far as possible keep the same foreman and workmen on the job throughout.

3.04 COORDINATION

A. In electrical rooms, where electrical equipment is located at walls with brace framing, provide and install steel channel supports for mounting of electrical equipment away from wall to avoid conflict with brace framing. Steel channel supports shall be unistrut or equal, and shall include all channels, bases, fittings, etc., as required for a complete installation.

B. In electrical rooms, Contractor is responsible for installation of electrical equipment within the space provided. Contractor shall provide ¼" scale plans of electrical room layouts, and elevations of steel channel supports (where used or required) of electrical equipment for review and approval prior to any installation or rough-in

3.05 INSTALLATION/APPLICATION/ERECTION

A. All electrical raceways and devices shall be installed concealed (for raceways) and/or flush mounted (for devices), unless otherwise noted. Provide cut-in boxes and "fish" flexible MC or flex conduit and wire through existing walls to remain, unless shown otherwise on plans. Cut and patch to facilitate such installation to match adjacent and original finish.

B. All cutting, repairing and structural reinforcing for the installation of this work shall be done by the General Contractor in conformance with the Architect's requirements.

3.06 EMERGENCY POWER SOURCES

A. All emergency source circuits shall be installed in separate raceways (from normal power), per 2014 NEC 700.10(B), or the applicable code at the time of permitting.

3.07 TEMPORARY LIGHTING AND POWER

A. Provide and install temporary lighting and power systems for the duration of construction, of adequate size to accommodate the required lighting and power loads. Coordinate with other trades to insure adequate sizing.

B. Provide distribution equipment as required to support all construction activities.

3.08 FIRE STOPPING AND FIRE RATED PENETRATIONS

A. All electrical equipment mounted in, on, or through fire rated construction shall be installed to maintain the fire rating of the construction.

B. Provide fire rated pads (or other suitable assembly) around all electrical junction boxes in fire rated walls/ceilings/floors to maintain the fire rating.

C. Provide fire rated construction around all recessed light fixtures and/or panel board / cabinets mounted flush in fire rated walls to maintain the fire rating. Coordinate depth of construction with other trades to avoid conflicts.

D. Conduit sleeves shall be provided as a means of routing cables through fire-rated walls or floors. Openings in sleeves and conduits used for system cables and those which remain (empty) spare shall be sealed with an approved fireproof, removable sagging material. Sleeves which pass vertically from floor to floor shall be sealed in a similar manner using an approved re-enterable system. Additional penetrations through rated assemblies necessary for passage of tel/data wiring shall be made using an approved method and permanently sealed after installation of cables.

3.09 ADJUSTING AND CLEANING

A. All electrical equipment, including existing equipment not "finish painted" under other sections, shall be touched up where finished surface is marred or damaged.

B. All equipment, lighting fixtures, etc., shall be left in clean condition, with all shipping and otherwise unnecessary labels removed there from.

3.10 SCHEDULES

A. Coordination: Coordinate installation of electrical items with the schedule for other work to prevent unnecessary delays in the total Work.

3.11 WARNING SIGN MOUNTING

A. Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

3.12 PAINTING OF EQUIPMENT

A. Factory Applied: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test, except equipment specified to meet requirements of ANSI C37.20 shall have a finish as specified in ANSI C37.20.

B. Field Applied: Paint electrical equipment as required to match finish or meet safety criteria. Painting shall be as specified in the respective equipment section.

3.13 TESTS

A. Testing and inspection: See Section 26 08 00 - Testing.

END OF SECTION

SECTION 26 08 00
TESTING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Work Included in This Section: All materials, labor, equipment, services, and incidentals necessary to perform the testing and inspection of the electrical work, including but not limited to the general systems noted below:
   1. Grounding System.
   2. Lighting System.
   3. Distribution System.
   4. Fire Alarm System.
   5. Clock, Speaker, Telephone System.
   6. Lighting control system.
   7. Lighting emergency inverter system
   8. Telephone and Data Wiring Systems
   9. Classroom AV System.
   10. Title 24 Acceptance Testing

B. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.

C. All work shall comply with Sections 26 05 00 and 26 27 00.

D. In addition to the general system tests and inspections indicated above, the Contractor shall retain the services of a recognized corporately and financially independent testing firm (Emerson Network Power or equal) for the purpose of performing the following inspections and tests. The testing firm shall provide all material, equipment, labor, and technical supervision to perform such tests and inspections:
   1. System Grounding.
   2. Switchgear, Distribution Panels, Panelboards.
   3. Feeders.

E. The purpose of these tests is to assure that all tested electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.

1.02 APPLICABLE CODES, STANDARDS, AND REFERENCES

A. All inspections and tests shall be in accordance with the International Electrical Testing Association - Acceptance Testing Specifications ATS-2013 (referred to herein as NETA ATS-2013).

1.03 QUALIFICATIONS

A. Qualifications of the Testing Firm shall be as listed in NETA ATS-2013.

PART 2 - PRODUCTS

2.01 THIS ARTICLE DOES NOT APPLY TO TESTING.

PART 3 - EXECUTION

3.01 GENERAL

A. Final test and inspection to be conducted in presence of the Authority having Jurisdiction (AHJ) or Inspector of Record (IOR). Test shall be conducted at the expense of, and managed by, the Contractor, at a mutually agreed time. Submit written test report of all tests, with test result values and overall outcome.

B. All portions of the electrical installation shall be inspected and tested to ensure safety to building occupants, operating personnel, conformity to code authorities and Contract Documents, and for proper system operation.

3.02 INSPECTIONS AND TESTS

A. Tests: Field tests shall be performed and reports submitted, as per Section 26 05 00, Part 1.
   1. Final Inspection Certificates: Prior to final payment approval, deliver to the Owner, with a copy to the Architect, signed certificates of final inspection by the appropriate local authority having jurisdiction.

B. Grounding System:
   1. All ground connections shall be checked and the entire system shall be checked for continuity. The resistance of grounding electrodes in the system shall be measured using a 3 point fall-of-potential method. The maximum ground resistance shall be three ohms. If the measured ground resistance exceeds three ohms, install an additional ground rod, bonded and interconnected with the grounding electrode system.
   2. Ground tests shall meet or exceed the requirements of the National Electric Code.

C. Lighting Systems:
   1. The interior and exterior lighting systems shall be checked for proper local controls and operation of entire installation, including the operation of the low voltage lighting control system.

D. Power Distribution System:
   1. Test main switchboard, distribution boards, panel boards, and transformers for grounds and shorts with mains disconnected from feeders, branch circuits connected and circuit breakers closed, all fixtures in place and permanently connected and grounding jumper to neutral lifted and with all wall switches closed.
   2. Test each individual circuit at each panelboard with equipment connected for proper operation. Inspect the interior of each panel.
   3. Check verification of color coding, tagging, numbering, and splice make-up.
   4. Verify that all conductors associated with each circuit are in same conduit.
   5. Demonstrate that all lights, jacks, switches, outlets, and equipment operate satisfactorily and as called for.
   6. Test proper functioning of the ground fault protective system(s).

7. Perform megger tests of all distribution system feeders prior to energizing. All Cables failing megger tests or with evidence of damage shall be removed and replaced in their entirety (no splices), at no cost to the Owner. Damaged cables may not be field repaired without specific approval of the Architect.

E. Fire Alarm System: Verify that all equipment, components, and devices function as specified. Refer to Section 28 3101 for additional testing requirements.

F. Clock/Bell / Telephone System: Verify that all equipment, components, and devices function as specified. Refer to Section 27 5100 for additional testing requirements.

G. Lighting Control System: Verify that all equipment, components, and devices function as specified. Refer to Section 26 5101 for additional testing requirements.

H. Telephone and Data Wiring Systems: Verify that all equipment, components, and devices function as specified. Refer to Section 27 0000 for additional testing requirements.

I. Classroom AV System: Verify and test all equipment, components, and devices for proper operation and function. Refer to Section 27 4100 for additional testing requirements.

J. Title 24 Acceptance Testing: Contractor shall complete the requirements for Title 24 Acceptance Testing, as per CA Title 24, Part 6.
   1. Perform testing requirements as per Title 24 Lighting Acceptance requirements. Testing shall include construction inspection of installed controls, occupancy / motion sensor testing, manual daylighting controls testing, automatic time switch controls testing, and demand response system interface, as applicable.
   2. Complete and submit all required forms for complete Acceptance Testing.
   3. Obtain required review and approval of Acceptance Forms to allow final certificate of occupancy to be granted.

END OF SECTION

SECTION 26 27 00
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the electrical work as shown on the drawings and as specified hereinafter, including but not limited to the work listed below:
   1. Raceways, feeders, branch circuit wiring, wiring devices, safety switches and connections to all equipment requiring electric service.

B. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.

C. All work shall comply with Section 26 05 00.

1.02 RELATED WORK

A. Division 09 - Finishes

B. Division 23 - Motors and Mechanical Equipment Installation

1.03 SUBMITTALS

A. Comply with the provisions of Section 26 05 00.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Refer to Section 26 05 00, Basic Electrical Requirements, Part 2 - Products.

B. List of Equipment Manufacturers:

Conduit and Conduit Fittings

Allied Tube and Conduit, Wester Tube and Conduit, LTV Steel Tubular, National Electric Products, AFC, Republic Steel Corporation, Rome Cable Corporation, United States Steel Corporation, Killark Electric Manufacting Company, Raco, VAW Aluminum Company, Bridgeport, Steel City, Thomas & Betts, Carlon, O.Z. Gedney, Appleton, Regal.

Wire and Cable (600V)

American Wire Company, General Wire and Cable Corporation, Okonite Company, Rome Cable Corporation, Cerrowire, American Insulated Wire, AFC Cable Systems, Essex, Simplex Wire and Cable Company, Southwire.

Solderless Lugs and Grounding Connections

Burndy Engineering Company Inc, O.Z. Gedney Company Inc, Penn Union Electric Corporation, Thomas and Betts Company Inc.

Pull Boxes, Gutters, Special Cabinets

Square D Company, Columbia Electric Manufacturing Company, General Electric Company, Westinghouse Electric Corporation, Circle Awalt.

Outlet Boxes

Appleton Electric Company, Killark Electric Manufacturing Company, Lew Electric Fittings Company, National Electric Products Corporation, Raco, Steel City Electric Company, Carlon, Bowers.

Wiring Devices

Leviton, Arrow-Hart, Cooper, Hubbell, Lutron, Bryant.

Conduit Racks, Hangers

General Electric Company, Killark Electric Manufacturing Company, Caddy, National Electric Products Corporation, Republic Steel Corporation, Rome Cable Corporation, United States Steel Corporation, VAW Aluminum Company, Superstrut, B-Line.

Safety Switches (Disconnect and Fusible)

Square D Company, Cutler Hammer Inc, General Electric Company, Westinghouse Electric Corporation.

Fuses

Bussman Manufacturing Company, Chase-Shawmut Company.

Firestopping

3M, Nelson.

2.02 MATERIALS

A. Raceways: Only the raceways specified below shall be utilized on this project. Substitutions shall be pre-approved in writing. All bare conduit ends (stub-ups or stub-outs) shall be provided with bushed ends or manufactured insulated throat connectors:
   1. Rigid Type - hot dip galvanized or sherardized steel, use on all exterior locations, below grade or in concrete slab, and to 18" on either side of structural expansion joints in floor slabs, with completely watertight, threaded fittings throughout. Compression fittings are not acceptable.
      a. All rigid steel conduit couplings and elbows in soil or concrete or under membrane to be ½ lap wrapped with Scotch #50 tape and threaded ends coated with T&B #S.C.40 rust inhibitor prior to installation of couplings.
      b. ½ lap wrapp all rigid steel conduit stub-ups from slab or grade to 6" above finished grade level with Scotch #50 tape.

2. In lieu of rigid steel conduit for power and control raceways and branch circuit conduits in soil or concrete slabs, "Schedule 40" PVC with Schedule 80 PVC conduit elbows and stub-ups may be used with code size (minimum No. 12) ground wire. A "stub-up" is considered to terminate 6" above the finished surface.
   a. Schedule 80 PVC conduit shall be used in all concrete footings or foundations and to 18" of either side of footings or foundation walls.
   b. Schedule 80 PVC conduit shall be used in all concrete masonry unit (CMU) walls or columns.
   c. All conduit runs in concrete floor slabs (where allowed) shall be installed to comply with all applicable UBC and structural codes to maintain the structural integrity of the floor slab. Where conflicts occur, alternate routing shall be provided at no additional cost to the Owner.
   d. Where schedule 80 PVC is coupled to schedule 40 or other raceways with differing interior dimensions, each end shall be reamed with a reaming tool to reduce the edge profile for protection of the passing conductors during the pull.
3. Intermediate metal conduit may be used in all exposed interior locations, except that electrical metallic tubing may be used in some locations as noted below. Utilize steel compression type fittings for all exposed conduit runs, unless otherwise noted. Cast fittings are unacceptable.
4. Electrical metallic tubing shall be used exposed in interior electrical and mechanical rooms, in interior unfinished spaces, and in interior concealed and furred spaces, made up with steel watertight or steel set screw type fittings and couplings. EMT shall not be used in under-building crawl spaces or other areas subject to moisture. Set screws shall have hardened points. Cast fittings are unacceptable.
5. Surface mounted rectangular steel raceways and boxes; use for all surface mounted installations, unless otherwise noted (all catalog numbers listed are Wiremold - equals allowed) – color Ivory, unless otherwise noted;
   a. #V500 for branch power runs on ceilings and walls (used with V500 series straps, elbows, connectors and V5000 series low profile boxes and covers).
   b. #2000 or 2400 low profile for larger power run requirements on ceiling or walls (used with V2000 series straps, elbows, connectors and low profile boxes and covers).
   c. #2400D for dual service power and tel/data run requirements (used with divided V2400 boxes and covers).
6. Surface mounted rectangular non-metallic dual service raceways; Wiremold #5400 (Ivory) or equal with all required compatible activation covers, bezels, inserts, and blank plates for a complete installation. Refer to drawings for outlet quantities in raceway and feed points. All raceway fed flush from rear with horizontal j-boxes, unless otherwise noted.
7. Use flexible conduit for all motor, transformer and recessed fixture connections, minimum ½"; "Seal tite" type used outdoors and in all wet locations, provide with code size (minimum No. 12) bare ground wire in all flexible conduit.

8. All conduit cuts (factory or field cut) shall be perfectly square to the length of the conduit and cut ends shall be reamed with a reaming tool to provide a smooth edge to the passing conductors and to remove all burs and scrapes. Use of a hand file is not acceptable.
9. All electrical raceways shall be installed concealed, unless otherwise noted. Cut and patch to facilitate such installation to match adjacent and original finish. All exposed conduits, where required, shall be installed parallel to building members.
10. All emergency source circuits shall be installed in separate raceways (from normal power), per 2014 NEC 700.10(B), or the applicable code at the time of permitting.
11. Where existing conditions preclude the installation of EMT in existing walls to remain, provide and install cut-in type boxes and "fish" flexible MC or flex conduit and wire through existing walls to remain, unless shown otherwise on plans.
12. Fasten conduits securely to boxes with locknuts and bushings to provide good electrical continuity.
13. Provide chrome escutcheon plates at all exposed wall, ceiling and floor conduit penetrations.
14. Support individual suspended conduits with heavy malleable strap or rod hangers; supports for ½ inch or 3/4 inch conduit placed on maximum 7-foot centers; maximum 10-foot centers on conduits 1 inch or larger.
15. Support multiple conduit runs from Kindorf B907 channels with C-105 and C-106 straps.
16. Conduit bends - long radius.
17. Flash conduits through roof, using approved roof jack; coordinate with General Contractor.
18. To facilitate pulling of feeder conductors, install junction boxes as shown or required.
19. All empty conduits on the project shall be provided with a nylon pull rope to allow pulling of future conductors intended for the specific raceway. Provide plastic wire-tie style nameplate tags on each end of pull rope with printed identification of conduit use and the location of the opposite end of the rope. Pull ropes for telephone and cable tv service conduits shall meet the respective utility company requirements.
20. Where conduits pass through structural expansion joints in floor slab, rigid galvanized conduit shall be used 18" on either side of joint, complete with Appleton expansion couplings and bonding jumpers, or equal. All above grade expansion joint crossings shall also utilize expansion joint couplings or flex conduit transitions as required for each particular installation. Installed condition shall allow for a minimum deflection of raceway and wire (in any direction) equal to the structural expansion joint dimension (building to building). No solid conduits shall be allowed to cross expansion joints without proper provisions for building and seismic movement.
21. Minimum cover of conduits in ground outside of building - 36 inches, unless otherwise noted.

22. Provide and install exterior wall conduit seals and cable seals in the locations listed below. Coordinate installation and scheduling with other trades:
    a. Conduit seals through exterior wall or slab (below grade): O.Z. Gedney series "FSK" in new cast in concrete locations, series "CSM" in cored locations.
    b. Conduit seals through exterior wall or slab (above grade): O.Z. Gedney series "CSMI."
    c. Cable seals at first interior conduit termination after entry through exterior wall or slab: O.Z. Gedney series "CSBI." Coordinate quantity of conductors at each location.

B. Outlet Boxes and Junction Boxes. Verify all backbox requirements with devices to be installed prior to rough-in.
1. One piece steel knockout type drawn boxes, unless otherwise noted, sized as required for conditions at each outlet or as noted.
2. Flush-mounted boxes equipped with galvanized steel raised covers for device mounting flush with finished surface. Provide extension rings as required on all acoustical or additional wall treatment areas to bring top of cover flush with finished surface (coordinate with architectural drawings). Devices shall be capable of being tightly mounted to boxes without distorting or bending device or mounting hardware.
3. Boxes for fixture outlets: 4-inch octagon or larger as required, or as noted.
4. Switch and receptacle outlets - not smaller than 4-inch-square in furred walls, with raised cover for single device; ganged where required.
5. Outlet and switch boxes for wet locations, cast aluminum FS or FD type with cast aluminum gasketed spring lid cover. Weatherproof "Bell" type boxes are not acceptable.
6. All connectors from conduit to junction or outlet boxes shall have insulated throats. Connectors shall be manufactured with insulated throats as integral part. Insertable insulated throats are unacceptable.
7. Outlet boxes for cable TV, telephone, 4" square or larger as required or noted, multi-ganged for telephone, data, and other services where indicated on the drawings.
8. Conduit Bodies: Malleable iron type, with lubricated spring steel clips over edge of conduit body, O-Z/Gedney type EW, or equal.
9. Pull boxes: All site pull boxes shall be flush in-ground concrete, with engraved covers identifying service use (i.e. electrical, communications, etc.). Boxes shall be Nema 250, Type 6, outside flanged, with recessed cover for flush mounting, by Christy or equal, with required depth to provide box and conduit depths shown or required.
    a. Provide concrete covers for all boxes in planted or paved areas (up to available concrete cover size).
    b. Provide galvanized steel covers for all larger boxes (when concrete is not available), or in traffic areas. No cast iron covers.
    c. Provide bolted covers and slab bottoms (with grouted perimeter) or vault type boxes for all electrical distribution and signal system pull boxes used for site distribution, to prevent rodent entry. No colar type boxes with dirt or gravel bottoms

d. Provide drain hole at bottom of all vault type boxes, with loose aggregate base below, for proper drainage.
e. All covers to be completely flush with finished adjacent surfaces.
f. Provide galvanized steel H20 rated covers and installation of box rated for H20 in all traffic areas.
g. Provide pullboxes per utility company specifications for all electrical primary and secondary services and for cable TV and telephone service runs. Verify exact size and type prior to order with each utility company.

C. Wire and Cable (line voltage and signal systems):
1. 600-volt class where used for or run with line voltage power wiring, insulation color coded, minimum No. 12 awg for power branch circuits, No. 14 for power control circuits, and wiring size and type as directed by signal system manufacturer for each signal system.
2. All conductors shall be copper.
3. Size and insulation type:
a. Standard locations: #12 to #1 AWG: THWN for wet locations and THHN for dry locations. #1/0 through #4/0 AWG: XHHW (55 Mils). 250MCM and larger: XHHW (65 Mils). All wire sizes used shall be based on a 75 degree insulation rating, unless specifically used with 90 degree rated breakers and devices.
b. All wiring (power and signal) installed underground between buildings, or in wet or damp locations, shall be outside listed and rated for wet locations.
c. High temperature and non-standard locations: Provide wire type and insulation category suitable for area of use as defined in NEC table 310-13.
4. Conductors No. 8 and larger and as otherwise noted on drawings shall be stranded. Conductors No. 10 and smaller shall be solid.
5. Provide signal system wiring for each system to meet the system manufacturers requirements and recommendations for each device or equipment type. Signal wiring systems shall be provided with shielding and/or insulation type and cable quantities as directed by the manufacturer, and meet all NEC requirements for locations used.
6. Install all wiring branch circuits and feeders (low voltage and line voltage) in conduit unless noted otherwise in the drawings. Contractor shall mandrel all feeders and pass a "sock" (or utilize other suitable means) through each raceway prior to pull to remove all water and construction debris. All raceways shall be completely clear of any obstructions or debris and all cut ends shall be reamed, prior to pull. Utilize pulling compound on all runs to insure minimum friction and pulling tension.
7. Megger test all feeders prior to energizing. See section 26 08 00 for additional information.
8. Approximately balance branch circuits about the neutral conductors in panels.
9. Connections to devices from "thru-feed" branch circuit conductors to be made with pigtails, with no interruption of the branch circuit conductors.
10. Neutral conductor identified by white outer braid, with different tracers of "EZ" numbering tags used where more than one neutral conductor is contained in a single raceway.

11. Neatly arrange and "marlin" wires in panels and distribution panelboards with "T and B Ty-rap" or approved equal plastic type strapping.
12. All wire and cable shall bear the Underwriters' Label, brought to the job in unbroken packages; wire color-coded as follows:

Voltage	Phasing	A	B	C	N
120/208	3PH4W	Black	Red	Blue	White

13. The equipment grounding conductor shall be insulated copper; where it is insulated, the insulation shall be colored green.
14. Label each wire of each electrical system in each pull box, junction box, outlet box, terminal cabinet, and panelboard in which it appears with "EZ" numbering tags indicating the connected circuit numbers.
15. Properly identify the "high leg" of 4-wire delta connected systems (in each accessible location) as required by NEC 110.15 and 230-56.
16. Provide permanently affixed adhesive labels with machine printed lettering (min. 1/8" high) at junction boxes serving fixtures that are supplied by (2) electrical sources (i.e. normal and emergency lighting). Label to read "CAUTION - This light fixture is powered by (2) separate sources. The normal power source breaker and the emergency power source breaker must be turned off before servicing this light fixture."
17. Install feeder cables in one continuous section unless splices are approved by Architect. Exercise care in pulling to avoid damage or disarrangement of conductors, using approved grips. No cable shall be bent to smaller radius than the spool on which it was delivered from the manufacturer. Color code feeder cables at terminals. Provide identifying linen tags in each pullbox.
18. Metal-clad cable, (MC) may be used in lieu of conduit and wire at concealed locations for final branch runs to devices on same circuit only. MC cable may not be used for multi-circuit branch circuit homeruns or feeders. Provide conduit and wire homeruns and feeders.
    a. The conductors shall be soft drawn annealed copper, solid or stranded as stated above. Insulation shall be type THHN. Conductors shall be cabled with fillers, taped wrapped with overall seamless corrugated aluminum sheath.
    b. Cables shall be 3 or 4 conductor type with parity sized ground wire.

D. Switches: Model numbers are Hubbell, color to be selected by architect, unless otherwise noted. All switches to utilize screw terminals for wire connections - no plug-in terminations:
1. Single Pole - No. HBL1221
2. Two Pole - No. HBL1222
3. Three Way - No. HBL1223
4. Momentary contact - No. HBL1557
5. Momentary contact Keyed - No. HBL1556L
6. Keyed, - No. HBL1221L
7. Pilot Light (on with load on) - Hubbell No. 1221-PLC
8. Motor Rated Double Pole (30A) - Hubbell No. 7832
9. Motor Rated Three Pole (30A) - Hubbell No. 7810.

10. Low voltage Data line switches - Refer to lighting control system (for compatability)

E. Receptacles: Mounting straps and contacts shall be one piece design, constructed of minimum .050" solid brass. Base shall be high strength, heat resistant, glass reinforced nylon. Device shall accept up to #10 wire, side or back wired with screw terminals - no plug-in terminations. Hubbell, Leviton, Pass & Seymore, or equal. Color to be selected by architect, unless otherwise noted. Numbers listed below are Hubbell:
   1. 15A 3PG 125 volt duplex - No. HBL5262
   2. 20A 3PG 125 volt duplex - No. HBL5362
   3. 20A 3PG 125 volt ground fault interrupter receptacle; GFI receptacles shall conform to the 2006 UL requirements to a) interrupt power to the unit in the event of internal failure, or b) provide an audible or visual indication of internal failure of the GFI; No. GF20 or equal. Through wiring to down stream GFI designated receptacles is not acceptable.
   4. 15A 3PG 125 volt half controlled duplex receptacle - No. BR15C1(color), with premanent "controlled" marking, factory applied.
   5. 20A 3PG 125 volt half controlled duplex receptacle - No. BR20C1(color), with premanent "controlled" marking, factory applied.
   6. 15A 3PG 125 volt full controlled duplex receptacle - No. BR15C2(color), with premanent "controlled" marking, factory applied.
   7. 20A 3PG 125 volt full controlled duplex receptacle - No. BR20C2(color), with premanent "controlled" marking, factory applied.
   8. GFI Module (blank face), no indicator light, 20A – No. GFBF20 or equal.
   9. All receptacles located in exterior or wet locations shall be corrosion resistant with UV stabalized body.

F. Plates: Leviton, or equal, except as noted:
   1. The color of all faceplates shall match the color of the devices installed under/in the faceplate, except as specifically noted otherwise.
   2. For flush outlet boxes, for switches, and receptacles: nylon, color to be selected by architect, unless otherwise noted.
   3. Plates for surface-mounted outlets: galvanized steel unless otherwise noted.
   4. Weatherproof duplex receptacle plates for exterior locations with ground fault interrupter receptacles in type FS or FD boxes – Hubbell #WPFS26 or compatible equal. Verify cover compatibility with box type and device installed.
   5. Weatherproof "in-use" cover, vertical or horizontal mount, for exterior with GFCI receptacles. Die-cast metal alloy, TayMac MX series or equal with openings to match installed devices.
   6. Locking plates for duplex receptacles where noted; Pass & Seymour #WP26-L (non weather proof).
   7. Locking plates for duplex exterior GFCI receptacles (or in wet or damp locations); Heavy duty cast aluminum flush cover with locking latch and key, Pass & Seymour #4600 with appropriate mounting plate for type of device installed. Coordinate backbox requirements and finished wall trim-out with wall installer prior to rough-in to insure an adequate and neat trim appearance upon completion.

8. Plates for flush telephone / data boxes: white nylon or as otherwise directed - provide and install at each telephone /data outlet plate to match duplex power outlet plate, for jack installation by others. Where the power and telephone / data outlet boxes are shared the plate shall be continuous in multi-gang locations. See drawings.

G. Equipment Disconnects: All disconnects shall be located to allow proper code required clearance in each area. Locations shown on drawings are diagrammatic only. The contractor shall coordinate exact locations in the field (with other trades) prior to rough-in to insure proper clearances.
   1. Motor Disconnect Switches and Safety Switches: General Electric Company Heavy Duty Type "THD", cover interlocked with operating handle so that cover cannot be opened with switch in closed position and switch cannot be closed with cover in open position. 240V or 480V rating, single or multi-pole as required or as noted on drawings, in Nema 1 enclosure indoors or Nema 3R enclosure outdoors unless otherwise noted. Provide dual element motor circuit fuses sized as recommended by equipment manufacturer (for final equipment actually installed).
   2. Code required disconnects: Provide a local disconnect in addition to the branch circuit protection device for all equipment as required by code (whether shown or not). Disconnects shall consist of a motor rated switch (or disconnect) for all motor loads less than 3/4HP or other suitable disconnect sized to match branch circuit conductors and load current of equipment, with number of poles as required.

H. Lugs and Connectors: Thomas and Betts "lock-tite", for No. 4 and larger wire; 3M "Scotchlock" fixed spring screw-on type wire connectors with insulator for No. 6 and smaller wire.
   1. All splices shall be made up with screw-on type connectors - no plug-in or push-in style connectors acceptable. Wires shall be solidly twisted together with electricians pliers before screw-on connector is installed to ensure a proper connection in the event of wire nut failure. No exceptions.
   2. Connectors listed or labeled for "no wire twisting required" are not an acceptable substitute for actual wire twisting.
   3. Utilize porcelain type connectors in all high temperature environments (above 105 degrees Celsius).

I. Splice Insulation: "Scotch" electrical tape with vinyl plastic backing or rubber tape with protective friction tape for interior work.
   1. Splices in electrical cables of 600 volt insulation class in underground system duct shall be made only in accessible locations such as pullboxes, light pole handholes, etc., using a compression connector on the conductor and by insulating and waterproofing (for exterior and underground locations) by one of the following methods:
      a. Cast type splice insulation shall be provided by means of a molded casting process employing a thermosetting epoxy resin insulating material which shall be applied by a gravity poured method or by a pressure injected method. The component materials of the resin insulation shall be in a

packaged form ready for convenient mixing after removing from the package. Do not allow the cables to be removed until after the splicing material has completely set.

b. Gravity poured method shall employ materials and equipment contained in an approved commercial splicing kit which includes a mold suitable for the cables to be applied. When the mold is in place around the joined conductors, the resin mix shall be prepared and poured into the mold. Do not allow cables to be moved until after the splicing materials have completely set.

J. Identification: Refer to Section 26 05 00.

K. Firestopping: as manufactured by 3M Fire Protection Products or equal.

1. Fire-rated and smoke barrier construction: Maintain barrier and structural floor fire and smoke resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound vibration absorption, an at other construction gaps.
2. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetration type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall penetrations. Systems or devices must be asbestos free.

PART 3 - EXECUTION

3.01 REFER TO BASIC ELECTRICAL REQUIREMENTS - SECTION 26 05 00 FOR WORK UNDER THIS SECTION.

3.02 TESTS

A. Testing and Inspection: See Section 26 08 00 - Testing.

END OF SECTION

SECTION 26 51 01
LIGHTING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Luminaires (i.e., lighting fixtures). Refer to the Luminaire Schedule, and provide a complete and working Building Lighting System. Catalog numbers in the Luminaire Schedule are basic luminaire types. Additional features, accessories and options herein specified, described, or scheduled are to be included for all luminaires provided.

B. Lamps. Provide all lamps for all luminaires of size and type as recommended by the luminaire manufacturer and as scheduled, or specified herein.

C. Ballasts and power supplies, including standard and dimmed LED.

D. Lighting controls, including occupancy sensors. See Section 26 5700 for Low Voltage Lighting Control System.

E. Exit and Emergency Egress lighting where indicated and where required.

F. Supports for outlet boxes and luminaires, including seismic restraint slack wires for recessed luminaires in suspended ceilings per code and backing in walls as required to keep luminaires secure and level.

1.02 INCORPORATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

B. Section 26 05 00 and 26 27 00 apply to all work in this section.

C. Division 03: Concrete (Bases for pole-mounted luminaires as noted in Luminaire Schedule).

D. Division 09: Painting and Finishes (cutting of holes in finished surfaces for recessed luminaires).

1.03 RELATED WORK

A. Ceiling Access panels where required for access to equipment, outlets, transformers, etc., located above suspended ceilings, sheet rock or plaster ceilings. Coordinate with the Architect and other trades.

1.04 SUBMITTALS

A. Submit under provisions of Section 01 33 00 and 26 05 00.

B. The Contractor shall furnish (6) six sets of submittals for review by the project team unless otherwise noted in these specifications. The submittals shall include the following information:

1. Product Index: The following information shall be included in the product index.
    a. Luminaire Type. The index shall call out each luminaire type per the Luminaire Schedule in the Contract Documents.
    b. Manufacturer's Catalog Number. Outstanding information required to make a complete catalog number shall be clearly identified in the index.

c. Where a pole is included with the luminaire, include the catalog number of the pole in addition to that of the luminaire.
d. Lamp Data. Provide the Manufacturer's name and Catalog Number for each lamp including wattage, color temperature, and color rendering index.
e. LED Data. Provide the Manufacturer's name for each LED array including wattage, color temperature, lumen output, and color rendering index.
f. Comments. The index shall include a column for comments. The comments column shall include extraneous information required for clarity.

2. Manufacturer's literature for every luminaire listed on the Luminaire Schedule.
   a. Catalog Information:
      1) Luminaire Data Sheet: The manufacturer's cut sheet shall include the following:
         (a) Photometrics: Candlepower distribution curve or table with horizontal readings at 0, 22.5, 45, and 90 degrees and vertical readings from 0 to 180 degrees in 5 degree increments in accordance with the Illuminating Engineering Society published test procedures.
         (b) Catalog Number Nomenclature
         (c) Coefficient of Utilization Tables
         (d) Luminaire Line Drawing
         (e) Ballast or power supply (each type)
3. Data sheets for electronic ballasts and power supplies. Indicate luminaire types on applicable ballast/power supply data sheets.
4. Data sheets for wallbox controls and other products specified in this section.
5. Shop Drawings:
   a. Provide shop drawings of suspension details for luminaires recessed in, mounted on, or suspended from hung ceilings. Details shall clearly illustrate proposed methods for supporting luminaires independent of the suspended ceiling system.
   b. Detailed shop drawings of all cove or box mounted luminaires containing the following information:
      1) Exact field measured length (clear inside dimension) of cove pocket or box.
      2) Exact luminaire length and arrangement of luminaires in cove or box.
   c. Detailed shop drawings of pendant mounted luminaires constructed with linear metal housings containing the following information.
      1) Support mechanism, including swivel canopies.
      2) Trim details.
      3) Closure piece details.
      4) Pattern configurations.
6. Samples:
   a. Provide samples of luminaire trim where "Finish as selected by Architect" is indicated on the Luminaire Schedule. Submit two finish samples, 75 mm x 75 mm (3" x 3") minimum, of all custom color, decorative metal, or anodized aluminum finishes. Samples must be approved in writing by the Architect prior to ordering.

b. Submit sample of custom luminaires: complete and operational, equipped with 120V, 6 foot cord and 3 prong grounded plug. Luminaire shall be fabricated and finished as specified, full size, using specified materials & equipment. Submit one luminaire to Owner's representative for review prior to production.
c. Indicate specific luminaire types that require shop drawings.

C. For Any Luminaires Substituted For Those Specified:
1. Refer to section 01 60 00 - Product Requirements, for all substitution procedures.
2. Provide independent testing laboratories, Inc., or equal, photometric test report for each Luminaire type and lamp combination listed on the Luminaire Schedule. Test reports shall be based on Illuminating Engineering Society published test procedures and shall contain polar coordinate candlepower distribution curves in five lateral planes for luminaires with asymmetric distributions and luminaire luminance data for vertical angles above 45 degrees from nadir. Test results shall indicate luminaire efficiency for the lamp and aperture assembly specified. luminaires with efficiencies more than 2% below the values of specified luminaires are not acceptable and will be rejected.
3. Due to the nature of LED products and Luminaires in general, Luminaire substitutions may require additional review on the part of the Engineer or Architect to ascertain the equivalency of the substituted products with those specified. Substitutions will be reviewed to determine their aesthetic, construction, and photometric equivalency to maintain similar design impact and performance in their intended environment. The Engineer and Architect have not included such unknown and unquantifiable review time in their scope of work and are not compensated by the Owner for such services. Costs for additional labor by the Engineer or Architect, to review substitutions, shall be borne by the Contractor. These costs can be minimized when sufficiently designed, detailed, and calculated information, as noted above, is provided for each substituted luminaire.
4. Prior approval does not guarantee final approval by the electrical engineer. The contractor shall be completely responsible for providing luminaires that meet or exceed the quality/performance of the specified products in their entirety. All deviations in quality/performance of the specified products must be listed and individually signed off by the engineer.
5. The Owner reserves the right to reject a proposed substitution based on his agent's professional judgment as to the utility, visual appropriateness, or finish of substitutions.

1.05 OCCUPANCY SENSORS

A. Equipment Qualification
1. Wall switch products must be capable of withstanding the effects of inrush current. Submittals shall clearly indicate the method used.
2. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.

3. Contractor/Supplier shall examine all general specification provisions and drawings for related electrical work required as work under Division 26.
4. Contractor shall coordinate all work described in this section with all other applicable plans and specifications, including but not limited to wiring, conduit, luminaires, HVAC systems and building management systems.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site and store in unopened cartons in protected location. Inspect products immediately and report all damage accordingly.

1.07 GUARANTEE AND WARRANTIES

A. All work performed under this section must be guaranteed to be free of defects in products or workmanship for one year after date of acceptance by Owner, unless noted otherwise in General Conditions.

B. Warranties:
   1. Electronic ballasts and power supplies must be warranted against failure for at least five years after date of substantial completion.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide luminaires as indicated in Luminaire Schedule; if conflict exists between Luminaire Schedule and Specifications, the more stringent requirement shall take precedence.

B. Provide luminaires new and complete with mounting accessories, junction boxes, trims, and lamps.

C. Provide products with UL labels appropriate to intended installation conditions, or with labels from other testing laboratories whose results are acceptable to local inspector, showing compliance with UL standards. Labels must be concealed from normal viewing angles.

D. All products of same type by same manufacturer.

2.02 SOLID STATE LUMINAIRES

A. Housing, where applicable:
   1. Steel bonderized or equal rust protected, or aluminum, rigid construction. Minimum gauge thickness shall be as follows:
      a. Interior locations: No. 20-gauge steel, No. 16-gauge aluminum.

B. Finish:
   1. Baked enamel finish (except when otherwise specified).
      a. Concealed interior surfaces (this applies to interior hardware, circuit boards, etc.) matte black.
      b. Concealed exterior surfaces: matte black.
      c. Visible surfaces: color and texture as specified for each luminaire type or as selected.

C. Light Emitting Diode (LED) requirements:

1. Correlated color temperature (CCT) for phosphor-coated white LEDs must have one of the following designated CCT's and fall within the following binning standards.
   a. 3500K defined as 3465 +/- 245K
   b. 4000K defined as 3985 +/- 275K
2. Color spatial uniformity shall be limited to variations in chromaticity for different directions (i.e. changes in viewing angle) within 0.004 from the weighted average point on the CIE 1976 (u',v') diagram.
3. Color maintenance shall be limited to a maximum change in chromaticity of 0.007 on the CIE 1976 (u',v') diagram over the lifetime of the product.
   a. Color rendering indexColor rendering index to be determined using ANSI C78.377-2008 and applicable IESNA standards.
   b. Laboratory tests must be produced using specific module(s)/array(s) and power supply combination that will be used in production.
   c. Manufacturers must provide a test report from a laboratory accredited by NVLAP or one of its MRA signatories
4. Lumen depreciation
   a. Lumen depreciation to be measured using IESNA LM-80-08 standard for IES approved method of measuring lumen maintenance of LED light sources.
   b. Phosphor coated white LED module(s)/array(s) shall deliver at least 70% of initial lumens for a minimum of 35,000 hours when installed in-situ and operated at 100% output and the maximum specified operating temperature.
   c. Colored LED module(s)/array(s) shall deliver at least 50% of initial lumens for a minimum of 35,000 hours when installed in-situ and operated at 100% output and the maximum specified operating temperature.
5. Acceptable LED manufacturers:
   a. Cree
   b. Nichia
   c. Osram Opto Semiconductors
   d. Philips Lumileds
   e. Xicato

D. Luminaire Efficacy:
   1. Luminaire efficiency shall be measured using IESNA LM-79-08 standard for electrical and photometric measurements of solid state lighting products.
   2. Manufacturer shall provide published luminaire efficacy, which is defined as luminaire light output divided by luminaire input power measured in a 25 degree Celsius environment. Efficacy shall include power supply, thermal, optical, and luminaire losses.

E. Thermal Management:
   1. Solid state luminaire shall not exceed LED manufacturer's maximum junction temperature requirements when operated in-situ at luminaire manufacturer's maximum ambient operating temperature and 100% light output.
   2. Solid state luminaires shall be thermally protected using one of more of the following thermal management techniques:
      a. Metal core board

b. Gap pad
c. Internal monitoring firmware

3. Solid state luminaire housing shall be designed to transfer heat from the LED board to the outside environment.

F. Power Supplies/Drivers:
1. Power supply shall have a power factor of 0.90 or greater for primary application
2. Power supply input current shall have Total Harmonic Distortion (THD) of less than 20%.
3. Power supply shall have a minimum operating temperature of minus 20 degrees Celsius or below when used in luminaires intended for outdoor applications.
4. Power supply output operating frequency to be equal to or greater than 120 Hz.
5. Power supply shall operate with sustained input variations of +/- 10% (voltage and frequency) with no damage to the driver.
6. Power supply shall tolerate sustained open circuit and short circuit output conditions without damage and without need for external fuses or trip devices.
7. Power supply output shall be regulated to +/- 5% across published load range.
8. Power supply shall have a Class A sound rating.
9. Power supply outputs shall have current limiting protection.
10. Power supply shall operate LEDs at constant and regulated current levels. LEDs shall not be overdriven beyond the diode manufacturer's specified nominal voltage and current.

G. Solid State Lighting Controls:
1. Control interface to dimmable power supplies shall consist of one of the following:
   a. Line Voltage Dimming. Controls to be rated for magnetic or electronic low voltage transformer operation.
   b. Low voltage (0-10V) control. Controls to be compatible with either current sink or current source operation.
2. Dimmable LED power supplies shall use pulse width modulation (PWM) to regulate power to LEDs
   a. Dimmable power supplies shall have 12-bit or greater resolution to obtain flicker-free operation throughout the dimming range.

H. System Installation
1. Hardwired connections to solid state luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
2. All solid state luminaires (100% of each lot) shall undergo a minimum eight-hour burn-in test during manufacturingIn addition to requirements identified in Section 1.04 STANDARDS, solid state lighting installations shall be UL Listed as a low-voltage lighting system including, but not limited to, luminaire, power supply, controller, keypad, and wiring.

I. Warranty
1. Luminaires, drivers, and controllers for solid state lighting systems shall be covered by a five-year warranty against defects in workmanship or material. Warranty shall include in-warranty service program providing for payment of

authorized labor charges incurred in replacement of inoperative in-warranty equipment.

2.03 LUMINAIRE CONSTRUCTION

A. Sheet metal: materials and thicknesses shall be 20 gauge (0.7 mm or 0.027") min., free of dents, scratches, oil-can, or other defects.

B. Painted luminaires: exposed weld marks, joints, and seams shall be filled and sanded smooth before finishing.

C. All edges cleaned and dressed to remove sharp edges or burrs.

D. Extrusions: 1/10" min. wall thickness, smooth and free of tooling lines, with cast end plates that exactly match extrusion profiles.

E. Castings: smooth, free of pits, scales, gate marks, or blemishes.

F. Spinnings shall have 1/32" min. thickness, smooth, free of spinning lines or blow-back, with clean edges.

G. Welds: Follow recommendations of American Welding Society. All welds continuous and free of spatter, residue, or warping.

H. No light leaks visible in finished room. Ensure that downlight housings mounted in wood slat ceilings are not visible from below. Field paint exterior of housing with high temperature paint if necessary.

I. Exposed end plates and joiners, with concealed fasteners.

J. End-to-end mounted luminaires: Verify row configurations and provide joiners, aligning splines, and trims to suit.

K. Hardware:
   1. Steel or aluminum interior luminaires: cadmium-plated hardware.
   2. Steel or aluminum exterior luminaires: stainless steel hardware.
   3. Stainless steel luminaires: stainless steel hardware.
   4. Copper alloy luminaires: brass hardware.

L. Raceways: Where used for through wiring, luminaires must be approved for use as raceways.

2.04 RECESSED LUMINAIRES

A. Point-source luminaires: provide pre-wired junction box and thermal protection, and provide slack wires to structure at two diagonal corners.

B. Troffer luminaires: provide hold-down clip at each luminaire corner, and slack wires to structure as detailed on the drawings. The detail will take precedence.

C. Verify ceiling construction details and provide luminaire housings and trims to suit.

D. Non-accessible ceilings: Provide access to junction boxes, ballasts, transformers, and battery packs through luminaire apertures; no access panels in ceiling.

E. Mounting frames: To prevent rusting, provide galvanized steel or cast aluminum frames for installation in damp locations or in plaster ceilings.

F. Adjustable luminaires shall be provided with rotation and tilt locking devices.

2.05 PENDANTS

A. Stem-mounted: 16 mm (5/8") max. o.d. stem with ball swivels at top (and bottom of linear luminaires) to permit 45o swing in any direction away from vertical. Flat canopy to permit splice inspection after installation. Pendants must permit +/- 13 mm (½") threaded vertical adjustment after installation, leaving at least 6 mm (1/4") thread contact at all points.

B. Provide internal safety cable from luminaire body to stud in outlet box.

C. Cable-mounted: 1 X 7 strand 3/32" diameter stainless steel aircraft cable, factory crimped, independently tested and verified to exceed 1500 pounds.
   1. Verify mounting heights for each luminaire and provide cable lengths and coordinate cord lengths with manufacturer as required prior to ordering luminaires. Provide aircraft cable adjuster nipple with locking jaws.

D. Supports: Carry luminaire weight to structure and provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting. Provide diagonal seismic restraint wires per code.

2.06 TRIMS

A. Trims must fit tightly and be held in by gravity, spring clips, or mechanical fasteners. Trims must not drop out under normal conditions or seismic forces which do not exceed the design criteria of the building.

B. Aluminum parabolic cones shall be smooth, properly shaped, with Alzak finish in colors as indicated.
   1. No hot spots or lamp images visible at angles shallower than lamp shielding angle.
   2. Self-flange cones must bend parallel to ceiling and cover ceiling hole without additional trim ring. Unpainted flange, shall have the same finish as cone interior.
   3. Cones and louvers for fluorescent luminaires must have permanent anti-iridescence treatment.

C. Lenses, diffusers, and patterned glass: glass or virgin acrylic as noted, with patterns as noted.
   1. Finished thickness 2 mm (1/10") min. unless noted otherwise.
   2. Linear runs over 1200 mm (4'-0") long shall be in equal-length pieces.
   3. Lenses for tungsten halogen luminaires shall be tempered borosilicate glass.
   4. Lamp enclosures for metal halide lamps shall be glass or acrylic and must be capable of retaining lamp fragments in the event of non-passive lamp failure.
   5. Glass UV filters for individual accent luminaires, where indicated, shall be 3 mm (1/8") borosilicate glass filters with dichroic coating, 2% max. light transmission @ 400nm, 80% min. transmission @ >425nm, Bausch & Lomb "Optivex" or equal by Balzers.
   6. Acceptable Manufacturers:
      a. Plastic lenses and diffusers: ALP, ICI/KSH & Haas.
      b. Glass lenses and patterned glass: Balzers, Bausch & Lomb, Gray.

2.07 FINISHES

A. Steel Reflectors: Unless otherwise specified, the reflector surface finish shall be of synthetic white enamel or polyester powder coating. Finish shall show no indication of chipping, cracking, flaking or any other sign of loss of adhesion. The initial reflection factor shall be not less than 88 percent averaging 5 randomly selected points on the reflector. After 100 hours of exposure to the radiation of a glass enclosed carbon arc lamp, such as a Fade-O-Meters, the reflectance of the exposed portion shall not be less than 5 percent and finish shall show no appreciable color change. The carbon arc lamp shall be operated at appreciable color change. The carbon arc lamp shall be operated at 13 plus or minus 0.5 amperes at 140 volts. The reflector shall be placed ten inches from the arc and the lamp so ventilated that the temperature of the exposed portion does not exceed 105 degrees F.

B. Aluminum Reflectors: Reflecting surfaces shall be provided with either a specular or diffuse finish as indicated. Reflection factors shall be not less than 83 percent for specular reflecting surfaces. Each reflecting surface shall be protected by dense coating of oxide weighing not less than 5.0 milligrams per square inch, applied by an anodic process. The reflector shall be given a sealing treatment that will prevent staining of the reflecting surface when subjected to a stain test. All aluminum reflectors & louvers shall be a low iridescent equivalent to that provided by Coil Anodizers.

C. Non-Reflecting Surfaces: Unless otherwise specified, the finish on all non-reflecting exterior surfaces shall be aluminum oxide or aluminum; white, gray or aluminum paint on steel; nickel or chromium plating on copper alloy. Fastening devices shall be nickel, chromium, cadmium or zinc plated. All painted surfaces shall be free of tears, star marks, blisters, pinholes, chipping and any other defects that may impair appearance or serviceability.

2.08 LAMPS

A. Unless otherwise noted, lamps described in the Luminaire Schedule and in these Specifications shall be manufactured by General Electric, Osram/Sylvania, North American Philips, or approved equal.

B. Each type of lamp by only one manufacturer to maintain color consistency.

C. Relamp luminaires or replace LED boards and drivers at no cost to owner if lamps exhibit excessive lamp to lamp color variation or burn out within 90 days of substantial completion date.

D. LED:
   1. LED quantity and wattage as specified for each LED luminaire.
   2. 3500 deg. K color temperature, unless otherwise noted.

2.09 BALLASTS DRIVERS AND TRANSFORMERS

A. General:
   1. Verify input voltages and match to branch circuit voltages.
   2. Provide ballasts with best-made sound ratings for each type and mount securely to prevent vibration.
      a. Replace excessively noisy ballasts or transformers at no cost to Owner.

3. Remote ballasts or transformers: Provide suitable enclosures and mounting hardware, and install in accessible, ventilated locations.
   a. Secondary wiring: provide number and size of conductors as required, with 3% max. voltage drop between transformer and last lamp.
   b. Keep ballasts or transformers at least 300 mm (12") apart and do not stack vertically.
4. Ballasts must contain no PCB's and be labeled accordingly.

B. LED Drivers:
1. High power factor, thermally-protected.
2. Compatible with LED lamps being used.
3. Capable of dimming LED source without perceptible flicker or stroboscopic effects.
4. Acceptable manufacturers: Advance, Jefferson, Universal.

2.10 EMERGENCY LIGHTING AND EXIT SIGNS

A. Emergency lighting:
1. Provide lighting for paths of egress as required by code.

B. Description of Systems:
1. Auxiliary battery pack/ballasts mounted integral to luminaires shall be Bodine B50 or approved equal. Provide no less than 1400 lumen output for lamps on emergency ballast for a minimum of 90 minutes.

C. Auxiliary Battery Pack/Ballasts for LED Luminaires:
1. Pure lead or nickel-cadmium, sealed and maintenance-free.
2. Automatic transfer to battery power if supply voltage drops below 75% of normal.
3. Must provide at least 87-1/2% or rated battery voltage for 90 minutes minimum.
4. Internal circuitry to provide continuous "trickle" charge and to prevent deep discharge below 80% of rated battery voltage.
5. Full recharge within 24 hours after restoration of normal power.
6. Charge indicator light visible and test switch operable without tools.
7. Concealed inside luminaire or above ceiling, but replaceable through luminaire aperture.
8. Designed to run one or two lamps per luminaire with minimum of 1400 lumen output.
9. Acceptable manufacturers: Bodine, Dual-Lite, Emergi-Lite, Lithonia, Radiant, Siltron.

D. Exit signs shall be back lit LED, surface-mounted on ceiling or wall, with integral battery packs as described above.
1. Fabricated aluminum construction, no light leaks around canopy. Plain box, with no decorative trim.
2. Letters shall be 20mm (3/4") stroke, 150 mm (6") high, with concealed knockouts for left or right arrows, brightness and evenness of illumination per code, green color.
   a. Battery pack contained in basic luminaire housing. No add-on packs or canopies.

b. Green LED lamps located at interior perimeter for indirect illumination of stencil letters.
c. Provide finish as specified in the Luminaire Schedule.
d. Knock out the arrows as indicated on the plans.

2.11 OCCUPANCY SENSORS

A. General
1. Wall switch sensors shall be capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet.
2. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180° coverage capability.
3. Wall switch products shall utilize Zero Crossing Circuitry which increases relay life, protects from the effects of inrush current, and increases sensor's longevity.
4. Wall switch sensors shall have no leakage current to load, in manual or in Auto/Off mode for safety purposes and shall have voltage drop protection.
5. Where specified, wall switch sensors shall provide a field selectable option to convert sensor operation from automatic-ON to manual-ON.
6. Where specified, vandal resistant wall switch sensors shall utilize a hard lens with a minimum 1.0mm thickness. Products utilizing a soft lens will not be considered.
7. Passive infrared sensors shall utilize Pulse Count Processing and Digital Signature Analysis to respond only to those signals caused by human motion.
8. Passive infrared sensors shall utilize mixed signal ASIC which provides high immunity to false triggering from RFI (hand-held radios) and EMI (electrical noise on the line), superior performance, and greater reliability.
9. Passive infrared sensors shall have a multiple segmented Lodif Fresnel lens, in a multiple-tier configuration, with grooves-in to eliminate dust and residue build-up.
10. Where specified, passive infrared and dual technology sensors shall offer daylighting footcandle adjustment control and be able to accommodate dual level lighting.
11. Dual technology sensors shall be corner mounted to avoid detection outside the controlled area when doors are left open.
12. Dual technology sensors shall consist of passive infrared and ultrasonic technologies for occupancy detection. Products that react to noise or ambient sound shall not be considered.
13. Ultrasonic sensors shall utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.
14. Ultrasonic operating frequency shall be crystal controlled at 25 kHz within ± 0.005% tolerance, 32 kHz within ± 0.002% tolerance, or 40 kHz ± 0.002% tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.
15. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.

16. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
17. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
18. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.
19. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.
20. Where specified, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed and Common outputs for use with HVAC control, Data Logging and other control options. Sensors utilizing separate components or specially modified units to achieve this function are not acceptable.
21. All sensors shall have UL rated, 94V-0 plastic enclosures.

B. Circuit Control Hardware - CU
   1. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.
   2. Relay Contacts shall have ratings of:
      a. 13A - 120 VAC Tungsten
      b. 20A - 120 VAC Ballast
      c. 20A - 277 VAC Ballast
   3. Control wiring between sensors and controls units shall be Class II, 18-24 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.
   4. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.

C. Acceptable Manufacturers
   1. The Watt Stopper, or Pre-Approved Equal: For pre-approval, provide all the information listed under "submittals" a minimum of ten (10) working days prior to initial bid date.
   2. The listing of any manufacturer as "acceptable" does not imply automatic approval. It is the sole responsibility of the electrical contractor to ensure that any price quotations received and submittals made are for sensors that meet or exceed the specifications included herein.

PART 3 - EXECUTION

3.01 PREPARATION

A. Architectural Reflected Ceiling Plans shall govern exact location and mounting conditions for all luminaires. Subcontractor shall be responsible for coordination of luminaire mounting and compatibility with ceiling construction and other trades.

B. Coordinate work with other trades. Location of lighting has priority over location of new framing (except major structural members), ducts, diffusers, sprinklers, speakers, smoke detectors, and other obstructions.

C. If obstructions are encountered which prevent installation of luminaires according to drawings, notify Architect immediately and do not proceed until conflict has been resolved.

D. Coordinate the location of luminaires in mechanical or unfinished spaces. Locations shown on Drawings may be adjusted by the Contractor to suit conditions. Install luminaires to avoid obstructions and maximize light output, 2100 mm (7'-0") min. mounting height.

E. Coordinate the location of any exposed conduit used to feed luminaires with the Architect prior to installation.

3.02 INSTALLATION

A. General:

1. Subcontractor shall be responsible for handling and installation of luminaires including all supports, hangers and hardware necessary for a complete installation. Luminaires shall be clean, plumb, level in straight lines, without distortion. Luminaires must be installed so they do not shift during relamping or adjustment. Remedy any light leaks which may develop after installation of recessed or enclosed luminaires.
2. Install luminaires at locations and heights as indicated, in accordance with luminaire manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that luminaires fulfill requirements.
3. Point-source luminaires shall be located as dimensioned, or in center of tile or on tile joint as drawn; 6 mm (1/4") max. off-center tolerance.
4. Linear luminaires shall have 3 mm (1/8") max. horizontal or vertical alignment variation in any 5 m (16-ft.) portion of run.
5. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds. 486 A and B, and the National Electrical Code.
6. Clean luminaires of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses.
7. Remove and replace luminaires that may have been damaged during construction at no additional cost to the Owner.
8. Protect installed luminaires from damage during remainder of construction period.

9. Provide equipment grounding connections for luminaires as indicated. Tighten connections to comply with tightening torques specified in UL 486 A to assure permanent and effective grounds.
10. Install luminaires, lamps, lenses, etc., after building is enclosed, weather tight and environmental conditions are nominally the same as expected for the complete spaces. All lamps, glassware, reflectors and refractors shall be clean and free of chips, cracks and scratches.
11. Lamps installed for use as temporary lighting prior to approval shall be replaced with new lamps. Replace all burn outs with specified lamp prior to project closeout.
12. All wall mounted luminaires and all ceiling mounted surface luminaires including exit lights shall be fed through a luminaire Stud/Hickey/Nipple assembly and with provisions to prevent luminaire turning.
13. Installation of exit signs shall be coordinated with other trades to ensure signs are visible as intended.
14. All junction box cover plates for the lighting branch circuit system shall be clearly marked with a permanent ink felt pen identifying the branch circuit and control relay (panel number, circuit number, lighting control cabinet designation and control relay number) contained in the box.
15. Provide permanently affixed adhesive labels with machine printed lettering (min. 1/8" high) at junction boxes serving luminaires that are supplied by (2) electrical sources (i.e. normal and emergency lighting). Label to read "CAUTION - This luminaire is powered by (2) separate sources. The normal power source breaker and the emergency power source breaker must be turned off before servicing this luminaire."

B. Recessed Luminaires:
1. The contractor shall be responsible to verify the fire rating of the ceiling system within which the luminaires are to be mounted. Where luminaires are installed in fire rated ceilings (and as required by code), provide fire rated enclosures around and over luminaires to maintain ceiling fire rating. No additional cost shall be allowed for failure to include such enclosures and installation in the bid.
2. Holes for Recessed Point-Source Luminaires: Cut holes to follow luminaire housings exactly so no gaps will be visible after trims are installed.
3. Install bottom of housing aligned with finished ceiling.
4. Keep ceiling insulation at least 75 mm (3") away from luminaires.
5. A-lamp downlights shall be installed with adjustable lampholders at proper heights for specified lamps.
6. Install trims after painting of spaces. Install trims tightly, with no gaps or light leaks.
7. Seismic restraints: Provide and install slack wires and hold-down clips per code.
8. Wallwashers:
   a. Orient wallwasher housings according to manufacturer's instructions to maximize brightness on the upper portion of the wall.
9. Lamp Orientation:

a. In situations where luminaires with horizontal lamps are aligned with each other, orient the lamps such that the axis of the lamps are in the same direction.

C. Ceiling-Mounted and Pendant Luminaires:
1. Provide support for outlet boxes and suspension points so luminaires can be installed securely, including seismic supports per code.
   a. Luminaire weight less than 25 kg (50 lb.) at each suspension point: hang from strap or stud on outlet box, or at non-feed points, provide 1/4"-20 stud projecting 20 mm (3/4") below ceiling.
   b. Luminaire weight 25 kg (50 lb.) or more at each suspension point: hang directly from structure, either independent of outlet box or from stud extending through outlet box to structure.
2. Pendants:
   a. Provide horizontal bracing from suspension points to ceiling framing to prevent sideways shifting.
   b. Provide diagonal seismic restraint wires above ceiling per code.
   c. Furnish suspended luminaires with universal joint type hanger canopy (and longitudinal sway adapter at each stem connection point for linear luminaires), to permit 45 degree swivel on 360 degree circle from Nadir at canopy (and 45 degree longitudinal movement at sway adapter).
   d. Luminaires over 450 mm (18") wide shall be provided with supports at all corners.
   e. Install pendants plumb and level.
   f. Verify luminaire weights and provide backing in ceiling as required.

D. Wall-Mounted Luminaires:
1. Mounting heights shown on Drawings are measured from finished floor to centerline of outlet box or recessed housing, unless otherwise noted.
2. Verify luminaire weights and provide backing in wall as required. Luminaires must not droop or tilt away from wall.
3. Wet locations: install sealant between luminaire and outlet box.
4. In circulation areas, wall-mounted luminaires must not project more than 100 mm (4") from wall if mounted above 685 mm (27") and below 2030 mm (80").

E. Re-Lamping Existing Luminaires:
1. Provide new lamps for all existing luminaires to remain.
2. Field verify exact lamp type, color temperature, wattage, and style, to provide proper replacements for each lamp in existing luminaires to remain.
3. Clean all existing lenses to remain.

3.03 LIGHTING CONTROLS

A. Lighting controls to include occupancy sensors in most spaces (for local control) and relay system lighting control for larger common spaces.

B. Occupancy sensors shall initially be set as follows:
1. Maximum sensitivity.
2. Maximum time delay (or 30 minutes).
3. Manual-on operation.

4. Automatic off operation.
5. Aim all adjustable sensors to properly cover room areas.

3.04 DELIVERY, STORAGE, & HANDLING:

A. Deliver luminaires in factory-fabricated containers or wrappings, which properly protect luminaires from damage. Inspect luminaires immediately upon delivery to ensure correct shipment without damage.

B. Store luminaires in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground.

C. Handle luminaires carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new. Protection wrapping on louvered (parabolic) luminaires shall not be removed until luminaires are ready for operation.

3.05 SEQUENCING AND SCHEDULING:

A. General:
   1. Coordinate with other work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of luminaires with other work.
   2. Sequence lighting installation with other work to minimize possibility of damage and soiling during remainder of construction.

B. Install controls so that all operable parts are at 48 inches (1220 mm) maximum height.

3.06 PROJECT CLOSEOUT

A. Clean luminaires and remove plaster and paint spatters.

B. Clean fingerprints and dust from downlight reflectors. Refer to manufacturer's instructions.

C. Verify that luminaires and controls are working at time of final acceptance by Owner.
   1. Relamp as required.

D. Test emergency lighting system for 90 minutes in presence of Owner's representative, check each luminaire for proper operation at end of 90-minute test, then recharge for 24 hours and briefly test each luminaire again for proper operation.

E. Install and aim adjustable lighting as directed by Architect.
   1. Provide personnel, lifts, ladders, and walkie-talkies as required.
   2. Aiming will occur at night, outside of normal working hours, at times as approved by the Architect.

F. Prepare two copies of a Lighting Systems Maintenance Manual consisting of the following in a hardcover binder. Deliver to Architect. After review, Architect will deliver one copy to Owner.
   1. One complete set of approved submittals, including product data and shop drawings.
   2. List of lamps used in Project, cross-referenced to luminaire types, with specific manufacturer's names and ordering codes.
   3. Relamping instructions for lamps that require special precautions (tungsten halogen, metal halide, etc.).

4. Luminaire cleaning instructions, including chemicals to be used or avoided.
5. Instructions for code-required testing and maintenance of emergency lighting system.
6. Identification of lighting products that contain hazardous materials or that require special disposal techniques (large quantities of fluorescent lamps, etc.)

END OF SECTION

SECTION 26 56 01
SITE LIGHTING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Luminaires

B. LED's

C. Power Supplies/Drivers

D. Poles

E. Pole bases

F. Controls and wiring

1.02 SYSTEM DESCRIPTION

A. Furnish all labor, materials, apparatus, tools, equipment transportation, temporary construction and special or occasional services as indicated on the Drawings or described in these Specifications and as required to make a complete working Lighting System.

B. Illumination levels shall be in accordance with recommendations by the Illuminating Engineering Society (IES).

1.03 INCORPORATED DOCUMENTS

A. Section 26 05 00 applies to all work in this Section.

1.04 SUBMITTALS

A. Catalog Information:
   1. Luminaire (each type) with photometric pattern.
   2. Contactors.
   3. Ballast or Driver (each type)
   4. Poles.
   5. Brackets.

B. Shop Drawings.

C. Manufacturer's Recommendations: Provide two copies before material is used.
   1. PVC conduit joints and junctions.
   2. Solvent welding directions.
   3. Pole bases.

D. Laboratory Test: Determine soil density relationships for compaction of backfill material in accordance with ASTM D1557, Method D.

PART 2 - PRODUCTS

2.01 MATERIAL AND EQUIPMENT

A. Provide new materials and equipment unless otherwise specifically indicated or specified. Materials shall be listed by Underwriter's laboratories, Inc. (U.L.) and bear evidence of such approval where applicable.

B. Luminaires: Site luminaires shall be weatherproof. Reflectors and refractors shall provide the light configuration indicated and conforming to IES recommendations.

C. Luminaires and poles shall be finished in epoxy enamel designed to withstand the effects of salt spray. Lens shall be securely attached to the lens frame for security during maintenance and relamping.

D. Lighting Contactors: NEMA ICS 2. Electrically operated, magnetically held unit in NEMA enclosure, rated poles and ratings as indicated on Drawings. Units shall have silver alloy double breaker contacts and coil clearing contacts and shall require no arcing contacts. On-off selector switch.

E. Poles, Brackets, Pole Bases and Attachments: Shall be rated for service with wind velocities of 100 mph considering the force exerted by the wind on the maximum exposure of the fixture luminaire selected.

F. Poles shall be anchor base type round, height and style as indicated, complete with handhole and gasketed cover, anchor bolts with leveling and locking screws and basecovers, and grounding connection, finished to match luminaire.

G. Concrete pole bases shall be cast-in-place reinforced concrete as indicated with anchor bolts and conduit entries as per manufacturer. Concrete shall be rated 3,000 PSI at 28 day test.

H. Concrete:
   1. Concrete for electrical requirements shall be at least 3,000 psi concrete with 1-inch maximum aggregate conforming to the requirements of Division 03 for Cast-In-Place concrete.

2.02 SOLID STATE LUMINAIRES

A. Finish:
   1. Baked enamel finish (except when otherwise specified).
      a. Exterior luminaire finish: refer to Luminaire Schedule.

B. Light Emitting Diode (LED) requirements:
   1. Correlated color temperature (CCT) for phosphor-coated white LEDs must have one of the following designated CCT's and fall within the following binning standards.
      a. 4000K defined as 3985 +/- 275K
   2. Color spatial uniformity shall be limited to variations in chromaticity for different directions (i.e. changes in viewing angle) within 0.004 from the weighted average point on the CIE 1976 (u',v') diagram.
   3. Color maintenance shall be limited to a maximum change in chromaticity of 0.007 on the CIE 1976 (u',v') diagram over the lifetime of the product.
      a. Color rendering indexColor rendering index to be determined using ANSI C78.377-2008 and applicable IESNA standards.
      b. Laboratory tests must be produced using specific module(s)/array(s) and power supply combination that will be used in production.
      c. Manufacturers must provide a test report from a laboratory accredited by NVLAP or one of its MRA signatories
   4. Lumen depreciation

a. Lumen depreciation to be measured using IESNA LM-80-08 standard for IES approved method of measuring lumen maintenance of LED light sources.
b. Phosphor coated white LED module(s)/array(s) shall deliver at least 70% of initial lumens for a minimum of 35,000 hours when installed in-situ and operated at 100% output and the maximum specified operating temperature.
c. Colored LED module(s)/array(s) shall deliver at least 50% of initial lumens for a minimum of 35,000 hours when installed in-situ and operated at 100% output and the maximum specified operating temperature.

5. Acceptable LED manufacturers:
   a. Cree
   b. Nichia
   c. Osram Opto Semiconductors
   d. Philips Lumileds

C. Luminaire Efficacy:
1. Luminaire efficiency shall be measured using IESNA LM-79-08 standard for electrical and photometric measurements of solid state lighting products.
2. Manufacturer shall provide published luminaire efficacy, which is defined as luminaire light output divided by luminaire input power measured in a 25 degree Celsius environment. Efficacy shall include power supply, thermal, optical, and luminaire losses.

D. Thermal Management:
1. Solid state luminaire shall not exceed LED manufacturer's maximum junction temperature requirements when operated in-situ at luminaire manufacturer's maximum ambient operating temperature and 100% light output.
2. Solid state luminaires shall be thermally protected using one of more of the following thermal management techniques:
   a. Metal core board
   b. Gap pad
   c. Internal monitoring firmware
3. Solid state luminaire housing shall be designed to transfer heat from the LED board to the outside environment.

E. Power Supplies/Drivers:
1. Power supply shall have a power factor of 0.90 or greater for primary application
2. Power supply input current shall have Total Harmonic Distortion (THD) of less than 20%.
3. Power supply shall have a minimum operating temperature of minus 20 degrees Celsius or below when used in luminaires intended for outdoor applications.
4. Power supply output operating frequency to be equal to or greater than 120 Hz.
5. Power supply shall operate with sustained input variations of +/- 10% (voltage and frequency) with no damage to the driver.
6. Power supply shall tolerate sustained open circuit and short circuit output conditions without damage and without need for external fuses or trip devices.
7. Power supply output shall be regulated to +/- 5% across published load range.
8. Power supply shall have a Class A sound rating.
9. Power supply outputs shall have current limiting protection.

10. Power supply shall operate LEDs at constant and regulated current levels. LEDs shall not be overdriven beyond the diode manufacturer's specified nominal voltage and current.

F. System Installation
   1. Hardwired connections to solid state luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
   2. All solid state luminaires (100% of each lot) shall undergo a minimum eight-hour burn-in test during manufacturing. Solid state lighting installations shall be UL Listed as a low-voltage lighting system including, but not limited to, luminaire, power supply, controller, keypad, and wiring.

G. Warranty
   1. Luminaires, drivers, and controllers for solid state lighting systems shall be covered by a five-year warranty against defects in workmanship or material. Warranty shall include in-warranty service program providing for payment of authorized labor charges incurred in replacement of inoperative in-warranty equipment.

2.03 LUMINAIRE CONSTRUCTION

A. Sheet metal: materials and thicknesses shall be 20 gauge (0.7 mm or 0.027") min., free of dents, scratches, oil-can, or other defects.

B. Painted luminaires: exposed weld marks, joints, and seams shall be filled and sanded smooth before finishing.

C. All edges cleaned and dressed to remove sharp edges or burrs.

D. Extrusions: 1/10" min. wall thickness, smooth and free of tooling lines, with cast end plates that exactly match extrusion profiles.

E. Castings: smooth, free of pits, scales, gate marks, or blemishes.

F. Spinnings shall have 1/32" min. thickness, smooth, free of spinning lines or blow-back, with clean edges.

G. Welds: Follow recommendations of American Welding Society. All welds continuous and free of spatter, residue, or warping.

H. Exposed end plates and joiners, with concealed fasteners.

I. Hardware:
   1. Steel or aluminum interior luminaires: cadmium-plated hardware.
   2. Steel or aluminum exterior luminaires: stainless steel hardware.
   3. Stainless steel luminaires: stainless steel hardware.
   4. Copper alloy luminaires: brass hardware.

J. Raceways: Where used for through wiring, luminaires must be approved for use as raceways.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Refer to Section 26 27 00, Part 2.02, for wiring and splicing requirements.

B. Underground cable installation shall conform to National Electrical Code except as otherwise specified or indicated.

C. Contractor Damage: The Contractor shall promptly cause repairs to be made to any indicated utility lines or systems damaged by his operation.

D. Under roads and paved areas, ducts shall be EPC-80-PVC polyvinyl chloride conduit.

E. Cables shall be in one piece without splices between connections except where the distance exceeds the lengths in which the cable is furnished.

F. Bends in cables shall have an inner radius of not less than 12 times the cable diameter.

G. Horizontal slack of approximately 3 feet shall be left in the ground on each end of cable runs, on each side of connection and at all points where connections are to be made above ground level.

H. Earthwork: Earthwork for electrical requirements shall conform to the requirements of Division 31.

I. Coordinate work with other trades. Pre-ship anchor bolts and templates for use in preparing bases for installation. After leveling luminaires, pack grout between mounting plate and concrete footing. Provide weep holes to prevent accumulation of moisture inside pole base.

3.02 TESTS

A. Test under provisions of Section 01 40 00 and 26 05 00.

B. The Owner shall be notified at least three working days in advance of the Contractor's proposed date of the tests to permit scheduling, and to permit witnessing of the tests. The Contractor shall furnish the Owner with three copies of the results of the tests.

C. Circuits: The Contractor shall test each circuit, all controllers, and components of the system for proper operation. The Contractor shall furnish the Owner with three copies of the test results.

D. Compaction Tests: Backfill shall be tested for compaction in accordance with ASTM D1556.

E. Operating Test: Contractor shall operate the system in the presence of the Owner proving the proper operation.

END OF SECTION

SECTION 26 57 00
LOW VOLTAGE LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.01 SYSTEM DESCRIPTION

A. Furnish all labor, materials, apparatus, tools, equipment transportation, temporary construction and commissioning services as indicated on the Drawings or described in these Specifications and as required to make a complete working facility lighting control system.

B. Integrated Low Voltage Lighting Control System:
   1. The low voltage lighting control system shall consist of relay panels and digital switches.
   2. The system shall accept program changes from a handheld configuration tool for date and time, location, holidays, event scheduling, button binding and group programming.
   3. Install a lighting control system consisting of relay/contactor panel(s), control switches, occupancy sensors, photocells and other controlling devices. The devices are connected by low voltage and line voltage wiring. The general operation of lighting and controlled loads shall include:
      a. Interior lighting: Manual switch and occupancy sensor control on/off with automatic time scheduled shut off.
      b. Scheduled on/off loads: Time on, time off by automatic time schedule with after hour override capability and shutoff.
      c. Exterior security lighting: Photocell or astronomic on, photocell or astronomic off.
      d. Requirements are indicated in Section 26 27 00 for raceways and electrical boxes and fittings required for installation of control equipment and wiring.
      e. Provide CBC 2013 compliant seismic installation. See Section 26 05 00 for all certification and submittal requirements.

1.02 INCORPORATED DOCUMENTS

A. Sections 26 05 00, 26 27 00, 26 51 01 and 26 56 01, apply to all Work in this Section.

B. Refer to Section 26 51 01 for fluorescent dimming ballasts.
   1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer Qualifications: Installer shall be one who is experienced in performing the Work of this Section, and who has specialized in installation of Work similar to that required for this project.

C. Component Pre-testing: All components and assemblies are to be factory pre-tested prior to installation.

D. System Support: Factory applications engineers shall be available for telephone support.

E. NEC Compliance: Comply with NEC as applicable to electrical wiring Work.

F. NEMA Compliance: Comply with applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.

G. UL Approvals: Remote panels are to be UL listed under UL 916 Energy Management Equipment.

H. CSA Approvals: Remote panels are to be CSA listed.

I. FCC Emissions: All assemblies are to be in compliance with FCC emissions Standards specified in Part 15 Subpart J for Class A application.

J. All System components shall be California Title 24 compliant, where applicable.

1.04 SUBMITTALS

A. Submit under provisions of Sections 01 33 00 and 26 05 00.
   1. Bill of Materials: Complete list of all parts needed to fully install selected System components.
   2. Shop Drawings: Submit dimensional Drawings of all lighting control system components and accessories.
   3. One Line Diagram: Submit a one-line diagram of the system configuration.
   4. Typical Wiring Diagrams: Submit typical wiring diagrams for all components including, but not limited to, relay panels, relays, digital low voltage switches, digital occupancy sensors and digital daylighting controls.

1.05 MANUFACTURERS

A. Integrated Low Voltage Lighting Control System:
   1. The basis of the specified system is the Watt Stopper Digital Lighting Management (DLM) or an equal. Any other system to be considered must submit descriptive information 10 days prior to bid.
   2. Prior approval does not guarantee final approval by the electrical engineer. The contractor shall be completely responsible for providing a system meeting this specification in its entirety. All deviations from this specification must be listed and individually signed off by the engineer.
   3. The Owner reserves the right to reject a proposed substitution based on his agent's professional judgment as to the utility, visual appropriateness, or finish of substitutions.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in Manufacturer's original, unopened, undamaged packages with intact identification labels.

B. Storage and Protection: Store materials away from exposure to harmful weather conditions and at temperature and humidity conditions recommended by Manufacturer.

1.07 GUARANTEE AND WARRANTIES

A. All Work performed under this Section must be guaranteed to be free of defects in products or workmanship for one year after date of acceptance by Owner, unless noted otherwise in General Conditions.

PART 2 - PRODUCTS

2.01 DIGITAL LIGHTING MANAGEMENT (DLM)

A. Description
   1. Lighting Control Panels shall be UL listed and consist of the following:
   2. EnclosureTub: NEMA 1, NEMA 3R, or NEMA 4 as indicated on the drawings, sized to accept an interior with 1-8 relays, 1-24 relays and six (6) four pole contactors, or 1-48 relays with six (6) four pole contactors.
   3. Cover: Surface or Flush as required, hinged and lockable and with restricted access to line voltage section. A final typed wiring schedule directory card shall be affixed to the cover's back.
   4. Interior: Barrier included for separation of high voltage (class 1) and low voltage (class 2) wiring. The interior shall include intelligence boards, power supply, mechanically latched control relays and multi-pole contactors. The interiors will include the following features:
      a. Screwless, removable, plug-in connections for all low voltage terminations.
      b. Digital inputs (four RJ-45 jacks) shall support 1-, 2-, 3-, 4-, and 8-button digital switches, digital occupancy sensors and digital daylight sensors.
      c. Each relay shall be capable of individual ON/OFF control by a low voltage switch and/or occupancy sensor input.
      d. The system shall monitor true relay status; the relay status will be displayed at the onboard pilot LED and monitored by the system electronics.
      e. Stagger the On and OFF sequence of the relays.
      f. Heavy Duty Relays - Mechanically latching contacts with single moving part design for improved reliability. Relays to have the following characteristics:
         1) 30 amp NEMA 410 electronic ballast rated and 20 amp tungsten, rated for 50,000 ON/OFF cycles at full load. Support #12-#14 AWG solid or stranded wire and rated for 120 and 277 volts; 20 amp NEMA 410 electronic ballast rated and 20 amp tungsten 347 volts.
         2) 30 VAC isolated contacts for status feedback and pilot light indication.
         3) 14,000 amp short circuit current rating.
      g. Contactors shall be DIN rail mounted, four pole standard, normally open or normally closed, electrically held with 120 or 277 volt coil voltage to match panel control power voltage. Contractors shall be compatible with all lighting, ballast and HID loads and be rated for 277 volt 20 amp tungsten and 600 volt 30 amp ballast loads.
   5. Power Supply: Multi-voltage transformer assembly with enough power to supply all electronics, occupancy sensors, dataline switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.

2.02 GROUP, CHANNEL, SCHEDULE AND PATTERN CONTROL

A. Description
   1. The lighting control panel shall support schedule, group, and photocell control functions via the network as configured using the LMCT hand held configuration tool.
   2. Group Status: Each group pushbutton shall include an LED status indication. The LED will be ON whenever all of the relays within the group are ON; and shall go OFF when all of the relays within the group go OFF. The LED will be green when in a "mixed" state. Each channel shall also have an associated dry contact closure and pilot contact which tracks the LED operation described above.

B. Features
   1. Individual relays may be assigned to more than one channel, and the channel status will be annunciated appropriately.
   2. Each channel shall also have an input for connecting switch or dry contacts for controlling a channel. Inputs shall accept 2 or 3-wire maintained or momentary inputs, and groups may be controlled by: an on-board group pushbutton switch, low voltage switch, digital switch, digital occupancy sensor, digital photocell, or time of day.
   3. Screwless, removable, plug-in terminals will be provided for all low voltage wiring connections.

2.03 NETWORK CLOCK

A. Description
   1. Integral system clock shall provide scheduling capabilities for panel-only projects without DLM segment networks or BAS control.
   2. Each panel shall include digital clock capability able to issue system wide automation commands to up to (11) eleven other panels for a total of (12) twelve networked lighting control panels. The clock shall provide capability for up to 254 independent schedule events per panel for each of the ninety-nine system wide channel groups.
   3. The clock capability of each panel shall support the time-based energy saving requirements of applicable local energy codes.
   4. The clock module shall provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery back up for the clock function and program retention in non-volatile FLASH memory. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed.
   5. The clock capability of each panel shall employ non-volatile memory and shall retain user programming and time for a minimum of 10 years.
   6. Schedules programmed into the clock of any one panel shall be capable of executing panel local schedule or Dark/Light (photocell or Astro) events for that panel in the event that global network communication is lost. Lighting control panels that are not capable of executing events independently of the global network shall not be acceptable.

7. The clock capability of each panel shall operate on a basis of ON/OFF or Normal Hours/After Hours messages to automation groups that implement pre-configured control scenarios. Scenarios shall include:
   a. Scheduled ON / OFF
   b. Manual ON / Scheduled OFF
   c. Astro ON / OFF (or Photo ON / OFF)
   d. Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)

B. Features
1. Runs event-based schedule routines independently (does not require BAS or Segment Manager).
2. Supports astronomical, time-based event types
3. Retains memory and time for a minimum of 10 years.

2.04 DIGITAL SWITCHES / DIMMERS

A. Description
1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration. Wall switches shall include the following features
2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
3. Configuration LED on each switch that blinks to indicate data transmission.
4. Load/Scene Status LED on each switch button with the following characteristics:
   a. Bi-level LED
   b. Dim locator level indicates power to switch
   c. Bright status level indicates that load or scene is active
5. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.
6. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.
7. Two RJ-45 ports for connection to DLM local network.
8. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.

B. WattStopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

2.05 DIGITAL OCCUPANCY SENSORS

A. Description
1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration. Wall switches shall include the following features Digital Occupancy Sensors – Self-configuring, digitally addressable and calibrated

occupancy sensors with LCD display and two-way active infrared (IR) communications.

2. Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor.
3. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:
4. Digital calibration and pushbutton configuration for the following variables:
   a. Sensitivity - 0-100% in 10% increments
   b. Time delay - 1-30 minutes in 1 minute increments
   c. Test mode - Five second time delay
   d. Detection technology - PIR, Ultrasonic or Dual Technology activation and/or re-activation.
   e. Walk-through mode
   f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.
5. Programmable control functionality including:
   a. Each sensor may be programmed to control specific loads within a local network.
   b. Sensor shall be capable of activating one of 16 user-definable lighting scenes.
   c. Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.
   d. On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:
      1) Ultrasonic and Passive Infrared
      2) Ultrasonic or Passive Infrared
      3) Ultrasonic only
      4) Passive Infrared only
6. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.
7. One or two RJ-45 port(s) for connection to DLM local network.
8. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.
9. Device Status LEDs, which may be disabled for selected applications, including:
   a. PIR detection
   b. Ultrasonic detection
   c. Configuration mode
   d. Load binding
10. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
11. Manual override of controlled loads.

12. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.

B. Units shall not have any dip switches or potentiometers for field settings.

C. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

D. WattStopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

2.06 DIGITAL PHOTOSENSORS

A. Description:
1. Open loop digital photosensors shall include the following additional features
2. Each of the three discrete daylight zones can include any non overlapping group of loads in the room.
3. Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone.
4. WattStopper Product Number: LMLS-500, LMLS-500-L.
5. Digital Photosensors – Single-zone closed loop, multi-zone open loop and dual-loop daylighting sensors with two-way active infrared (IR) communications can provide switching, bi-level, tri-level or dimming control for daylight harvesting.

2.07 DIGITAL ROOM CONTROLLERS AND PLUG-LOAD CONTROLLERS

A. Description
1. Open digital controllers for lighting and plug loads automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements. The controllers will be simple to install, and will not have dip switches or potentiometers, or require special configuration for standard Plug n' Go applications.
2. Each of the three discrete daylight zones can include any non overlapping group of loads in the room.
3. Digital controllers for lighting and plug loads automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room and plug load controllers shall be provided to match the room lighting and plug load control requirements. The controllers will be simple to install, and will not have dip switches or potentiometers, or require special configuration for standard Plug n' Go applications
4. Multiple room controllers connected together in a local network must automatically prioritize each room controller, without requiring any configuration or setup, so that loads are sequentially assigned using room controller device ID's from highest to lowest.
5. Dual voltage (120/277 VAC, 60 Hz), or 347 VAC, 60 Hz (selected models only). 120/277 volt models rated for 20A total load, derating to 16A required for some

dimmed loads (forward phase dimming); 347 volt models rated for 15A total load; plug load controllers carry application-specific UL 20 rating for receptacle control.

6. Zero cross circuitry for each load
7. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
8. Device Status LEDs to indicate:
   a. Data transmission
   b. Device has power
   c. Status for each load
   d. Configuration status

B. On/Off Room Controllers shall include:
   1. One or two relay configuration
   2. Efficient 150 mA switching power supply
   3. Three RJ-45 DLM local network ports with integral strain relief and dust cover
   4. WattStopper product numbers: LMRC-101, LMRC-102

C. On/Off/Dimming enhanced Room Controllers shall include:
   1. Real time current monitoring
   2. Multiple relay configurations
      a. One, two or three relays (LMRC-21x series)
      b. One or two relays (LMRC-22x series)
   3. Efficient 250 mA switching power supply
   4. Four RJ-45 DLM local network ports with integral strain relief and dust cover
   5. One dimming output per relay
      a. 0-10V Dimming - Where indicated, one 0-10 volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10 volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting. (LMRC-21x series)
      b. Line Voltage, Forward Phase Dimming - Where indicated, one forward phase control line voltage dimming output per relay for control of compatible two-wire or three-wire ballasts, LED drivers, MLV, forward phase compatible ELV, neon/cold cathode and incandescent loads. (LMRC-22x series)
      c. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver.
      d. The LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.
      e. Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100% dimming range defined by the minimum and maximum calibration trim.
      f. Calibration and trim levels must be set per output channel.
      g. Devices that set calibration or trim levels per controller are not acceptable.

h. All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.

6. Each load shall have an independently configurable preset on level for Normal Hours and After Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After Hours events.
7. Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.
8. The following dimming attributes may be changed or selected using a wireless configuration tool:
   a. Establish preset level for each load from 0-100%
   b. Set high and low trim for each load
   c. Set lamp burn in time for each load up to 100 hours
9. Override button for each load provides the following functions:
   a. Press and release for on/off control
   b. Press and hold for dimming control
10. WattStopper product numbers: LMRC-211, LRMC-212, LRMC-213, LMRC-221, LMRC-222

D. Plug Load Room Controllers shall include:
1. One relay configuration with additional connection for unswitched load
2. Configurable additive time delay to extend plug load time delay beyond occupancy sensor time delay (e.g. a 10 minute additive delay in a space with a 20 minute occupancy sensor delay ensures that plug loads turn off 30 minutes after the space is vacated).
3. Factory default operation is Auto-on/Auto-off, based on occupancy
4. Real time current monitoring of both switched and un-switched load (LMPL-201 only)
5. Efficient switching power supply
   a. 150mA (LMPL-101)
   b. 250mA (LMPL-201)
6. RJ-45 DLM local network ports
   a. Three RJ-45 ports (LMPL-101)
   b. Four RJ-45 ports (LMPL-201)
7. WattStopper product numbers: LMPL-101, LMPL-201.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Description
1. Digital Switches and/or photocells shall be mounted in the spaces as indicated on the Drawings. Each low voltage wire shall be labeled clearly indicating which relay panel it connects to. Use only Watt Stopper pre-terminated LMRJ series Cat 5e cable as indicated on the Drawings. All relays and switches shall be tested after installation to confirm proper operation and the loads recorded on the directory card in each panel.

2. The relay panels shall be mounted in electrical closets as indicated on the Drawings. The numbered relays in the panel shall be wired to control the power to each load as indicated on the Panel Wiring Schedules included in the Drawings. All power wiring shall be identified with the circuit breaker number controlling the load. If multiple circuit breaker panels are feeding into a relay panel, wires shall clearly indicate the originating panel's designation.

3.02 PRE-INSTALLATION MEETING

A. Manufacturer shall provide a factory authorized representative to provide a functional overview of the lighting control system prior to products being installed.
   1. Discuss functionality and integration of all products per design requirements.
   2. Confirm location of occupancy sensors and photocells as required.
   3. Confirm low voltage control wires meet specification.
   4. Explain adjustment options and verify specification requirements for each device.

3.03 PROGRAMMING

A. Set / program lighting controls per relay schedules on drawings, with input from owner for exact times required for each operation.

B. All programming shall comply with Title 24 requirements (i.e. automatic control and override limits).

C. For relays controlling halogen and metal halide lamps, a minimum 15 minute off period is required per day to mitigate potential for non-passive end of life failure. Review programming schedules and program this off-cycle for relays otherwise scheduled for continuous operation. Coordinate timing of off-cycle with Owner.

D. Test all programming for proper operation of each relay at scheduled times.

3.04 SYSTEM STARTUP

A. The Manufacturer shall provide a factory authorized technician to commission and confirm proper installation and operation of all system components.

B. Contractor shall provide system documentation after the equipment has been installed:
   1. Lighting control operational summary sheet.
   2. Programming record sheet.
   3. System Installation and Operation Manual shall be provided to the owner.

3.05 TRAINING

A. Manufacturer shall provide factory authorized application engineer to train Owner personnel in the operation and programming of the lighting control system for the first (2) two days of occupancy; then (1) one week later, and again (1) month later.

3.06 TESTS

A. Test under provisions of Section 26 05 00 and 26 08 00.

B. The Owner shall be notified at least three working days in advance of the Contractor's proposed date of the tests to permit scheduling, and to permit witnessing of the tests. The Contractor shall furnish the Owner with three copies of the results of the tests.

C. Circuits: The Contractor shall test each circuit, all controllers, and components of the system for proper operation. The Contractor shall furnish the Owner with three copies of the test results.

D. Operating Test: Contractor shall operate the system in the presence of the Owner proving the proper operation of the system and all components.

END OF SECTION

SECTION 27 00 00
VOICE AND DATA COMMUNICATION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. This project includes the provisions for and installation of a complete telecommunications system pathways and wiring infrastructure system for the new facility, including all terminations, testing, and all related passive components required for a completely concealed and fully operation installation.

1.02 WORK INCLUDED

A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the work as shown on the drawings and as specified hereinafter, including, but not limited to the work listed below.

B. Provide and install complete and functional voice and data communication system, including all necessary passive components, to allow full operation of the wiring infrastructure system upon completion.

C. The installation shall include all cable (optical fiber and twisted-pair copper), inner-duct, conduit, interconnect / patching equipment (fiber and copper), connectors/adapters (fiber and copper), splices, patch cords and jumpers (optical fiber and twisted-pair copper), wiring blocks, data and voice outlets, wireless communications system antenna connections, and any other equipment specified herein.

D. The install action shall not include any active network components such as routers, switches, hubs, fiber optic transceivers, wireless communications system transceivers, antennae, base stations and concentrators or servers, which shall be supplied by the owner.

E. Upon completion of the installation, this contractor shall test all fiber and copper pathways and record the test results as specified herein.

F. The scope of work under this Section shall include any other work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings, including raceways / pathways for a completely concealed installation.

1.03 RELATED WORK

A. Division 01 - General Requirements.

B. Division 09 - Finishes.

C. Section 26 05 00 - Basic Electrical Requirements

D. Section 26 27 00 - Basic Electrical Materials & Methods

E. Equipment and work provided by the owner's network integrator, including owner provided network servers, switches, hubs, optical fiber transceivers, routers, wireless communication system equipment, etc.

1.04 INCORPORATED DOCUMENTS

A. Requirements of the General Conditions, supplementary conditions, and Division 01 Sections apply to the work of this section, unless modified herein.

B. Published specifications, standard tests or recommended methods of trade, industry or government organizations shall apply to work of this section where cited by abbreviations noted below, unless modified herein.
   1. National Electrical Code, latest edition, (NEC), Article 800-4.
   2. Underwriters' Laboratories, Inc. (UL), UL 1459, UL 1863.
   3. TIA/EIA-569-A "Commercial Building Standard for Telecommunications Pathways and Spaces."
   4. TIA/EIA-568-B. "Commercial Building Telecommunication Standard".
   5. TIA/EIA-455-61 "FOTP-61, Measurement of Fiber or Cable Attenuation using an OTDR".
   6. IEEE 802.3 "Carrier Sense Multiple Access With Collision Detection".
   7. TIA / EIA-568-B.2-1 For 250 MHz frequency range transmission over category 6 cabling system.
   8. ANSI / TIA /A-568-B.3-1 "Additional transmission performance specifications for 50/125 Micron Optical Fiber Cables."
   9. IEEE B02.11b "Wireless Network standard"
   10. TIA / EIA - 606 "Labeling and marking standards for cable 6 and pathways."
   11. Owner's telecommunications Standards and Requirements.

1.05 CONTRACTOR QUALIFICATIONS

A. Contractor must possess a valid state Contractor's License and must have successfully performed at least three projects of similar scope, within two years of the date of this bid. Proof of performance shall be in the form of reference sheets, which shall include a brief description of the project, the beginning and ending contract price, the project foreman or superintendent's name, and the name, address, and telephone number of a project contact.

B. Contractor must be able to prove to the satisfaction of Owner that it has significant experience in the installation of optical fiber cable systems. Installation must include installation of optical fiber cable, fiber termination, knowledge of interconnect equipment, and a thorough knowledge of testing procedures. Contractor must provide a minimum of three references supporting its claim of experience for similar projects within the two years prior to this bid. Documentation must be included with the bid documents submitted.

C. Contractor must have been in business and in the business of installing telecommunications systems, continuously, for a period of at least three years, prior to the date of this bid.

D. Contrcator must have an RCDD on staff.

1.06 SUBMITTALS

A. General: Comply with the requirements of section 26 05 00 - Submittals.

B. Submit complete list of all items of materials to be furnished, and installed to the owner for compliance review prior to purchasing the materials. Submittals shall include:
   1. Complete bill of materials and equipment, including a complete listing of the characteristics of the equipment as specified.

2. One line diagram indicating all system connections, all closet locations, rack arrangements, cabinets, and workstation outlets.
3. Fiber frame Rack and communications cabinet layouts and dimensions.
4. Samples of proposed cable markers and labeling, and patch panel and connector block labeling and color-coding.
5. List of instrumentation to be used for system testing, including certificate of manufacturers calibration.
6. 1/4th scale plan of all telecommunications rooms and closets, indicating proposed layout of all equipment and cable trays, troughs, and runways.
7. Manufacturer's warranty application for the indicated project.
8. Schdule of work completion coordinated with the General Contractor.

C. Submit Contractor's qualifications as outlined in Section 1.03 above.

D. Submit "as-built" record drawings at the completion of the installation and testing.

E. The Contractor shall submit all testing documentation prior to acceptance of the work by the Owner.

F. Contractor shall submit to the Owner, in writing, 48 hours advance notice when testing of optical fiber cable will begin.

1.07 GENERAL REQUIREMENTS

A. The voice and data communications system shall consist of four components:
1. An optical fiber backbone (data).
2. A copper twisted-pair backbone (voice).
3. Twisted pair copper workstation cabling (voice and data).
4. Twisted pair copper cabling for wireless telecommunications system antennae.

B. Each building and floor shall be connected via a single cable, multi-stand, composite, and optical fiber cable to a Main Distribution Frame (MDF). Individual Intermediate Distribution Frames (IDF) shall be located at each building or floor for termination, and cross-connection/patching of horizontal copper station cabling. Each optical fiber cable shall originate at the MDF and shall be terminated at its respective IDF. Additional IDF's shall be provided where noted on the drawings.

C. All optical fiber cables shall be enclosed in innerduct installed in conduit.

D. All copper backbone cables shall be routed along with the fiber cable, shall originate at the MDF, and shall terminate in their respective IDF.

E. From each IDF, one or more twisted-pair copper cables shall be routed to each data and voice outlet location, (and one cable to each wireless antenna location), as indicated on the drawings.
1. The wiring system shall be provided and installed per TIA / EIA-568-B star wiring topology and shall be Category 6 rated for both data and voice.
2. Unshielded twisted pair (UTP) cable, installed for high-speed data application, shall not exceed 295 feet in length between terminations.

F. Terminations:
1. All fiber strands shall be terminated with connectors and lands on fiber interconnect equipment.

2. All data cables and wireless communications cables shall be terminated on modular patch panels.
3. All voice cables shall be terminated on wiring blocks.
4. All active equipment will be provided and installed by the owner.

G. The MDF and IDF will also house active data distribution equipment provided by the owner, possibly including but not limited to local area network hubs and switches, optical fiber transceivers, wireless communication systems base stations and concentrations routers, and servers. This Contractor shall coordinate with Owner's network integrator to ensure that data rack and cabinet layouts fully accommodate all owner-provided equipment.

1.08 FUNCTION AND OPERATION

A. The function of the data communications cable system is to transmit data signals from a central location to multiple individual data outlet locations. Upon completion of the work outlined in this specification, the entire cable system, including cable, and communications outlets shall be tested to (and meet) Category 6 compliance.

B. Upon completion of the work, the multimode optical fiber cable system shall be capable of 10 Gb/s data rates over a distance of 300 meters and of transmitting signals with a minimum bandwidth of 200 MHz at both 850 and 1300nm. The cumulative signal loss, through connectors, jumpers, couplers, and fiber cable, shall be less than 10 dB.

C. Upon completion of the work, the singlemode optical fiber cable system shall be capable of transmitting signals with a bandwidth of up to 500 MHz at both 1310 and 1550 nm. The cumulative signal loss, through connectors, jumpers, couplers, and fiber cable, shall be less than 10dB.

1.09 GUARANTEE

A. The Cabling System shall meet the performance requirements of the ANSI/TIA/EIA-568-B standard. The warranty on the material, services, and operation of the cabling system to this specification must be for a period of at least 15 years. The connecting hardware shall have a lifetime extended warranty against defects in material and workmanship.

B. The warranty must include the following statements regarding the cabling system:
1. "Will support and conform to TIA/EIA-568-B specifications covering any current or future application which supports transmission over a properly constructed horizontal cabling system premises network which meets the channel and/or basic link performance as described in TIA/EIA-568-B".
2. "Will be free from defects in material or faulty workmanship for the entire warranty period".

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Copper & Fiber Cable

Superior Essex, Avaya, Siecor, or equal

B. Fiber Optic Distribution Panels and Interconnects

Leviton, ADC Telecommunications, Siecor, or equal

C. Copper Patch Panels and Devices

Leviton, Avaya, Ortronics, Siemon, or equal

D. Cabinets and Racks

ESW (Encore), Leviton, Homaco, Chatsworth, or equal

E. Innerduct

Endot, or equal

F. Firestopping

STI (Specified Technologies, Inc.), 3M, or equal

G. Steel Wire Cable Tray:

Mono-Mesh, GS Metals, or equal

H. Cable Runway:

B-Line, Chatsworth, Mono-System Inc, or equal

I. Fiber Optic Cable Trough:

ADC Telecommunications, or equal

2.02 MATERIALS

A. Copper Cable:

1. Inter-building outside-plant cable (voice only) shall be multi-pair unshielded twisted pair type, #24 AWG, Superior Essex type ANMA or equal. The wiring shall comply with the following:
   a. Maximum DC resistance: 26.5 Ohms Per 1000 feet
   b. Maximum mutual capacitance at 1 kHz: 15.7 nF per 1000 feet
   c. Nominal attenuation @ 1 MHz: 6.7 db per 1000 feet
   d. Characteristic impedance @ 1.0 Hz: 1.0 MHz: 100 Ohms (+) 15%
2. Interior backbone cable (voice only) shall be multi-pair unshielded twisted pair type, #24 AWG, Superior Essex AR Series Riser Cable type ARMM or equal. The cable sheath shall be armored and riser-rated (CMR). The cable shall meet ANSI / TIA / EIA-568 standards for 100 ohm category 3 UTP multi-pair backbone cable and also comply with the following:
   a. Maximum DC resistance: 26.5 Ohms per 1000 feet
   b. Maximum mutual capacitance at 1 kHz: 15.7 nF per 1000 feet
   c. Nominal attenuation @ 1 MHz: 7.6 db per 1000 feet
   d. Characteristic impedance @ 1.0 - 16.0 MHz: 100 Ohms, (+) 15%
3. Inter-building and interior backbone cable shall meet the following requirements.
   a. Cable Conductors specifications:
      1) 24 AWG solid copper conductors.
      2) Individual conductors PVC jacketed.
   b. Cable construction specifications:
      1) Core wrap - Polypropylene film.
      2) Shield - Corrugated aluminum tape bonded to riser-rated jacket.

c. Cable Jacket marking: Must be legible and shall contain the following information:
   1) Manufacturer's name.
   2) Copper conductor gauge.
   3) Pair counts.
   4) UL and CSA listing.
   5) Manufacturer's trademark.
   6) Category rating.
   7) Sequential foot markings, in 1-foot increments.
d. Cable jacket shall be gray with black lettering.
e. Backbone cabling shall have the following characteristics:

4. Horizontal distribution cable (for both data and voice) in conduit shall consist of four unshielded twisted pairs, #23 AWG, Superior Essex Data Gain Cat. 6 type CMR or equal, with the following characteristics:
   a. Maximum DC resistance: 9.4 Ohms per 100 meters
   b. Maximum mutual capacitance @ 1kHz: 14 nF per 1000 feet
   c. Maximum attenuation @ 250 MHz: 33 db per 100 meters.
   d. Characteristic impedance @ 1.0 - 250.0 MHz: 100 Ohms (+) 22%
   e. Meet or exceed TIA/EIA-568-B, Category 6.
   f. ACR: 7dB @ 250 MHz
5. Horizontal distribution cable (for both data and voice), where not installed in conduit in plenum spaces, shall be plenum rated and consist of four unshielded twisted pairs, #23 AWG, Superior Essex Data Gain Cat. 6 type CMP or equal, with the following characteristics:
   a. Maximum DC resistance: 9.4 Ohms per 100 meters
   b. Maximum mutual capacitance @ 1kHz: 14 nF per 1000 feet.
   c. Maximum attenuation @ 250 MHz: 33 db per 100 meters.
   d. Characteristic impedance @ 1.0 - 250.0 MHz: 100 Ohms (+) 22%
   e. Meet or exceed TIA/EIA-568-B, Category 6
   f. ACR: 7 dB @ 250 MHz.
6. Horizontal cable for both data and voice shall meet the following requirements.
   a. Cable jacket marking: Must be legible and shall contain the following information:
      1) Manufacturer's name.
      2) Copper conductor gauge.
      3) Pair counts.
      4) UL and CSA listing.
      5) Manufacturer's trademark.
      6) Category rating.
      7) Sequential foot markings, in 2-foot increments.
   b. Data station (and wireless antenna) cable jacket shall be blue with black lettering and shall be in 1000-foot boxes.
   c. Voice station cable jacket shall be white with black lettering and shall be in 1000-foot boxes

d. Type CMR cable shall be solid annealed copper with polyolefin insulation round design with flexible web separator with flame retardant PVC jacket.
e. Type CMP cable shall be same as Type CMR except with type FEP insulation.

7. Data Equipment Inter-Connect patch Cords: Four twisted-pair stranded, Category 6 Enhanced Power Sum, 24 AWG copper conductors. Individual conductors PVC jacketed. Each conductor provided with unique color code. Manufacturer terminated on each end with Avaya Category 6 8-pin / 8-position modular plug to be pinned as per EIA / TIA 568 B. Connector plug shall be polarized to prevent polarity reversal or split pairs, and shall be factory-marked to indicate top of connector. Inter-connect cord shall be UL listed.
   a. The Contractor shall complete data interconnects between patch panels and Owner-provided active network electronics.
   b. Minimum performance specifications:
      1) The data equipment inter-connect cable must meet the impedance, attenuation and NEXT requirements for Category 6 Horizontal Cable of EIA / TIA 568 B.
   c. Lengths as required running from the data station cable terminations to the ports on equipment mounted in any rack position. Minimum length shall be 5 feet and the maximum length shall be 15 feet.

B. Fiber Optic Cables
1. The mechanical and environmental specifications for fiber optic cable shall be in accordance with ANSI/EIA/TIA-492AAAA, Bellcore, FDDI, and NEC sections 770-6(b) and (c) standards.
   a. Cable shall meet/exceed Bellcore TR-TSY-000020, FDDI and NEC sections 770-6(b) and (c) standards.
   b. Strand counts shall be per drawings.
2. Multimode inter-building (exterior) backbone fiber optic cable shall be outside plant rated, with number of multimode strands as noted on the drawings, with dielectric central member, non-armored, water-blocking material, ripcord, dielectric strength member over loose buffer tubes, and polyethylene jacket, Superior Essex TeraGain (11---6G01) Loose Tube Single Jacket All-Dielectric Cable or equal, and shall meet/exceed the following cable characteristics:
   a. Multimode Core/Cladding size: 50/125um
   b. Maximum attenuation: 3.5 dB/km @ 850nm, 1.0 dB/km @ 1300 nm
   c. Minimum bandwidth: 200 MHz-km @ 850nm, 500 MHz @ 1300nm
3. Multimode indoor backbone fiber optic cable shall be plenum rated, with number of multimode strands as noted on the drawings, with dielectric central member, non-armored, ripcord, dielectric strength member over TB11 buffered fiber, PVC jacket, Superior Essex TeraGain (44---6G01) or equal, and shall meet/exceed the following the following cable characteristics:
   a. Multimode Core/Cladding size: 50/125um
   b. Maximum attenuation: 3.75 dB/km @ 850nm, 1.00 dB/km @ 1300nm
   c. Minimum bandwidth: 200 MHz-km @ 850 nm, 500 MHz-km @ 1300nm
4. Singlemode inter-building (exterior) backbone fiber optic cable shall be outside plant rated, with number of single mode strands as noted on the drawings, with dielectric central member, non-armored, water-blocking material, ripcord,

dielectric strength member over loose buffer tubes, and polyethylene jacket, Superior Essex (11---9T01) Loose Tube Single Jacket All-Dielectric Cable or equal, and shall meet/exceed the following cable characteristics:

a. Single mode Core / Cladding size: 8.31/125um
b. Maximum attenuation: 0.40 dB/km @ 1310nm, 0.30 dB/km @ 1550nm

5. Singlemode indoor backbone fiber optic cable shall be plenum rated, with number of single mode strands as noted on the drawings, with dielectric central member, non-armored, ripcord, dielectric strength member over TB11 buffered fiber, PVC jacket, Superior Essex (44---9101) or equal, and shall meet/exceed the following cable characteristics:
   a. Single mode Core/Cladding size: 8.3/125um
   b. Maximum attenuation: 0.40 dB/km @ 1310nm, 0.30 dB/km @ 1550nm
6. Composite singlemode/multimode inter-building fiber optic cable shall be non-plenum rated, with number of single mode and multi-mode strands as noted on the drawings, with dielectric central member, non-armored, water-blocking material, ripcord, dielectric strength member over loose buffer tubes, and polyethylene jacket, Superior Essex TeraGain Loose Tube Single Jacket All-Dielectric Cable or equal, and shall meet/exceed the following cable characteristics:
   a. Multimode Core/Cladding size: 50/125um
   b. Multimode maximum attenuation: 3.5 dB/km @ 850 nm, 1.0 dB/km @ 1300nm
   c. Multimode maximum bandwidth: 200 MHz-km @ 850nm, 500 MHz-km @ 1300nm
7. All cable assemblies are to be Leviton Opt-X type or equal.
8. General Fiber Optic Cable Requirements:
   a. See the Drawings for required fiber counts and routing.
   b. ANSI.EIA/TIA-568B-B.3 Addendum 1.
   c. The cable manufacturer must guarantee the supplied multimode fiber optic cable will meet the specifications covering latest following standards and network applications using standard off the shelf, non-proprietary network hardware:
      1) IEEE 802.3FOIRL10 Mbps
      2) IEEE 802.310 Base F10 Mbps
      3) FDDI 100Mbps
      4) IEEE 802.31000BaseLX1000Mbps 300 meters or less
      5) ATM OC-3155 Mbps
   d. The cable manufacturer must guarantee the supplied single mode fiber optic cable will meet the specifications covering latest following standards and network applications using standard off-the-shelf, non-proprietary network hardware:
      1) OC-12625 Mb/s
      2) OC-481024 Mb/s
      3) IEEE1000 Base SX1000 Mb/s
      4) ATM625 Mb/s
      5) ATM1.2 Gbps

6) Fibre Channel1.062 Gbps

e. Fiber optic cable sheath construction shall be of a tight-buffered MIC style design with integrated strength member.
f. The fiber optic cable shall have an integrated strength member, which is a high tensile strength dielectric providing axial strength and anti-buckling properties for the fibers.
g. The fiber optic cable shall utilize aramid yarn as a flexible strength member surrounding the buffered fibers beneath the cable jacket.
h. The individual fibers in a tight-buffered fiber optic cable shall be placed in groups of 6 or 12 fiber strands per subunit.
i. The individual subunits shall be color coded for easy identifications.
j. The cable tensile load rating shall be a maximum of 461 lbf for a 24-fiber count 6-fiber subunit.
k. The cable minimum bend radius at 0-150lbs pulling or handling load shall be 10 times the outside diameter of the sheath.
l. The cable minimum bend radius at 151-600 kbs pulling or handling load shall be 20 times the outside diameter of the sheath.
m. The fiber optic cable shall be low smoke, flame retardant and shall meet the flame test requirements of UL 910. It shall be UL listed as OFNP.
n. Tight-buffered multimode/single mode composite cable sheath jacket shall be orange in color with black lettering.

9. Multimode Fiber Optic Patch Cords:
   a. Fiber optic specifications:
      1) Fiber type: Multimode.
      2) Fiber material: Corning Infinicor 300 50/125 or Avaya 50/125.
      3) Buffer: 900 um, mechanically strippable PVC.
      4) Fiber strength: 110-kpsi minimum.
      5) Duplex
   b. Cable construction specifications:
      1) Duplex: Buffered fibers shall be supported in aramid yarn matrix.
      2) Cable listing: UL OFNR.
   c. Cable jacket marking: Must be legible and shall contain the following information:
      1) Manufacturer's name.
      2) Fiber size: 50/125
      3) Fiber grade: Enhanced.
      4) UL and CSA listing (OFNR).
      5) Manufacturer's trademark.
      6) Sequential foot markings, in 2-foot increments.
   d. Cable jacket shall be orange in color with black lettering.
   e. Minimum performance specifications as follows:
      1) Maximum attenuation: 3.0 dB/km @ 850 nm, 1.0 dB/km @1300nm
      2) Minimum bandwidth: 200 MHz-km @ 850 nm, 500 MHz-km @1300nm
   f. Multimode fiber optic connector shall be duplex SC.

g. Multimode fiver optic patch cables SC to SC shall be duplex with an oval over-sheath. Each multimode fiber shall be labeled 'A' or 'B' to provide fast identification of "Transmit" and "Receive" fibers in patching between network electronics and backbone connections. Fiber optic duplex patch cables shall be provided in a 15 foot length as follows:
   1) Avaya FL3EP-EP-15 or Leviton 62DSC-M05.

C. Data and Voice Outlets
1. Cable termination hardware shall be individual; Category 6 Channel rated Leviton (or equal) jacks for both data and voice. The listed product shall have the following characteristics:
   a. One eight-position, eight-conductor jack (nonkeyed), TIA/EIA-568-B Compliant, wired to T568B, Leviton category 6 extreme #61110-R*6 (* indicates color – see below).
   b. The cover of the information outlet shall be labeled above the jack. The number on the outlet jacks shall coincide with the identification requirements listed in Section 3.01-S-3 below.
   c. The color of all voice jacks shall be white.
   d. The color of all data jacks shall be blue.
   e. The color of all faceplates and blank inserts or visible mounting plates shall match the adjacent power or signal outlet covers on the project (provided under another section).
   f. The devices at outlets and the devices in the patch panels shall be of the same manufacturer and same type.
   g. See Drawings for number of jacks at each outlet, jack arrangement, and mounting type.
2. The 8-pin 8-position jacks at terminal blocks and at each 4-pair termination shall be labeled with laser-printed polyester self-laminating wrap-around labels.
   a. Eight-pin 8-position jack label-faceplates;
      1) All labels shall be polyester and white in color;
      2) All labels shall be 1.80-inch in width and 0.375-inch in length;
      3) Labels shall have an adhesive backing;
      4) Labels shall be attached to the faceplate by adhesive and clipping in behind the snap in clear plastic cover;
      5) Labels shall be laser printed with the labeling scheme as specified;
      6) Labels shall be Panduit Pan-CODE Laser Labels (PLL) part EFPL-1, Leviton LabelWare, or equal.
   b. Terminal block designation strip:
      1) All labels shall be polyester;
      2) Labels shall be white in color for 4-pai data station cable terminations, located within a blue plastic label holder;
      3) Labels shall be attached to the designation strip provided with the blue plastic holders;
      4) All labels shall be 7.88 inches in width and 0.50 inches in length;
      5) Labels shall have an adhesive backing;
      6) Labels shall be laser-printed with the labeling scheme as specified;

7) Labels shall be Panduit Pan-CODE Laser Labels (PLL) part number PLL-22-Y3-1, Leviton LabelWare, or equal.

D. Termination Hardware at MDF / IDF's (Voice)
   1. All cables installed for voice application shall be terminated in accordance with industry standards on 110S type wiring blocks.
   2. Avaya or Leviton 110A type wiring blocks with metal backboard category 6 insulation displacement style, or equal shall be installed with sufficient spacing to permit the orderly routing of jumper cables between wiring blocks, and wire management accessories shall be provided for each 110 block.
   3. UTP cable terminating blocks: Compact 110-type or equal Category 6 insulation displacement terminal blocks complete with mounting hardware, connecting blocks, retainers, wire guides, designation strips, etc, UL listed.
      a. Minimum performance specifications: Must meet EIA/TIA 568-B requirements for Category 6.
      b. Avaya Systimax or Leviton Category 6 - 110 Cross Connect System Terminal block kit in 300 pair configuration: 110PA2-300FT, with vertical cable manager: 188D3 or Leviton #41AB6-3F4.
      c. Leviton Category 6 300-pair Vertical Cord Manager, Basic Unit, with bottom cable tray, with vertical cable manager each side.
      d. Or equal.
   4. Wiring blocks, metal frame, and cable managers shall be mounted to plywood backboards. Each frame or wire management accessory shall be mounted such that its horizontal dimension is level. All blocks shall be aligned vertically. Each block shall be affixed to the plywood backboard by means of screws suitable for fastening to plywood. A minimum of four (4) of the mounting holes provided shall be utilized for fastening. Screws shall be tightened tot he extent that hey hold the frame or wire management accessory snug to the backboard, but not so tight as to distort or damage the device. Wiring blocks shall be terminated in accordance with the manufacturer's instructions and recommendations. Installation of wire management accessories shall also be conducted in accordance with the manufacturer's instructions and recommendations.
   5. Labeling at wire troughs and for all cable, jacks, and other elements of the voice/data cabling system shall follow TIA/EIA-606 Standards. Provide color-coded labels for all wiring blocks as follows:
      a. Interface to Site Cabling - Brown
      b. Interface to Equipment Cabling - Purple
      c. Interface to Horizontal Cabling - Blue
      d. Interface to Telephone Company - Green

E. Termination Hardware at MDF /IDF's (Fiber Optic)
   1. Optical Fiber Interconnect Equipment: Interconnect equipment shall be mounted on equipment racks. Interconnect equipment shall affixed to the rack by at least (4a) screws. The screws shall be the correct size and thread configuration for the holes in the rack. The screws shall be tightened to the extent that they hold the equipment firmly to the rack, without distorting the equipment or stripping the

threads. All optical fiber interconnect devices shall be assembled and installed in accordance with the manufacturer's instructions and recommendations.

2. Fiber Interconnect Equipment shall be of sufficient size to permit termination of all fiber strands, maintaining minimum bend radius for both multimode and singlemode cables, and maintaining required cable storage. In the event that an enclosure must be oversized (number of termination ports) due to manufacturer's product standardization, the next larger available enclosure size shall be utilized.
3. Adapter plates, which accommodate Duplex SC type connectors, shall be provided within each Fiber Optic Distribution Panel (unless otherwise noted on the drawings). Multimode and singlemode connectors (quantity and type as indicated on the drawings) shall be included on adapter plates.
   a. The duplex SC adapter at the main distribution frame (MDF) shall be mounted in a B-A configuration.
   b. The duplex SC adapter at each intermediate distribution frame (IDF) shall be mounted in an A-B configuration for cables coming from the MDF, and in a B-A configuration for cables going to an additional DF (if applicable) further downstream.
4. Fiber optic distribution panels shall be rack-mount type, utilizing Leviton Opt-X fiber System components, or equal, with fiber capacity as indicated on the drawings, equipped with snap-in adapter panels.
   a. Provide quantity of connector panels for complete termination of all fiber strands, complete with duplex SC adapters.
   b. Provide blank connector plates for all spaces not equipped with adapter panels.
5. All glass stands of each fiber optic cable shall be terminated on Leviton Fast Cure type duplex SC connectors which require no epoxy or heat cure devices, allow re-termination to reduce waste, and have the following characteristics:
   a. Multimode: ceramic ferrule
   b. Singlemode: ceramic ferrule
   c. 568SC style
   d. Plastic housing
   e. Low loss - 0.2 db (typical), 0.5 (guaranteed)
6. All inter-building fiber optic cables (loose tube type) shall be terminated at fiber optic distribution panels using a Leviton 49887 Series (or equal) buffer tube fan-out kit.
7. Labeling for fiber optic cabling and distribution panels shall match the labeling system for voice and data cabling and hardware.

F. Termination Hardware at MDF / IDF's (Data)
   1. All cables installed for data application shall be terminated in rack-mounted modular patch panels and the entire installation shall be in compliance with TIA/EIA-568-B Category 6 requirements.
   2. Data patch panels shall be Leviton Extreme 6 Category 6 discrete port-type. Port panels shall be certified by the manufacturer as suitable for 1000 Mbps data transmission. Patch panels shall be manufactured of aluminum or steel.

3. Wire management hardware shall be Leviton Versi-Duct 49265 Series, or equal, installed at both the top and the bottom and between each patch panel and along the sides of the rack for patch cable routing and management.
4. Wire managers shall be of sufficient width and depth to permit orderly routing of all patch cables at one hundred percent utilization.
5. Patch panels shall be mounted on equipment racks. Panels shall be affixed to the rack by at least four (4) screws. The screws shall be of the correct size and thread configuration for the holes in the rack. They shall be tightened to the extent that they hold the equipment firmly to the rack, without distorting the equipment or stripping the threads.
6. Patch panel quantity of ports as noted on the drawings.
   a. 24 Port -Leviton 49270-U24
   b. 48 Port -Leviton 49270-U48

G. Equipment Racks
1. Floor mounted open bay relay type racks shall be utilized in equipment rooms and voice/data closets to provide adequate mounting space for patch panels, wire managers, fiber optic distribution panels, and network integration equipment.
2. Equipment racks shall be supported or braced at the top if each rack by a length of unistrut. Unistrut shall be attached to full height wall by the appropriate fastening hardware. Equipment racks shall have the following physical characteristics, unless otherwise noted:
3. Equipment Racks shall be 7-feet X 19-inche 6061-T6 aluminum, bolt-down EIA standard equipment rack, with 1-1/4 X ½-inch front and rear flange hole pattern, 12-24 threaded holes, clear finish, and self-support base, UL listed. Each rack line up shall be equipped with a rack storage drawer.
   a. Nineteen X 84-inch equipment rack, clear, Chatsworth 48353-503 or equal.
   b. Equipment cable guard, clear, Chatsworth 40058-519.
   c. Seismic gussets for each rack, black, Chatsworth 11592-701.
   d. Rack storage drawer, clear, Chatsworth 41050-519.
   e. Rack storage drawer, clear, Chatsworth 11505-519.
   f. Vertical plug strip, ivory, Wiremold, Plugmold 2400, V24GB606.
4. Horizontal cable trough for equipment racks.
   a. Patch cable organizers with 6.00 X 2.80-inch horizontal rings for routing patch cables across equipment racks to equipment ports. Panel shall fit in 2 rack units and match the color of the equipment racks, Chatsworth Products, clear. Chatsworth Products Large Horizontal Ring Panel 11564-519 or Levtion #49253-BCM.
5. Vertical rack cabling sections:
   a. For use on the vertical edge rail of the equipment racks as indicated on Drawings.
   b. Seven-foot X 12.75-inch rectangular channel with latching cable retainers shall be Chatsworth Products Inc., Two-Sided Vertical Rack Cabling Section 11729-503, and color shall be the same as the equipment racks, clear finish.
6. Fiber patch cord management:

a. For use in the vertical rack cabling section for the routing of fiber optic patch cables.
b. Two-inch square, covered, yellow in color, slotted duct shall be 6 feet long, with cover. Duct shall be ADC FGS-MSHS-C.

H. Communication Cabinets - Wall Mounted
1. Wall mounted communication cabinets shall be utilized wherever noted on the drawings, to provide adequate mounting space for patch panels, wire managers, fiber optic distribution panels, and network integration equipment.
2. Height of cabinet shall be as noted on the drawings. The cabinet shall be provided with 19" equipment mountings and shall have the following physical characteristics:
   a. Depth suitable for mounting of equipment up to 18 deep.
   b. Cabinet shall be supplied with front and rear equipment mounting rails, drilled and tapped to a 5/8", 5/8", 1/2" hole pattern.
   c. Finish shall be black powder coat finish.
   d. Locking front Plexiglas door.
   e. Vented top and bottom/back open for cable entry.
3. Wall mounted communications cabinet shall be ESW W-00440 - Wall Box - Chasis Series or equal, minimum 30" deep, 24" wide and 36" high.

I. Fiber distribution frames:
1. Fiber distribution frame, front facing, 23 x 84-inches. Provide fiver optic connector modules for each fiber optic distribution frame as indicated on the Drawings. Provide 5-inch lower cable through, vertical cable managers and end panels. Ensure that support columns for cable tray and ladder have adequate clearance behind the vertical cable managers. Provide blank panels for each position not occupied by a termination panel or shelf.
   a. Front facing fiber distribution frames: ADC F3DF PWUEF-7ER1S
   b. Interbay management Panel: ADC F3F-IMP070
   c. End panel mounting kit: ADC F3F-ENDL01
   d. End panel: ADC UGEP-7PW
   e. Lower horizontal cable trough: ADC F3C-ACCTO7
   f. Blank panels: FSF-23BLNK.
2. Optical fiber shelves on fiber distribution frames: Fully enclosed fiber optic termination self. Rack-mountable vertically in 8-1/2 inches of rack space. Front access only. Complete with all necessary cable clamps, couplings and connector bulkheads.
   a. Fiber optic shelves shall have a Plexiglas latching front panel. Labeling and connectors shall be clearly visible with front panel open or closed.
   b. The fiber optic shelves shall be provided with SC type terminations as indicated on the Drawings.
   c. Fiber optic adapter identification cards shall be provided with the panel for the front and rear labeling of the adapters and the panel.
   d. Fiber optic shelves shall be 23-inches rack mount version.
   e. Cable clamp for 0.20-inch through 0.40-inch cable, ADC FL2-ACC009.
   f. Cable clamp for 0.50-inch through 0.80-inch cable, ADC FL2-ACC007.

g. Bonding/grounding kit, ADC FL2-ACC006.

3. Fiber optic termination panel labels.
   a. Fiber optic termination panels shall be labeled using the plastic panel provided by the termination panel manufacturer. The plastic panel shall be overlaid with a one-piece adhesive backed-sheet. Contractor shall cut the sheet to size.
   b. Eight-and-a-half-inch x 11-inch laser printable adhesive backed sheets: Avery 5165.

J. Steel wire cable tray.
   1. Wire cable tray for communications cables: Wire tray shall be constructed of welded wire mesh with a continuous safety-edge wire lip. Provide a mesh cable tray system for continuous support of communications cables. The wire cable tray shall be manufactured system complete with all required mounting hardware and withal fittings and cables needed to form a bonded (grounded) system; straight and curved sections in specified widths.
   2. The wire cable tray shall be manufactured from carbon steel high strength wire. The wire shall be welded, bent and surface treated after the wire manufacturing process.
   3. The wire tray finish shall be hot dip galvanized.
   4. The maximum wire mesh size shall be 4 inches by 2 inches.
   5. The wire tray depth shall be 2 inches.
   6. The wire tray width shall be 12 inches.
   7. Each Section of the wire tray shall be bonded to a continuous insulated #6 AWG copper ground wire.

K. Cable runway:
   1. Cable runway: UL listed, tubular steel side rails, 1 ½ - inch x 0.375-inch, with 1-1/2-inch stringers on 9-inche centers, 1-1/2-inch x 1-inch welded rungs, and tubular removable posts; yellow zinc dichromate (UZN) finish, complete with all required mounting hardware, fittings and cables needed to form a bonded (grounded) system.
      a. Fifteen-inch cable ladder: B-Line SB Series, or equal.

L. Fiber optic trough
   1. Fiber optic troughs shall be installed between the front-facing fiber optic distribution frames and the equipment racks for routing of fiber optic patch cable.
   2. The fiber optic trough shall be 4-inch, yellow, ADC Fiber Guide Fiber Management system, or equal.
   3. All components to be yellow in color.
   4. Fiber optic troughs shall not be covered.
   5. Fiber optic troughs shall be marked with the manufacturer's name, the product name, number, and material designation and UL designation.

PART 3 - EXECUTION

3.01 CABLE AND WIRE INSTALLATION:

A. This contractor shall be responsible for the provision and installation of all data and voice cables including all supports, hangers, and hardware necessary for a complete

and fully concealed installation. Under no circumstances shall cables be routed exposed (unless otherwise noted in the documents) or laid on the suspended ceiling. This contractor shall be responsible for providing and installing all necessary cable support hardware to meet Category 6 requirements. Refer also to Section 26 05 00 Basic Materials & Methods:

1. T-Bar Suspended Ceilings: Copper station cabling may be run outside of conduits when routed above T-Bar suspended ceilings. Cables installed in this fashion are to be run horizontally in bundles and tied down neatly suspended from J-hooks, and well clear of any light fixtures or other electrical appliances that may affect data transmissions.

B. At each voice/data closet cables are to be segregated by type, neatly tied together and routed to the patch panels and 110 blocks. All cables shall be tagged.

C. Cable distances from patch panels to data outlet shall not exceed 295 feet. This contractor is responsible to ensure the distance specified is not exceeded.

D. Care shall be exercised in routing both station and backbone/tie cables so as to avoid areas where sources of high levels of EMI (such as electric motors, transformers and fluorescent lighting fixtures) may exist. Maintain a minimum distance of 12 from these sources when run parallel. Cross at 90-degree angles where crossing must occur.

E. Each station cable shall be "home run" (no splices or cross connection points) between jacks and patch panels or 110 blocks.

F. All openings or raceway transitions through firewalls and floors shall utilize UL listed fire-rated penetrations.

G. The fiber optical cable manufacturer's installation instructions shall be followed in order to avoid damage during placement within the facility. All fiber optic cable shall be placed within innerduct to provide mechanical protection and to provide visual warning or caution when handling or other work operations are performed adjacent to the installed fiber cable.

H. No more than (2) 90-degree bends shall be allowed on all conduit runs for the horizontal voice/data cabling system, without an intermediate pullbox or junction box.

I. Multi-Pair Riser Cable: Install all riser cables in accordance with the Drawings. All riser cables will be "punched down" on terminating blocks in the telecommunications rooms. Cables running on steel wire cable tray within the telecommunications rooms throughout the building shall be neatly placed and lashed to the horizontal and vertical steel wire cable trays at 2-foot intervals, not to exceed every other rung, plus all locations where the cable changes direction.

1. Do not bend Category 3 ARMM copper riser cables to a radius of less than 10 times the cable diameter.
   a. ARMM-200, 11-inch minimum bend radius;
   b. ARMM-300, 13-inch minimum bend radius.
2. Contractor shall use only equipment designed for placing ARMM copper riser cables in telephone conduits, sleeves and cable trays.

J. Riser and OSP cable terminations.

1. Twisted pair metallic cables: Cable pair twists shall be maintained up to within ½-inch of the point of termination for Category 3 riser distribution cables. For other riser distribution cables, maintain twists as close as practicable to the point of termination. Under no circumstances shall cable pairs be untwisted or otherwise altered prior to termination.

K. Station cable terminations.
   1. Cable pair twists of Category 6 Cable shall be maintained within 0.5-inch of the point of termination. Under no circumstances shall cable pairs be untwisted or otherwise altered prior to termination.
   2. Do not bend Category 6 station cables to a radius of less than 10 times the cable diameter - approximately 2-inches.
   3. Allow slack in Category 6 Cable bundles at entrances and exits of conduit sleeves and at transitions from "J" hooks to cable trays. Never pull cables tight at cable tray transitions; doing so may damage the cables by crimping them on the cable tray side of the bundles.
   4. Keep the cable evenly distributed within the cable tray. Do not allow the cables or bundles to be pulled tight against the splines or to be unevenly balanced on one side of the tray.
   5. Bundles of station cable in floor slots shall not exceed 2.5 inches in diameter, and shall be spaced 4 inches apart for proper fire stopping of the floor slot.
   6. Bundles of station cable in 4-inch floor sleeves shall not exceed a 39 percent fill.

L. Fiber optic cable and termination installation.
   1. The Contractor shall place all optical fiber backbone cabling in accordance with these Specifications, and as indicated on the Drawings.
   2. Fiber optic cables: After dressing the cable to its final destination, sheath shall be removed to a point that allows the strands to be placed in break out kits to be splayed and terminated in a neat and uniform fashion. At this point all fibers shall be terminated in strict compliance with the manufacturer's submitted instructions.
      a. Cable sheaths shall be clamped to the outside of fiber termination shelf. The cable clamp shall be manufactured by the manufacturer of the termination shelf and shall be designed to clamp outside plant fiber optic cable sheaths.
      b. The tight-buffered sheath cable shall have the OFNR sheath and Kevlar strength members terminated at the cable clamp on the outside of the shelf. Only the buffer tubes and buffered fibers shall continue into the termination shelf.
      c. Provide a minimum of 48-inches of subunit buffer tube and 40 inches of buffered fiber inside of the termination shelf.

M. Where fiber or copper cable enters an equipment room or voice/data closet, it shall be affixed to the backboard via "D" Rings and cable ties. All cable shall be neatly bundled, combed, and tied. All exposed cable runs shall be horizontal or vertical, and bends shall comply with manufacturer required minimum cable bending radii.

N. All openings into wall mounted cabinets and fiber optic distribution panels shall be grommet.

O. Fiber innerduct shall be installed in accordance with manufacturers instructions and industry standards. Within the equipment rooms, the innerduct shall extend from the end of conduit to (4) feet above the floor and shall be affixed to the backboard by means of clamps designed for that purpose. Care shall be taken to avoid kinking the innerduct or applying excessive tension during the installation process.
   1. Innerduct runs do not have to be continuous throughout. Breaks are acceptable at pull boxes where required. This contractor is responsible for determination of actual lengths of innerduct required. This contractor is responsible for determination of actual lengths of innerduct required. Enough innerduct shall be provided and installed to extend from the fiber service loops at the MDF to the fiber service loops at each IDF. In pullboxes, segments of innerduct shall extend a minimum of (12) inches into the pullbox.

P. During installation of optical fiber cable in conduit, special care shall be taken to avoid damage to the cable. While under pulling tension, the cable shall not be bent into a curve with a radius of less than (20) times the cable diameter. Pulling tension shall not exceed manufacturer's recommended maximum tensile load. Contractor shall utilize a winch with tension control or a "break-away" link designed to break away at or below the recommended maximum tension.

Q. A minimum (30) foot service loop shall be provided at each terminal location for all fiber optic cables. Provide service loop via backboard attached cable reels.

R. Each end of gel-filled voice cable shall be damned at the breakout point-using manufacturer recommended blocking kit. All pairs extending beyond the breakout point and dam shall be cleaned such that no gel remains.

S. Provide (1) patch cable for each activated jack on the project. Lengths shall be 5ft. minimum or as required for the MDF or IDF design.

T. Provide one fiber jumper for each two strands of fiber at each equipment rack, with duplex SC type connectors unless otherwise noted on the drawings.

U. Provide 3 pair jumper cables as required for all voice system cross-connects at telephone backboards.

V. Equipment racks and Frames.
   1. Equipment racks shall be assembled and mounted in locations noted on the drawings and as described herein. Each rack shall be assembled in accordance with the manufacturer's instructions and recommendations. Each rack shall be mounted such that the side rails are plumb. Each rack shall be affixed to the building structure at each of the mounting holes provided. Attachment shall be by 1/2" X 1-1/4" lag bolts. A 3/8" pilot hole shall be drilled for each lag bolt. Each bolt shall be tightened to the extent that it holds the mounting hardware firmly, but not so tight as to distort the hardware or strip the threads
   2. Provide seismic support and bracing for all equipment racks and fiber distribution frames installed under this work. Equipment racks and distribution frames must be structurally designed to accommodate cable loads. No other support mechanism will be supplied. Comply with Division 1 of these Specifications. Provide seismic design calculations and seismic design drawings prepared by the contractor's structural engineer for coordination and approval by

Owner's Representative prior to fabricating or installing any supports. In general, provide support only from floor slabs, beams, columns, or structural walls, (such as shear walls). Do NOT use existing or new partitions to provide either vertical or lateral support UNLESS the seismic design calculations and drawings demonstrate that the partition, either with or without reinforcement, is able to support the seismic and other loads. Any proposed reinforcement to be the responsibility of the Contractor.

3. Nineteen-inch relay racks:
   a. Assemble equipment racks with cable management hardware specified.
   b. Fasten the equipment racks to the steel wire cable tray or cable ladder with equipment rack brackets.
   c. Place a base dust cover panel over the area between the front and rear base flange of each equipment rack.
   d. Place horizontal ring style cable managers in the racks at the positions shown on the drawings. Relocate the cable managers within the racks as required to accommodate the installation of network electronics and to manage the copper and fiber patch cables installed for use with this system.
   e. Horizontal cable troughs for managing patch cables routing to equipment ports shall be placed on equipment racks.
      1) Six horizontal ring panels shall be placed in 7-foot equipment racks.
      2) Six Philips head screws, threaded to the 12-24 threading of the equipment racks shall be used to attach each horizontal trough.
   f. A vertical rack cabling section shall be placed on each of the 2 vertical edge rails of the equipment racks. Attach the 2-sided vertical rack cabling section to the equipment racks at the location of the threaded inserts. The 2-sided vertical rack cabling section shall be bolted to the threaded inserts in the side rails of the each equipment rack with four 1/2 -inch hex head bolts and lock washers.

W. Labeling: Labeling shall include, but not be limited to:
   1. Labeling telecommunications outlet faceplates;
   2. Labeling station cables;
   3. Labeling terminal blocks;
   4. Labeling fiber optic cable sheaths;
   5. Labeling fiber optic and copper splice closures;
   6. Labeling fiber optic stands;
   7. Labeling fiber termination panels;
   8. Labeling of telecommunications equipment racks and fiber frames;
   9. Labeling of telecommunications pathways, including conduits, steel wire cable trays, cable runway and pullboxes;
   10. Labeling of all grounding conductors and ground bars in the Intermediated Distribution Facilities (IDFs) and Main Distribution Facility (MDF).
   11. The intent of the final labeling is to allow the Owner or persons contracted by the Owner to identify any part of the structured cabling system through physical identification of the components and their related components at the specified

access point without the use of electrical, electronic or mechanical means of identification.

12. Equipment rack and cable tray / pullbox labels:
    a. Equipment Racks shall be clearly labeled as follows:
        1) Labels shall be adhesive backed individual letters and numbers.
        2) Individual letters shall be 3/4*-inch in width and 1-inch in height.
        3) Individual characters shall be self-spacing by simply butting the individual characters against each other in a row.
        4) Characters shall be either white or yellow on a black background.
        5) Labels shall be designed for exposed outdoor applications.
        6) Labels shall be:
            (a) 3M Scotchcal 5003 Non-Reflective Lettering Systems.
            (b) Panduit, PVL100YB.
            (c) Or equal.
    b. Fiber Frame Labeling:
        1) Frame shall be provided with a frame identification placard;
        2) Placard shall be 12.75-inches wide x 1.39 inches high and shall point down at a 37-degree angle.
        3) Individual rack identification signs shall be laser printed with 1-inch high characters and shall be laminated prior to placement in the identification placard;
        4) Characters shall be black on a white background;
        5) Identification placard shall be Norcal Metals NC-D1185-2, or equal, no known equal.
        6) Printing and lamination shall be by Contractor.
    c. Cable Tray Labeling:
        1) Cable tray shall be provided with a label clip fastened to the underside.
        2) Label clip shall be 3.94-inches wide by 0.63-inch high and shall attach to the cable tray without the use of additional fasteners;
        3) Label clips shall be attached to each label clip:
            (a) All labels shall be polyester with white color;
            (b) All labels shall be at least 3.00 inches in width and 0.38-inch in length;
            (c) Labels shall have an adhesive backing;
            (d) Labels shall be attached to label clips with the adhesive back self-laminating portion;
            (e) Labels shall be laser printed with the labeling scheme as specified;
            (f) Label shall be 0.25-inch high, Ariel San Serif;
            (g) Labels shall be Panduit, Pan-CODE Laser Labels (PLL) part number PLL-19-Y2, or equal.
    d. Labeling at Pull Box:
        1) Cover and interior labeling for pull box:
            (a) All labels shall be polyester with white color;
            (b) All labels shall be at least 1.88- inches in width and 0.83-inch in length;

(c) Labels shall have an adhesive backing;
(d) Labels shall be attached on cover and interior of pullbox at locations indicated on the Drawings with the adhesive back self-laminating portion.
(e) Labels shall be laser printed with a labeling scheme approved by the Owner's Representative.
(f) Label shall be 0.25-inch high, Ariel San Serif;
(g) Labels shall be Panduit, Pan-CODE Laser Labels (PLL) part number PLL-19-Y2, or equal.

2) Cover and interior labeling for conduit at pull box:
(a) All labels shall be polyester with white color.
(b) All labels shall be at least 1.88- inches in width and 0.83-inch in length;
(c) Labels shall have an adhesive backing;
(d) Labels shall be attached on cover and interior of pullbox with the adhesive back self-laminating portion at location where conduit enters the pullbox.
(e) Labels shall be laser printed with a labeling scheme approved by the Owner's Representative.

13. Copper Riser- cable sheath labels:
a. Copper riser cable sheaths shall be labeled with machine stamped stainless steel tags that shall be tie wrapped to the cable sheath.
1) All tags shall be 316-stainless steel.
2) All tags shall be 0.75-inches in width and 3.5-inches in length;
3) Tags shall have two .30 holes punched at each end;
4) Tags shall be attached to cable sheaths with Panduit standard width stainless steel tie wraps.
5) Tags shall be machine stamped or engraved with the labeling scheme as specified;

14. Copper station – cable sheath labels:
a. Copper station cable sheaths at 8-pin 8-position jacks, at junction boxes, enclosures, and pull boxes shall be labeled with laser-printed polyester self-laminating wrap-around labels.
1) All labels shall be polyester with white color.
2) All labels shall be at least 1.00- inches in width and 1.33-inch in length; with a 0.5-inch x 1-inch printable area;
3) Labels shall have an adhesive backing;
4) Labels shall be attaché to cable sheaths by wrapping around the sheath with the adhesive back self-laminating portion;
5) Labels shall be laser printed with the labeling scheme as specified;

15. Copper and fiber optic data interconnect cable sheath labels:
a. Copper data interconnect cable sheaths shall be labeled with laser printed polyester self-laminating labels at each end.
1) All labels shall be polyester with white color.

2) All labels shall be at least 1.87- inches in width and 3.167-inch in length; with a 0.5-inch x 1-inch printable area;
3) Labels shall have an adhesive backing;
4) Labels shall be attached to cable sheaths by wrapping around the sheath and creating a flag with the label body and clear laminating portion.
5) Labels shall be laser-printed with the labeling scheme as specified.

16. Cable / outlet / jack / termination identification:
    a. Each copper cable, its associated 568A jack at the outlet, and the associated C-4 connecting block on the terminal block or patch panel shall be labeled with a unique identifier consisting of the following:
        1) The IDF room number where the station cable is terminated, ###.
        2) The end user room number in which the 4-pair cable is terminated and the telecommunications outlet is located, ###.
        3) A 3-digit serial number, rest to 001 for each room, which sequentially identifies each telecommunications jack / cable in a room, ###.
        4) The type of service provided by a Particular cable, either D for data or V for voice.
        5) Example of IDF 107, user room 129, jack /cable number 1 (data cable): 107-129-001-D.
    b. The following are examples of the numbering scheme:
        1) IDF room 1.1, User Rm. 111, Jack/ cable 1, Data line.
           1.1-111-001-D
           (a) IDF Number: 1.1
           (b) Room Number: 111
           (c) Serial Number: 001
           (d) Data Line: D
        2) IDF room 1.1, User Rm. 106, Jack / cable, Voice line.
           1.1-106-001-V
           (a) IDF Number: 1.1
           (b) Room Number: 106
           (c) Serial Number: 001
           (d) Voice Line: V
17. Cable identification:
    a. Each fiber optic backbone cable sheath shall be labeled with a unique identifier as shown on the Drawings.
    b. Label the cable sheath at the termination shelf and on the innerduct as the fiber optic cables pass through IDFs and pull boxes.
    c. Each SC connector in each termination shelve shall be labeled with a unique identifier as noted on the Drawings.
18. Cable sheath identification:
    a. Identify multi-pair copper riser cable sheaths with machine-generated labels at the following locations:
        1) Within 12 inches of the point that the cable exits the top or bottom of the 110P-type terminal block column.
        2) Within 12 inches of the point that the cable enters a splice.

3) At 40-foot intervals above T-Bar ceilings.
4) At pull boxes
5) Within 12 inches of the point that the cable enters or exits wall and floor sleeves.

19. Cable pair identification:
    a. Identify all riser cable pairs in 5-pair increments on a 110 terminal block designation strip. The numbering shall be 4 digits beginning with "0001" and continuing through "0800". The Contractor shall provide white, laser printer generated designation strips.
    b. Identify all riser cable pairs in 5-pair increments on 25-pair connectors. The numbering shall be 4 digits beginning with "0001" and continuing through "0800".
20. Warning Tags: At each location where fiber cable is exposed, it shall be marked with warning tags. These tags shall be yellow or orange in color, and shall contain the warning: "CAUTION FIBER OPTIC CABLE". The text shall be permanent, black, block characters, and at least 3/16 high. A warning tag shall be permanently affixed to each exposed cable or bundle of cables, at intervals of not more than (5) feet. Any section of exposed cable, which is less than five (5) feet in length, shall have at least one warning tag affixed to it.

3.02 GROUNDING SYSTEM AND CONDUCTORS

A. Bonding and Grounding:
    1. Communication bonding and grounding shall be in accordance with the NEC and NFPA. Horizontal cables shall be grounded in compliance with ANSI/NFPA 70 and local requirements and practices. Horizontal equipment includes cross connect frames, patch panels and racks, active telecommunication equipment and test apparatus and equipment.

B. Telecommunications Bonding Backbone:
    1. Provide a Telecommunications Bonding Backbone utilizing a minimum #6 AWG bonding conductor (or as shown on drawings) that provides direct bonding between equipment rooms and telecommunications closets. Connect this bonding backbone cable to the main grounding electrode system at the electric service switchboard.
    2. Provide a copper ground bar at each tel/data equipment room or rack location, connected to the bonding backbone.
    3. Provide a #6 AWG stranded copper cable from each ground bar to each adjacent rack or cable trays system.

3.03 PROTECTION BLOCKS

A. Protection:
    1. Provide protection blocks at each building entry for copper cable terminations.
    2. Provide sufficient capacity for protections of all pairs.
    3. Materials: Cable protection shall be Corning Type S110 with protector panels, including entrance cable protection modules with gas tube protector units with heat coils. Units shall be for indoor use, 5-pin gold protection block type, stub input (length as necessary for cable entrance and telecommunication room

construction), exposed 110-termination field output, wall-mounted, stackable up to 600 pair, and shall be UL listed.

3.04 FIRE AND SMOKE PARTITION PENETRATIONS

A. Conduit sleeves shall be provided as part of this contract as a means of routing cables through fire-rated walls and floors. Openings in sleeves and conduits used for system cables and those that remain (empty) spare shall be sealed with an approved fireproof, removable sagging material at completion. Sleeves, which pass vertically from floor to floor, shall be sealed in a similar manner using an approved re-enterable system. Additional penetrations through rated assemblies, necessary for passage of voice/data wiring, shall be made using an approved method and permanently sealed after installation of cables.

3.05 STEEL WIRE CABEL TRAY

A. Provide seismic support and bracing for all steel wire cable tray installed under this work. Steel wire cable tray shall be designed to accommodate the large cable loads expected in the MDF and IDFs. No other support mechanism will be supplied. Comply with Division 01 of these specifications. Provide seismic design calculations and seismic design drawings prepared by the Contractor's structural Engineer for coordination and approval by Owner's Representative prior to fabricating or installing any supports. Any proposed reinforcement to be the responsibility of the Contractor. Coordinate seismic design with architectural, structural, mechanical, electrical, plumbing, fire protection and other trades.

B. Twelve-inch wire tray shall be installed in the MDF and IDFs at 7 feet 0 inches AFF as indicated on the Drawings.

C. Wire tray shall be leveled to a tolerance of 1/8-inch over 10 feet of cable runway.

D. Wire tray fittings: shall be used to join and support the wire tray segments.

E. Twelve-inch steel wire cable tray shall be supported at a maximum of 4-foot centers from the structure above using trapeze assemblies.

F. Cut openings in the cable tray grid 6 inches wide and 6 inches deep above the vertical cable managers at the equipment racks to allow the data interconnect cables to be easily routed.

G. Wire tray sections shall be bonded together with the manufacturer's fittings.

H. All field cut wire tray shall be deburred and all sharp edges shall be ground smooth prior to placement.

I. Coordinate the placement of fiber guide down spouts with the placemen of steel wire cable tray grid to insure an unobstructed path for fiber optic patch cables.

J. Mounting plates and 'J' bolts and splice washers shall be used to attach the steel wire cable tray grid to insure an unobstructed path for fiber optic patch cables.

3.06 CABLE RUNWAY

A. Cable runway shall be installed in the MDF and IDFs at 8 feet 6 inches AFF as indicated on the Drawings.

B. Cable runway shall be leveled to a tolerance of ¼-inch over 8 feet.

C. Runway rack fittings shall be used to join the cable ladder segment to: each other, equipment racks, and floors.
   1. Corner clamp brackets shall be used to join sections of ladder rack that are perpendicular to each other.
   2. Ladder rack stringers shall be attached to steel grid with angle brackets and 'J' bolts.
   3. Cable runway shall be supported at a maximum of 4-feet on center from structure above using trapeze assemblies.
   4. Open-ended stringer segments shall be closed with corner clamps and end bars.
   5. Mounting plates and 'J' bolts shall be used to attach the ladder racking to the equipment.

D. All field cut cable ladder shall be deburred prior to placement.

E. Coordinate the placement of cable ladder rungs with the placement of fiber guide down spouts to insure an unobstructed path for fiber optic patch cables.

3.07 FIBER OPTIC TROUGH

A. Fiber optic troughs shall be installed between the front-facing fiber optic distribution frames and the equipment racks for routing of fiber optic patch cable in the MDF.
   1. Join the fiber guide through fittings and straight sections with junction kits.
   2. Align the downspouts with the vertical rack cabling sections on the equipment racks.
   3. Align the downspouts with the inter-bay management panels on the front-facing fiber distribution frame.
   4. The fiber guide shall be leveled to within 1/8-inch over 8 feet.
   5. Tighten all fastening and joining hardware to the manufacturer's specifications. Replace any damaged bolts, washers and nuts.

B. The fiber guide troughs shall be 4 feet on center and supported from the structure above shall be attached to 5/8-incg threaded rod using threaded rod brackets.
   1. The fiber guide shall be placed with the bottom of the trough at 6 inches above the top of the steel wire cable tray sections in the MDF.

3.08 PLYWOOD BACKBOARDS

A. Provide backboards shall be fire retardant, ¾-inch A-B grade plywood, void free, 2440-mm (8 feet) high unless otherwise noted, capable of supporting attached equipment, and painted with a minimum of 2 coats of fire retardant off-white semi gloss paint. Manufacturer's stamps visible from the front side of the plywood backboard shall be masked to painting.

B. Plywood backboards shall be fastened to the structural members of the building only using an approved fastener. Plywood backboards shall not be anchored to GBW.

C. Plywood shall be mounted form +6-inches AFF to +8 feet 6-inches at the locations indicated on the Drawings.

D. Plywood backboards shall be cut to fit in width and shall have holes cut into the backboard to accommodate and provide access to devices behind the backboard, such as switches and outlets.

3.09 TESTING AND DOCUMENTATION

A. Refer also to Section 26 08 00 – Testing.

B. The Owner reserves the right to have a representative present during all or a portion of the testing process. If the Owner selects to be present during testing, results will only be acceptable when conducted in the presence of the Owner.

C. Optical fiber cable testing shall be in compliance with Annex H of TIA.EIA-568-B "Optical Fiber Link Performance Testing", as well as the additional requirements specified below.

D. Fiber Optic Testing Requirements – Preparation:

In preparing for actual field tests, the following procedure shall be followed:

1. Ensure that the test jumpers (end-to-end attenuation) or test fiber box (OTDR) are of the same fiber core size and connector type as the cable system, e.g. 50 um core test jumpers should be used for testing a 50 um multimode cable.
2. Ensure that optical sources are stabilized and have center wavelengths within + 20nm of the 850/1300 nm multimode and 1310/1550 nm single-mode nominal wavelengths. In accordance with TIA/EIA-526-14A, multimode LED sources should have spectral widths from 30-60nm at 850nm and 100-140 nm at 1300nm.
3. Ensure that the power meter is calibrated at each of the nominal test wavelengths and traceable to the National Institute of Standards and Technology (NIST) calibration standard.
4. Ensure that the power meter and the light source are set tot the same wavelength.
5. Ensure that all system connectors, adapters, and jumpers are properly cleaned prior to measurement.

E. Manufacturer's testing:

1. Contractor shall retain and provide to the Owner's Representative the manufacturer's attenuation test for each reel of fiber optic cable provided. These tests shall include the following information.
   a. Manufacturer's reel number.
   b. Fiber type.
   c. Manufacturers part number.
   d. Minimum bandwidth.
   e. Maximum attenuation.
   f. Traceable batch number.
   g. Length of fiber on reel.
2. Contractor shall provide the manufacturer's attenuation test for each fiber optic patch cord provided.

F. Pre-installation testing:

1. The Contractor shall perform an OTDR test on one fiber of each 6-fiber subunit, or on 2 fibers in each 12-fiber subunit (buffer tube).
   a. Example: Two OTDR traces on a worksheet with the reel/cable identifier, technician's name, technician's signature, date and place of the test as well as the model number and serial number of the OTDR. Test shall be scheduled with the Owner's Representative to allow the tests to be witnessed.

G. Post-installation testing – multimode fiber optic strands:
   1. After installation of connectors, visually inspect each fiber end-face at 10X magnification. Refinish fibers with visible defects and / or striations in the core area.
   2. Perform end-to-end, bi-directional attenuation (loss test for each multimode fiber strand installed at 850 nm and 1300nm wavelengths. Conduct tests in accordance wit EIA TIA-526-14, Method B and with test instrument manufacturer's printed instructions.
   3. Demonstrate that measured link loss does not exceed the "worst case" allowable loss, defined as the sum of the connector losses (based on number of mated connector pairs at the EIA / TIA 568 maximum allowable loss of 1.5dB per mated pair), the optical fiber loss (based on length) and the EIA / TIA 568 maximum allowable loss (3.75dB/km @ 850nm and 1.0dB/km @ 1300nm).
   4. Strands whose measured attenuation fall outside the acceptable range shall be subject to further inspection and testing to determine the nature of the fault. At a minimum, an OTDR shall be used to determine the true loss for each connector pair, the exact length of the fiber and to identify the presence of any core damage.
   5. Faults related to connectorization shall be corrected, and the fiber re-tested, until acceptable attenuation measurements are recorded.
   6. Where defects are found to be inherent in the fiber itself, replace any cable having fewer than the manufacturer's guaranteed number of serviceable fibers.
   7. The Contractor shall perform an end-to-end bi-directional OTDR test on each multimode fiber optic strand installed at 850nm and 1300nm wavelengths.
   8. All fiber optic test instruments used on the site shall be capable of storing test data files and downloading these test results as data files. The fiber optic strand number shall be used as the record identifier for each test.
   9. All OTDR traces shall be delivered to the Owner's Representative in electronic format. The Contractor shall provide the Owner's Representative with software to read the OTDR traces. The application software shall be licensed to the Owner.
   10. All Power meter readings shall be provided in a coma delimited file format capable of being inserted into a Microsoft Excel spreadsheet for review. Power meter readings shall be delivered to the Owner's Representative in electronic format.

H. Post-installation testing – single mode fiber optic strands:
   1. After installation of connectors, visually inspect each fiber end-face at 10X magnification. Refinish fibers with visible defects and / or striations in the core area.
   2. Perform end-to-end, bi-directional attenuation (loss) test for each single mode fiber strand installed at 1310nm and 1500nm wavelengths. Conduct tests in accordance with EIA / TIA-526-14, Method B and with test instrument manufacturer's printed instructions.
   3. Demonstrate that measured link loss does not exceed the "worst Case" allowable loss which is defined as the sum of: the connector losses (based on the number of mated connector pairs) and the EIA / TIA-568 maximum allowable loss.

4. Strands whose measured attenuation fall outside the acceptable range shall be subject to further inspection and testing to determine the nature of the fault. At a minimum, an OTDR shall be used to determine the true loss for each connector pair, the exact length of the fiber and to identify the presence of any core damage.
5. Faults related to connectorization shall be corrected, and the fiber re-tested, unit acceptable attenuation measurements are recorded.
6. Where defects are found to be inherent in the fiber itself, replace any cable having fewer than the manufacturer's guaranteed number of serviceable fibers.
7. The Contractor shall perform an end-to-end bi-directional OTDR test on each multimode fiber optic strand installed at 850nm and 1300nm wavelengths.

I. Recommended test equipment (obtain approval of Owner's Representative prior to using substitute test equipment):
   1. All fiber optic test instruments used on the site shall be capable of storing test data files and downloading these test results as data files. The fiber optic stand number shall be used as the record identifier for each test.
   2. All OTDR traces shall be delivered to the Owner's Representative in electronic format. The Contractor shall provide the Owner's Representative with software to read the OTDR traces. The application software shall be licensed to the Owner.
   3. All power meter readings shall be provided in a coma delimited file format capable of being inserted into a Microsoft Excel spreadsheet for review. Power meter readings shall be delivered to the Owner's Representative in electronic format.
   4. Optical fiber power meter and light source: Corning Cable Systems OTS-210 Series Optical Power Meter and OS-300 Light source, or equivalent. Provide calibration certification for power meter.
   5. Optical fiber light source: Corning Cable Systems OS-300 Light Source with AC power supply. Output at 850nm 1300nm and 1550nm or equivalent. Provide calibration certification for light source.
   6. OTDR: Corning Cable Systems OTDR Plus, HP 8147, Tektronix or Laser Precision with 850nm 1300nm and 1550nm modules. Hard copy printout and electronic format for data collection and transfer. Provide calibration certification.
   7. OTDR emulation software for viewing and analyzing the OTDR traces.
   8. Optical fiber inspections scope: Noyes Optical Fiber Scope OFS300 300X fiberscope or equivalent.

J. Documentation – Fiber Optic Testing:

   Maintain accessible documentation of the following test results and cable records. This documentation shall be formatted and maintained systematic all in accordance with the requirements stated in TIA/EIA-606, "Administration Standard for the Telecommunications Infrastructures of Commercial Buildings".

   Documentation of cable testing shall be required and the engineer shall be present during all tests. The contractor shall provide a table of test results in a 3-ring binder submitted with the as-built drawings. The binder shall include.
   1. End-to-End Attenuation Data for each fiber, showing both measured and calculated losses.
   2. OTDR Signature Traces.

3. Certificate of Compliance for Connector and Splice Loss – Completed by the contractor to confirm test performance, compliance with stated loss requirements, and applicable warranty coverage for all individual connector and splice losses in the campus and backbone cable plant.
4. Cable Specifications – the specification sheet provided by the manufacturer and defining the minimum optical and mechanical performance guaranteed for the code.
5. Cable Route Diagram – Defining the location, route, and connectivity of the "as built" cable plant including:
   a. Fiber routing and location information
   b. Fiber connectivity information
   c. Splice point locations
   d. Patch panel locations
   e. Cable Lengths
   f. Cable part numbers

3.10 COPPER CABLE TESTING AND DOCUMENTATION

A. Copper Cable pair connector terminations:
   1. During copper connector termination, visually verify all terminations.
      a. Assure proper seating of connector block on terminal strips of all insulation displacement connectors;
      b. Assure proper seating of splice connector modules;
      c. Assure proper twist in cable pairs is maintained at terminations and splices.
      d. All unacceptable connectors shall be inspected after rework.
   2. Verify that the copper cable sheath is properly clamped at the splice closures to eliminate strain on the copper pair terminations.
   3. Verify that the copper cable sheaths are properly bonded at splice closures and terminations.
   4. Verify that all labeling and color-coding is correct.

B. Paired and multi-conductor riser metallic cables:
   1. After terminating and splicing the cables, test all cable pairs for continuity, ground fault, proper cross-connection, shorts and crossed pairs.
   2. For multi-pair cables: For 100-pair or smaller, replace entire cable if bad pair or conductor is found. For larger pair counts cables, replace if more than 1 percent of pairs are bad.

C. All test results and corrective procedures are to be documented and submitted to the Owner within 5 working days of test completion.
   1. Paired and multi-conductor metallic cable test reports: As a minimum, also provide cable number, cable type, pair or conductor count, individual pair or conductor numbers number of cross connects and / or conductor, total number of serviceable pairs or conductors in cable.

D. Recommended test equipment (obtain approval of Owner's Representative prior to using substitute test equipment):
   1. Metallic cable pair tester.

a. The Contractor shall utilize a FLUKE DSP-4x00 test instrument with firmware version 3.0 or newer, or equivalent Class III Category 6 Field Tester.

E. Prior to testing of installed cable, submit for review and approval of Owner copies of 5 complete test reports in electronic format, as a test to insure that the Contractor understands the testing and submittal process. This will prevent the Contractor from testing a large group of tables incorrectly that would have to be re-tested.

F. Four-pair Category 6 station cables testing and submittal process:
1. Submit cable schedule and testing schedule to Owner's Representative.
2. After terminating both ends of all UTP cables, test all UTP Category 6 station cables. Conduct tests with a 110 to 8-pin 568A patch cable in place on both ends.
3. Each jack in each outlet shall be tested for TIA/EIA-568-B Category 6 compliance, using an appropriate Level 3 testing instrument, to verify both the integrity of all conductors and correctness of the termination sequence. Testing shall be performed between modular jacks at the outlets and the modular jacks at the patch panels.
4. Test Criteria: The system shall be tested to TIA/EIA-568-B Category 6. The test path shall include jacks, station cables, jack panels, and adapter cables.
5. Documentation - Copper Cabling:
   a. Maintain accessible documentation of the following test results and cable records. This documentation shall be formatted and maintained systematically in accordance with the requirements stated in ANSI/TIA/EIA-06, "Administration Standard for the Telecommunications Infrastr4uctures of Commercial Buildings".
   b. Documentation of all cable testing is required. The contractor shall provide a table of test results in a 3-ring binder submitted with the as-built drawings. The table shall include:
      1) 250 MhZ sweep test, polarity checks, Near End Cross Talk, Signal Attenuation, Noise, DC loop back resistance, pair-by-pair continuity, and the installed length for all Data/Voice station cables and pairs.
      2) The report shall indicate all defective pairs and test results of all pairs listed above. Cables not complying with TIA/EIA-568-B Category 6 tests shall be identified to the Owner for corrective action, which may include replacement at no additional expense to the Owner.

3.11 TRAINING AND CROSS CONNECTIONS

A. The Contractor shall provide a minimum of (1) person for a minimum of (48) man-hours beginning with the first scheduled move-in date to train Owner personnel in maintenance and repair of cabling system. This technician shall also assist the Owner in cross connecting the voice and data services throughout the facility during the move-in period. It is at this time that all Owners provided connectivity for voice and data services will be provided to the Contractor. Patching (cross connection) of the station assignments between the Owner's services demark shall also be considered part of this Contractor's work.

3.12 ACCEPTANCES

A. Prior to acceptance all the following conditions must be met:

1. All required the Contractor shall make submittals and deficiencies or rejected submittals shall be corrected.
2. All specified cable management devices including cable ladder, steel wire cable tray, 2-sided vertical rack cabling sections, horizontal ring panels, and fiber optic troughs shall be installed as indicated and specified. All parts not installed shall be inventoried and provided to the Owner in the manufacture's packaging.
3. All seismic bracing shall be in place.
4. All specified station cabling with associated termination components, labeling and fire stopping shall be installed properly. Any component not installed shall be inventoried and provided to the Owner in the manufacturer's packaging; loose miscellaneous parts shall not be accepted.
5. Terminal blocks shall be clean and free of trimmed or cut-off copper pairs, sheaths, armors, cable lubricants or any other disposables used in the installation of the station cables.
6. All station cables shall be neatly dressed behind the terminal blocks in the IDF.
7. The backbone fiber optic cable system including multimode and single mode fiber optic strands, composite cable, ST and STPC connectors, 72-position termination shelves with couplers and fiber optic jumper storage shelves has been installed and tested per these Specifications.
8. Do no install fiber optic cross-connects until after the backbone distribution cable test reports have been reviewed and accepted by the Owner's Representative.
9. All required submittals indicated in Paragraph 1.03 of this Specification Section shall be made by the Contractor, and any deficiencies or rejected submittals shall be corrected.
10. All specified fiber optic backbone cabling with associated termination components, splicing, labeling and testing shall be installed and completed properly. Any component not installed shall be inventoried and provided to the Owner in the manufacturer's packaging. Loose miscellaneous parts shall not be accepted.
11. The fiber optic termination shelves and the racks and floors around the shelves, shall be clean and free of trimmed or cut-off fiber optic strands, buffering, sheath and cable lubricants and any other disposables used in the placement and termination of the fiber optic backbone cables.
12. All innerducts and fiber optic backbone cables shall be neatly dressed into the pathways, communications vaults and vault racking.
13. Any deficiencies and punch list items shall be corrected.
14. All as-built documentation shall be complete, reviewed and provided to the Owner.

B. Acceptance of the voice / data communications system by the Owner shall be based on the result of testing, functionality, and the receipt of documentation and warranty. With regard to testing, contractor must provide two technicians, equipped with the specified test equipment, to do random test verification in the presence of, and at the direction of, an Owner designated representative. Verification testing shall no exceed 20% of the cable plant, provided cables tested are verified to be 100% compliant, per requirements previously stated. If more than 5% of cables tested during the verification process fail, Owner reserves the right to have the entire cable plant

retested, at the contractors expense, and in the presence of an Owner-designated representative.

3.13 RECORD DRAWINGS

A. The project record drawings shall show the types, locations and counts of installed:
   1. Fiber optic cables and strands;
   2. Fiber optic terminations counts and types.

B. The project record drawings shall show the types, locations, cable numbers and pair counts of installed twisted-pair cable:
   1. Cable routing and numbers.

C. The project record drawings shall show the types and locations of installed equipment racks / cabinets and fiber optic distribution frames.

END OF SECTION

SECTION 27 51 02
CLOCK & SPEAKER SYSTEM

PART 1 - GENERAL

1.01 GENERAL

A. The conditions of the General Contract (General, Supplementary, and other Conditions) and the General Requirements are hereby made a part of this Section.

1.02 SCOPE OF WORK

A. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and comprehensive integrated Clock and Speaker (PA) System.

1.03 SUBMITTALS

A. Specification Sheets shall be submitted on all equipment including:
   1. Clock/speaker equipment, racks, and equipment.
   2. Synchronous wall clocks, power supplies, and controls.
   3. Speakers.
   4. Outside paging speakers.
   5. Back boxes and specialty rough-ins.
   6. Wiring.
   7. Uninterruptible power supply

B. Submit single line drawing of the entire system showing the location and typical connections for all equipment.

C. Submit a certificate of completion of installation and service training from the system manufacturer.

1.04 QUALITY ASSURANCE

A. All items of equipment including wire and cable shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.

B. The contractor shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least five years. The contractor shall be a duly authorized distributor of the equipment supplied with full manufacturer's warranty privileges.

C. The contractor shall show satisfactory evidence, upon request, that he maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The contractor shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

D. The contractor shall hold the necessary valid C-10 California State Electrical Contractors License.

1.05 IN-SERVICE TRAINING

A. The contractor shall provide a minimum of eight hours of in-service training with this system. These sessions shall be broken into segments, which will facilitate the training

of individuals in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training.

1.06 WIRING

A. System wiring and equipment installation shall be in accordance with good engineering practices as established by the EIA and the NEC and these Specifications. Wiring shall meet all state and local electrical codes. All wiring shall test free from all grounds and shorts.

1.07 EQUIPMENT WARRANTY

A. The contractor shall furnish a letter from the manufacturer of the equipment, which certifies that the equipment has been installed according to factory intended practices, that all the components used in the system are compatible and that all new portions of the systems are operating satisfactorily. Further, the contractor shall furnish a written unconditional guarantee, guaranteeing all parts and all labor for a period of two (2) years after final acceptance of the project by the owner.

1.08 SYSTEM DESCRIPTION AND OPERATION FEATURES

A. There shall be at least four built-in dedicated emergency alarm tones. Each may be accessed by dialing a three-digit number (912 through 915) from designated administrative telephones.

B. The system shall provide for field-programmable three-digit architectural station numbers.

C. There shall be an automatic level control for return speech during amplified-voice communications.

D. Each station loudspeaker shall be assignable to any one, any combination, or all of eight (8) paging zones. Each station loudspeaker shall be assignable to any one, any combination, or all, of eight (8) time-signaling zones.

E. There shall be eight (8) time-signaling schedules with a total of 1024 user-programmed events. Each event shall sound one of eight (8) user-selected tones. It shall be possible to assign each schedule to a day of the week, or manually change schedules from an authorized administrative telephone.

F. An internal program clock (with battery back up) shall be included, allowing a total of 1024 user-programmed events. It shall be possible to synchronize the program clock with an external master clock. This external program clock shall then synchronize daily with the system clock to ensure that all time displays are the same.

G. There shall be a zone-page/all-page feature that is accessible by selected administrative stations. There shall be automatic muting of the loudspeaker in the area where a page is originating. There shall be a pre-announce tone signal at any loudspeaker selected for voice paging.

H. All system programming data shall be stored in nonvolatile memory. The system shall be capable of being interfaced with either an on-site or off-site computer for system configuration programming and system diagnostics. A valid password shall be required to gain access to the following programmable functions:
   1. Set Day and Time.

2. Program time-signaling events, time signaling schedules, and assign schedules to days of the week.
3. Program time signaling zones.
4. Program paging zones.
5. Manually change time signaling schedules.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Rauland-Borg (District Standard).

2.02 EQUIPMENT

A. Control Equipment:
   1. UPS unit for power back-up.
   2. The system equipment shall be mounted in an upright equipment rack having 19" panel space. Color shall be black. All clock / speaker system programming and equipment shall be provided as required to fully implement a functioning system.
   3. Provide over voltage and transient spike surge protector to condition AC voltages into all microprocessor control systems.

2.03 INSTRUMENTS AND DEVICES

A. Speakers shall be 8" full range loudspeaker / baffle combination. 6oz. nominal magnet eight, 7-watt continuous power, with matching dual 25/70 volt transformer. Transformer shall be capable of delivering at least 5 separate wattage taps from 1/8 watt to 5 watts.
   1. Surface wall mounted combination clock / speaker enclosures with baffles to be provided at all locations shown on the plans.
   2. Outdoor weatherproof surface mounted speakers shall be Soundolier APF15T speaker with Lowell CB86-6 back boxes and Lowell SQLK-APF vandal resistant grills. Speakers shall be moisture resistant type for voice and tones with matching transformer.

B. Classroom Wall Clocks shall be 12" round synchronous analog clocks. Mount in common surface mount enclosure with speakers.

2.04 WIRING

A. All field wiring and system head-end equipment shall support any type of station, at the time of installation.
   1. Speaker to terminal can - West Penn #291 or as recommended by equipment manufacturer.
   2. Outdoor speakers to terminal can - West Penn #291 or as recommended by equipment manufacturer.
   3. Speaker Multi Conductor Cables: West Penn 425 individual shield per pair. Qty per cluster as required.

B. Terminal blocks: All conductors in terminal cans and equipment rack shall be terminated on Siemens 66M1-50 punch blocks or approved equal. Mark each terminal in accordance with the wiring diagrams of the system. No splices are permitted except in approved junction boxes.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Control panel equipment shall be mounted with sufficient clearance for observation and testing.
   1. System installation shall be accomplished by a factory authorized service representative.
   2. All controls, function switches, etc., shall be clearly labeled on all equipment panels.
   3. All clock/speaker junction boxes must be clearly marked for easy identification.
   4. Wiring splices are to be avoided to the extent possible, and in each instance they must be made only in junction boxes and shall be crimp or 66 block connected.
      a. Transposing or changing color-coding of wires shall not be permitted.
      b. Wire nut-type connections are not acceptable.
      c. All wiring shall be in conduit, EMT thin-wall, rigid, or flexible conduit only where specifically noted on the Drawings.
      d. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal.
      e. Cabinet terminals shall be numbered and coded.
      f. Shielding: Cable shielding shall be connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in same manner as conductors.
      g. All wiring shall be checked and tested to ensure that there are no grounds, opens or shorts.
      h. Cable Taps: Use numbered terminal strips in junction, pull or outlet boxes, cabinets, or equipment enclosures where any circuit tap is made.
      i. Wiring Within Enclosures: Install conductors parallel with or at right angles to the sides and back of the enclosure. Bundle, lace, and train the conductors to terminal points with no excess.
   5. All conduit runs shall have no more than (2) 90 degree bends or bends which total more than 180 degrees.
      a. All conduit, mounting boxes, junction boxes and panels shall be securely hung and fastened with appropriate fittings to ensure positive grounding throughout the entire system.

3.02 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, certifying, and adjustment of the system.

B. Pretesting: Upon completing installation of the system, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.

C. Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable. The letter shall include the names and titles of the witnesses to the preliminary tests.

D. Final Test Notice: Provide 10 day's minimum notice in writing to the Architect and the Owner when the system is ready for final acceptance testing.

3.03 TESTING

A. System testing, documentation, and preparation of final record documents shall only be performed with a factory trained and authorized technician.

B. The factory-authorized technician shall perform all electrical and mechanical tests required by the equipment manufacturer's form.

C. Minimum System Tests: Test the system in as follows:
   1. Verify the absence of unwanted voltages between circuit conductors and ground.
   2. Megger test all conductors other than those intentionally and permanently grounded with electronic components disconnected. Test for resistance to ground. Report readings less than 1-megohm for evaluation.
   3. Test all conductors for short circuits utilizing an insulation-testing device.
   4. With each circuit pair, short circuit at the far end of the circuit and measure the circuit resistance with an ohmmeter. Record the circuit resistance of each circuit on the record drawings.
   5. Test the system for all specified functions in accordance with the manufacturer's operating and maintenance manual. Systematically initiate specified functional performance items at each station. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, and signal tones.
   6. Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the period and in the manner specified.

D. Retesting: Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

E. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit the log to the Architect and the Owner upon the satisfactory completion of tests.

F. Tag all equipment and stations and other components at which tests have been satisfactorily completed. Remove all tags upon completion of all tests.

G. Final tests and inspection shall be held in the presence of the Architect and the School District Representative.

H. A test report shall be prepared by the factory-authorized technician and submitted in triplicate, with an additional copy to be registered with the equipment manufacturer. The report shall include, but not be limited to:
   1. A complete list of equipment installed.
   2. Indication that all equipment has been properly installed and functions has been tested according to these Specifications.

3. Technician's name, the date of the test, and the company he represents.

3.04 FINAL ACCEPTANCE

A. Final acceptance shall require the Contractor to deliver to the Architect the following;

B. Three (3) copies of the operating instructions and system maintenance manuals, as well as:
   1. Three (3) copies of the final test reports.
   2. Three (3) sets of data sheets for each piece of equipment supplied.
   3. Three (3) sets of record drawings. Record drawings shall include:
      a. "As-built" conduit layout diagrams including wire color code and/or tag number.
      b. Complete "as-built" clock/speaker wiring diagrams, including "as-built" conduit size and size and quantity of conductors in each conduit.
      c. Floor plans showing exact location of all clock/speaker system equipment, components, and devices.

3.05 COMMISSIONING

A. Provide the services of a factory-authorized service representative to demonstrate and train the Owner's maintenance personnel as specified below. :
   1. Train the Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system.
   2. Schedule training with the Owner at least seven days in advance.
   3. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

END OF SECTION

SECTION 28 31 00
FIRE ALARM SYSTEM - VOICE EVAC

PART 1 - GENERAL

1.01 DESCRIPTION

A. This project shall include the furnishing, installation, connection, programming, commissioning, and testing of new fire alarm equipment required to form a complete coordinated system ready for operation at the modernized building. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, voice evacuation system, control panel, auxiliary control devices, annunciator, power supply extender panels and amplifiers (as required), and all associated wiring.

B. A digital dialer with off-site monitoring is existing.

C. The system shall include emergency voice evacuation alarm communication system components required to upgrade the existing Siemens XLS system. A digitized pre recorded voice message shall notify occupants that a fire alarm condition has been reported. The message shall instruct the occupants with emergency instructions. All notification shall be speaker/strobes or strobe lights.

D. The work shall include all required programming to allow proper sequence and operation as required by code.

E. Provide CBC 2013 compliant seismic installation. See Section 26 0500 for all certification and submittal requirements.

F. All work shall comply with Sections 26 0500 and 26 2700.

1.02 SCOPE

A. This specification outlines the requirements for a microprocessor based, addressable (intelligent) automatic fire detection and alarm system. The system and components shall be supplied by one manufacturer.

B. The work described in this specification consists of all labor, materials, equipment and services necessary and required to complete and test the automatic fire detection and alarm system. Any material not specifically mentioned in this specification or not shown on drawings but required for proper performance and operation shall be furnished, installed, and connected complete.

1.03 REQUIREMENTS

A. This installation shall be made in accordance with the drawings, specification and the following:
   1. National Electrical Code Article 760
   2. NFPA Standard 72
   3. Local Codes and Authorities Having Jurisdiction
   4. ADA requirements and regulations.

1.04 RELATED WORK

A. Division 26: Basic Electrical Materials and Methods

B. Division 21: Fire Protection Systems

C. Division 23: HVAC Systems

D. Division 23: Fire Smoke Dampers

1.05 FIRE DETECTION SYSTEM DESCRIPTION

A. The system shall be a networkable, supervised, non-coded, 24 volt DC, power limited system and shall be capable of having all addressable initiation devices on the network in alarm at one time. Notification device circuits shall be wired Class B. Initiation device circuits shall be wired Class B (SLC). A single ground or open on any initiating device circuit or notification appliance circuit shall not cause system malfunction, loss of operating power, or the ability to report an alarm.

B. Provide initiation, notification and other devices as per specifications and as indicated on the drawings.

C. Indicate alarms, supervisory, and trouble signals on the building fire alarm control panel and annunciator.

D. Initiate signals to control (shut-off) HVAC system units and FSD's as per drawings and as required by code.

E. Transmit alarm signals to off-site reporting agency via a digital communicator with specific building address ID.

F. The fire alarm system shall function as follows when any smoke or duct detector, waterflow switch, manual station or other initiating device operates:
   1. Operate required audible/visual and visual devices as shown on the Drawings.
   2. Automatically notify off-site reporting agency.
   3. Indicate at the control panel alphanumeric display the number and location of the alarmed device.
   4. Light an indicating lamp on the smoke detector initiating the alarm.
   5. Light an indicating lamp on the remote annunciator indicating the location alarmed as well as the type of device alarmed (area smoke detector, duct detector, manual pull station, waterflow switch, valve supervisory switch, etc.).
   6. Perform other actions as per the sequence of operation specified on the fire alarm drawings (i.e. for fire smoke dampers, and other items).

G. Provide additional system features and capacities as indicated in Part 2 of this Section of the Specifications.

1.06 GUARANTEE

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.

1.07 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification.

B. National Fire Protection Association (NFPA) - USA:
   1. No. 70 National Electrical Code (NEC)
   2. No. 72 National Fire Alarm Code
   3. No. 101 Life Safety Code

C. Underwriters Laboratories Inc. (UL) - USA:
   1. No. 268 Smoke Detectors for Fire Protective Signaling Systems

2. No. 864 Control Units for Fire Protective Signaling Systems
3. No. 268A Smoke Detectors for Duct Applications
4. No. 521 Heat Detectors for Fire Protective Signaling Systems
5. No. 464 Audible Signaling Appliances
6. No. 1971 Visual Signaling Appliances
7. No. 38 Manually Actuated Signaling Boxes
8. No. 346 Waterflow Indicators for Fire Protective Signaling Systems

D. Local and State Building Codes.

E. All requirements of the Authority Having Jurisdiction (AHJ).

1.08 APPROVALS

A. The control panel and all peripherals shall have proper listing and/or approval from Underwriters Laboratory (UL) and be California State Fire Marshall listed and approved.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model.

B. The system shall be UL 864 listed.

C. Acceptable System Manufacturers: Siemens, District Standard, no exceptions.

D. The system design is based on Siemens products and has been approved by DSA as such. Deviations from the approved design (for manufacturer or device layouts) may be allowed with approval by the Architect. However, it shall be the Contractor's responsibility to redesign and resubmit the plans to DSA for re-approval.

E. All equipment and components shall be installed in strict compliance with manufacturers' recommendations.

F. All equipment shall be attached to and ceiling/floor assemblies and shall be held firmly in place. (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.02 CONDUIT, BOXES, AND WIRE

A. All conduit and wire shall comply with Section 26 0500 of these specifications.

B. Conduit:
1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
2. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
4. Conduit shall be 3/4 inch minimum.

C. Wire:
1. All fire alarm system wiring shall be new and installed in conduit.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760). Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 16 AWG for initiating device circuits and signaling line circuits, and 12 AWG for Notification device circuits.
3. All field wiring shall be completely supervised, Class B (SLC) for initiation loops, and Class B for notification loops, with end-of-line devices located as shown on the riser diagram.

D. Terminal Boxes, Junction Boxes and Cabinets:
1. All boxes and cabinets shall be UL listed for their use and purpose.
2. The Fire Alarm Control Panel and expander panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the power panel as FIRE ALARM and include a breaker handle lock for the dedicated breaker. Fire alarm control panel primary power wiring shall be #12 AWG. The control panel cabinet shall be properly grounded.

2.03 CONTROL PANEL

A. The control panel shall be microprocessor based and totally power limited. The panel shall be capable of supporting Class A (Style 6) or Class B (Style 4) network Communications lines, and Class A (Style Z) or Class B (Style Y) Notification Circuits. The panel shall have the following features; Totally Field Programmable, Password Access Protection, Built in Panel Diagnostics, Alarm and Trouble Resound, Alarm Event Buffer, Trouble Status Buffer, Point Identification Display, 24 hour Trouble resound, One Man Walk Test, Alarm Verification, and Positive Alarm Sequence. The panel (and expander panels where required) shall include audio amplifiers and related components to support the voice evacuation requirements. The panel shall have the following relays with a form C configuration; Alarm, Trouble, Supervisory, and Default Alarm Mode (to allow alarm reporting during microprocessor failure).

B. The control panel shall be designed to monitor and process a minimum of 198 addressable inputs (smoke detectors, manual stations, water flow devices, etc.), and up to 198 addressable monitor or control modules. The Network Communication Lines shall support various annunciation devices (i.e. LED Annunciators, Alphanumeric Displays, Printers) in addition to the addressable inputs and outputs described above. The system architecture shall allow for T-tapping of the Network Communications Lines. The use of a Zone Monitor module on the Communications Line shall further enhance the system with a master/slave concept, of allowing a group of conventional detection devices (standard smoke detectors, manual stations, waterflow and tamper switches) to be interfaced into the system as an address point. The system shall include individual power supply expander panels as required to support the notification loops. Each notification circuit shall be independently field programmable by the use of addressable control modules rated for the required current.

C. The control panel shall contain an Alphanumeric Display interface which contains a microprocessor with a non-volatile memory to store field programmable alarm and trouble messages. The Alphanumeric Display shall consist of two 40 character lines for alarm, supervisory and trouble identification, and in quiescent mode, indicates system status.

D. The control panel shall have history reporting, with the history stored in either the alphanumeric or printer modules. The history shall be at least 1,000 events. These events can be alarm, verification, supervisory, trouble, acknowledge, system reset, walk test, and the use of any panel keypad keys and access to any panel modes such as Program or Test.

E. The control panel shall have self diagnosis. Once the program is stored in memory and upon system initiating, if there is a discrepancy between the number of devices entered into the program and the actual number of devices connected to the system, the panel shall annunciate a trouble for the devices in question.

F. Power Supply
   1. The Power Supply for the Fire Alarm Control Panel may be integral or external to the Fire Alarm Control Panel, and shall provide all control panel and peripheral device power needs. Additional power required to operate all alarm devices (above and beyond the capacity of the main panel supply) shall be provided with power expander panel(s), connected to the alarm output of the main control panel. Provide all required interface modules and relays for proper notification circuit operation as per manufacturer's instructions. Expander panel shall be as manufactured by the chosen Fire Alarm System manufacturer (qty. as required for full alarm operation).
   2. Input power shall be provided at 120 VAC, 60 HZ. The power supply shall provide an integral battery charger for use with a minimum of 12 AH batteries.
   3. It shall provide a minimum of 6.0 amperes of regulated 24 VDC power for Audio-Visual alarm notification devices, 200 mA of 4-wire smoke detector power, and 200 mA of Non-Resettable power.
   4. The power supply shall be designed to meet UL and NFPA requirements for power-limited operation on all initiating and notification circuits.
   5. Positive-temperature-coefficient thermistors, circuit breakers, fuses, or other over-current protection shall be provided on all power outputs.

G. Mechanical Design: The control panel shall be housed in a cabinet designed for mounting directly to a wall or vertical surface. The back box and door shall be constructed of.060 steel with provisions for electrical conduit connections into the sides and top. No conduit penetrations shall be utilized on the back or bottom of the panel. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. The cabinet shall be approximately 5 inches deep and 14.5 inches wide. Height shall be approximately 16 inches.

2.04 STANDARD INITIATION DEVICES

A. Addressable Photoelectric Smoke detectors, (Intelligent) shall be provided as indicated on the drawings, with features and characteristics as follows:
   1. The detector shall be self compensating for ambient temperature and humidity.
   2. The detector shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester. The detector readout shall yield a discrete electrical value for status tracking and logging for determining maintenance and cleaning requirements.

3. The detector shall be suitable for two wire operation and two way communication on the intelligent analog signaling circuits.
4. The detector shall display a flashing red LED when in the alarm state when the system is operating from normal or standby power.
5. The detectors furnished shall be listed for use in environments as covered by Factory Mutual, UL and shall be installed according to the requirements of NFPA 72 for open area coverage.
6. Detectors for magnetic door hold open functions shall be provided with an auxiliary relay base for auxiliary function wiring connections.
   a. Door holder power shall be routed via the relay base on smoke detectors denoted with an "R" to release the associated doors upon alarm.

B. Heat detectors shall be provided as indicated on drawings. Heat detector shall be of the rate compensation type, 135 degree.

C. Duct Detectors:
1. Duct detectors for air-handling units, complete with all required sampling tubes and housings, shall be provided and connected complete by this contractor, installed by the mechanical contractor. Coordinate with the mechanical contractor.
2. Duct Detectors shall be connected to the air handler starter unit, in order to facilitate unit shut-down upon alarm (via an auxiliary relay in the duct detector). Coordinate exact control wiring with mechanical contractor. Provide and install all required wiring and conduit for starter/duct detector interface.
3. Provide and install power connection to each duct detector as required. Coordinate with mechanical contractor.
4. Provide Nema 3R exterior rated housings for all exterior duct detectors.

D. Manual Stations, (Intelligent) shall be single action and semi-flush or surface mounted as indicated on the drawings.
1. The manual station shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring.
2. The manual stations shall be addressable and identifiable by the master fire alarm control panel when they are resident on the analog loop. Address programming shall be accomplished electronically and reside within the station in non volatile memory.

E. A monitor module Interface device shall be provided for required interface points such as water flow devices and tamper switches, or any contact type devices as indicated on drawings. This Interface device shall have one or two Class B (Style 4) circuits as required.

F. Provide a 120VAC circuit connection to each sprinkler system water flow bell (provided by Div. 15). Wire power via the local water flow switch aux. Contact to activate the bell upon water flow activation.

2.05 REMOTE ANNUNCIATOR

A. A remote annunciator shall be provided at the main building entry.

B. The annunciator shall be wall mounted in a multi-gang box or as required. It shall provide an 80 character display to indicate the zone(s) in alarm and LED's for system trouble and supervisiory conditions.

C. The annunciator shall include a lockable and latched door with glass front to allow viewing of all indicators.

D. The annunciator shall include a local sounder with reset and alarm acknowledge, including key lock-out.

E. The annunciator shall be flushed-mounted type.

2.06 BATTERIES

A. Batteries shall be 12 volt, sealed valve-regulated type, with combined Amp-Hour ratings as required by code.

B. Battery shall have a minimum sufficient capacity to power the fire alarm system for not less than twenty-four hours in standby mode, plus 5 minutes of full system alarm upon a normal AC power failure.

C. The batteries are to be completely maintenance free, no liquids required. Fluid level checks, refilling, spills and leakage shall not be required.

2.07 CONTROL DEVICES

A. Control modules shall be provided as indicated on the drawings for fire alarm output functions. These devices shall be connected to the Network Communications Lines, and be field programmable for one of the following options; Remote Relay (form C 1amp 24vdc, 200ma 120vac) with supervised relay operation, Remote Supervised Indicating Appliance Circuit (fused at 1 amp). There shall be an LED on the device that will flash to indicate the unit is being monitored and a steady LED to indicate the unit has been activated. Secondary relays with control power connections shall be provided as required where contact ratings (voltage & amps) so dictate.

2.08 NOTIFICATION DEVICES

A. Speaker / Strobe Notification Devices:
   1. All speakers shall operate on 70.7 VRMS, with field selectable output taps from 1/8 to 2 Watts in 3dB steps. Frequency response shall be a minimum of 400 HZ to 4 KHZ.
      a. Speaker circuits shall have 20% space capacity for future expansion or increased power output requirements. All speaker tap settings shall be set per recommended settings (minimum 1/4 watt) for area coverage, and shall be re-tapped as required after final testing to provide adequate audible coverage throughout each area (to meet NFPA requirements).
      b. Speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.
      c. Provide amplifier modules as required to carry the full designed load, plus 20% spare capacity. Provide (1) additional back-up amplifier module for automatic back up of any failed amplifier module.

d. Speaker/Strobe combinations shall be provided as indicated on Drawings. The speaker / strobe combination shall be Wheelock or equal, ADA and UL 1971 compliant (candela values as required) - white finish.
e. Strobe Lights shall be provided as indicated on Drawings. The strobe lights shall be wall mounted at +80" AFF or 6" below the ceiling level, whichever is lower, Wheelock or equal, ADA and UL 1971 compliant (candela values as required) - white finish

B. Refer to Part 3 of this Section for required synchronization of strobes when located in the same field of view.

2.09 FIRE / SMOKE DAMPERS

A. Fire / Smoke dampers (FSD's), where used, are provided and installed by Division 23. This contractor shall provide and install a 120V power connection to each damper, wired to keep the damper in the open position under normal conditions.

B. An integral FSD smoke detector shall be provided by Division 23 with the damper assembly. This contractor shall provide and install an addressable monitor module, connected to the alarm contacts on the duct detector, to monitor the condition of the detector and annunciate an alarm condition to the main control panel upon detection of smoke.

C. This contractor shall wire the 120V control power for the FSD's via an auxiliary alarm contact in the detector base, to automatically close the damper upon smoke detection. Coordinate all provisions with the mechanical contractor and engineer.

D. All FSD provisions shall comply with the applicable sections and requirements of the CBC and the local AHJ.

E. Every effort has been made to indicate all required damper locations at rated partitions in coordination with Division 23 work. This contractor shall coordinate with the sub-mechanical contractor to identify all required locations for FSD's and provide connections to all units as required by code. The architectural drawings indicate by symbol, all such rated partitions. No extra cost shall be approved for additional required connections not shown on the drawings.

2.10 AUDIO AMPLIFIERS

A. The Audio Amplifiers shall provide audio power at 70.7 Volts RMS for distribution to speaker circuits.

B. Multiple audio amplifiers shall be mounted in the FACP, or at the FACP or expander panel locations, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).

C. The audio amplifiers shall include an integral power supply, and shall provide the following controls and indicators:
1. Normal Audio Level LED
2. Incorrect Audio Level LED
3. Brownout LED
4. Battery Trouble LED
5. Amplifier Trouble LED

2.11 AUDIO AMPLIFIER GAIN ADJUST

A. Adjustment of the correct audio level for the amplifier shall not require any special tools or test equipment.

B. Amplifiers shall include audio input and amplified output supervision; back up input, and automatic switch over function, (if primary amplifier should fail).

C. Amplifiers shall be backed up in groups (1 amplifier backs up several at the same location). Failure of any one amplifier in the system shall not degrade system performance in any way

2.12 AUDIO MESSAGE GENERATOR (PRERECORDED VOICE)

A. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a prerecorded voice message to all speakers in the building.

B. Activation of any alarm-initiating device shall cause a prerecorded message to sound over the designated speakers. The message shall be repeated a minimum of four (4) times.

C. A built in microphone shall be provided to allow paging through speaker zone circuits.

D. The audio message generator shall have the following controls and indicators to allow for proper operator understanding and control:
   1. All Call LED
   2. On Line LED

E. All Call Switch Local Speaker Volume Control Local (Test) Speaker

2.13 SPEAKER CIRCUIT CONTROL SWITCHES / INDICATORS

A. The speaker circuit control switches/indicators shall include visual indication of active and trouble status for each speaker circuit in the system.

B. The speaker circuit control panel shall include switches to manually activate or deactivate each speaker circuit in the system.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panel and remote annunciator shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Provide identification labeling on all devices to identify loop and device number/address. Labeling shall consist of min. 3/8" black lettering on white

background P-Touch style adhesive labels with machine printing, Helvetica font or similar.

E. At the final inspection a factory trained representative of the manufacturer of the major equipment shall perform the tests in Section 3.2 TESTING.

F. Wiring:
   1. All circuits shall be in conduit, minimum 3/4".
      a. Addressable loops circuits shall be two (2) conductor twisted/shielded or wiring approved by the manufacturer.
         1) Speaker audio circuits shall be two (2) #16 conductor (twisted/shielded) wiring approved by the manufacturer. Confirm all cable types with manufacturer prior to rough-in.
         2) Notification circuits shall be 12 AWG minimum for strobes, but not to exceed manufacturers wire capacity for modules. Control power circuits shall be 14 AWG minimum or as required.
         3) When (3) or more visual notification devices are located within the same field of view and are less than 55 feet apart (within the field of view), all devices within that field of view shall be synchronized to provide the same flash rate and frequency. Provide all required sync modules and compatible strobe devices to provide a synchronized output.

3.02 TESTING

A. Provide the service of a competent, factory trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system. Each building shall be separately tested as completed and the entire networked system tested just prior to project completion. Include contractor pre-test for each building prior to the final AHJ testing to insure a suitable final test result.
   1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
   2. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP and annunciator.
   3. Verify activation of all flow switches.
   4. Open initiating device circuits and verify that the trouble signal actuates at the FACP and annunciator.
   5. Open and short all notification appliance circuits and verify that trouble signals actuate at the FACP and annunciator.
   6. Ground circuits and verify response of trouble signals at the FACP and annunciator.
   7. Check presence and audibility of voice evacuation message at all speaker/strobe devices.
   8. Check installation, supervision, and operation.
   9. Verify that each initiating device alarm is properly received and processed by the FACP and annunciator (Walk Test).
   10. Conduct tests from FACP to verify trouble indications for common mode failures, such as alternating current power failure.

B. Test reports shall include, but not be limited to:
   1. A complete list of equipment installed indicating proper operations as listed above.

3.03 FINAL INSPECTION

A. Final acceptance will require the contractor to deliver to the Owner the following;
   1. Three (3) copies of the operating instructions and system maintenance manuals.
   2. Three (3) set of record drawings.
   3. Three (3) copies of the final test reports.
   4. Three (3) copies indicating the name and phone number of person to contact in the event of equipment failure, and date when system warranty will be terminate.
   5. Three (3) sets of data sheets for each piece of equipment supplied.
   6. Three (3) copies of the point prints.

B. The fire alarm system subcontractor or manufacturer shall offer for the Owner's consideration at the time of system submittal a priced inspection, maintenance, testing and repair contract in full compliance with the requirements of NFPA 72.
   1. The services offered under this contract shall be performed at no charge during the first year after system acceptance and the owner shall have the option of renewing for single or multiple years, up to five years, at the price quoted in bid.
   2. The contractor performing the contract services shall be qualified and listed to maintain ongoing certification of the completed system to the UL for specific installed system listing.

3.04 GUARANTEE

A. The fire detection system shall be guaranteed for a period of one year from date of acceptance. The guarantee shall cover parts, labor, and travel to and from the site.

3.05 INSTRUCTION

A. Provide complete instruction manuals and training to the building personnel. "Hands-on" demonstrations of the operation of all system components and the entire system shall be provided.

END OF SECTION

O'MAHONY & MYER
ELECTRICAL ENGINEERING & LIGHTING DESIGN

Parkway Heights Middle School
Modernization Phase 2

South San Francisco Unified School District

DSA
Fire Alarm Cut Sheets

NOTE: All CSFM listing sheets were compiled with the latest available versions from the OSFM as of November 08, 2017.

SIEMENS

Data Sheet
Fire Safety & Security Products

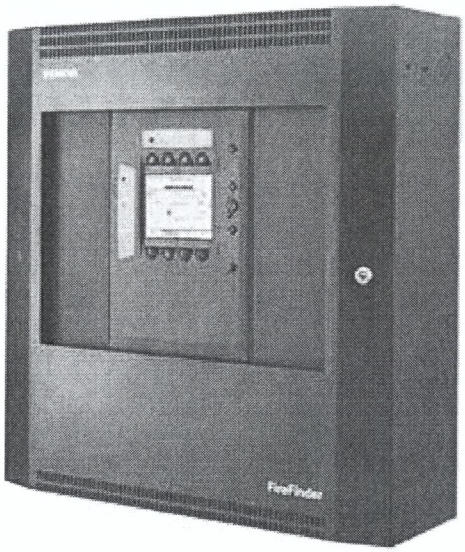
FireFinder™ XLS

Advanced Fire Alarm Control Panel

FACP

ARCHITECT AND ENGINEER SPECIFICATIONS

- Standard 2500 addressable, point-capacity system
- Ability to network with other FireFinder XLS systems
- Powerful, easy-to-use programming capabilities
- Fully field programmable, via Windows® laptop PC
- 6" Backlit LCD display
- User-friendly system interface
- Touch screen for maintenance operations and function keys
- Global annunciation and control capability
- Multi-language display
- Universal AC power input: 120VAC – 240VAC @ 50 / 60Hz
- 12 amps of system power (expandable to 48 amps)
- Numerous Relays: *Alarm*, *Trouble*, *Programmable*, etc.
- *SureWire*™ addressable-loop technology
- Polarity-insensitive detection circuits (patented)
- Useful diagnostic LEDs on all cards
- Supports *FirePrint*™ application-specific detection
- Intelligent / analog detection circuits: Class A or Class B
- Supports single-person test, "Walk Test"
- Seismic certified
- Modular assembly



- Supervised remote printer
- 32-character custom messages
- Thermal strip printer
- Security-device monitoring
  - (ⓈUL 1076 Listed)
- Sprinkler Supervision
- Degrade-mode operation
- Coded outputs
- NCCG Graphics support
- UUKL Listed for smoke control
- ⓈUL 864 9th Edition Listed & ⓈULC Listed; FM, CSFM & NYMEA Approved

- User help screens
- Multiple command stations
- Menu-driven operator commands
- 5000-event, history-logging capability with on-line and off-line reports
- Multiple levels of password protection
- Automatic environmental compensation for smoke detectors
- *Alarm* verification
  - by device or zone
- Pre-alarm operation
- Logic-controlled output functions
- Time-based-controlled output functions
- Holiday schedule
- City tie / leased line
- 200 notification-appliance-circuits (NACs) capacity
- Up to 3.0 amps (24VDC) per NAC
- Built-in strobe synchronization protocol
- Supports pre-action, deluge and agent releasing
- Voice evacuation system (optional)
- NEC 760 power-limited circuits
  - (ⓈUL 864 Compliant)
- Intelligent interface to building / process management systems
- Operates as interactive peer with other XLS or XLSV units in a XNET network
- Distributed processing
- Detector Sensitivity Readout / Printout
  - per NFPA 72

System Overview

FireFinder XLS is a microprocessor-based, advanced life-safety system that has a 6" display and large, lighted buttons; making it the most intuitive fire-alarm user interface in the industry. Through the use of the unique multiprocessor 'Network' design – along with the ability to utilize analog and conventional detection devices – FireFinder XLS exemplifies a flexible and highly configurable life-safety system.

FireFinder XLS is ideally suited for commercial, institutional and industrial fire detection and notification applications. XLS complies with the requirements of NFPA Standard 72, and is listed by Underwriters Laboratories under their standard ⓈUL 864.

Underwriter's Laboratories of Canada also lists the XLS for fire applications under ⓈULC-S527. FireFinder XLS is Factory Mutual Approved; as well as CSFM and NYMEA Approved for use in those specific locales. In addition to the standard fire applications, FireFinder XLS is ⓈUL Listed under the category UUKL for smoke control. FireFinder XLS can be used as a listed Fireman's Smoke Control Station in high-rise office buildings, malls and other large structures.

FireFinder XLS is ⓈUL Listed and FM Approved for Sinorix™ clean-agent systems and pre-action or deluge sprinkler systems, which include foam or water applications. FireFinder XLS operates on the releasing requirements specified in NFPA 13 and 2001.

SIEMENS Industry, Inc.
Building Technologies Division

System Overview — (continued)

The FireFinder XLS system has been seismic qualified in accordance with:

- International Building Code, 2006 Edition
- California Building Code, 2007 Edition
- ASCE Standard 7, 2005 Edition
- OSHPD CAN 2-1708A.5, Rev. 3
- ICC-ES AC 156, Effective 1/1/2007

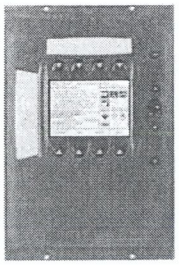
FireFinder XLS is also OSHPD preapproved under: OSP-0057-10.

FireFinder XLS Components

The basic FireFinder XLS control unit consists of the following sub-assemblies: Person Machine Interface (Model PMI); Power Supply (Model PSC-12); Device Loop Card (Model DLC); Zone Indicating Card (Model ZIC-4A); Card cage (Model CC-5); Inner Door Blank Single Plate (Model ID-SP); CAB-1, CAB-2 or CAB-3 enclosures.

Optional modules that can be installed with the XLS System include: Card Cage (Model CC-2); Network Interface Card (Model NIC-C); Zone Indicating Card 8 circuits (Models ZIC-8B / ZIC-2C); Control Relay Card (Model CRC-6); Output Control Module (Model OCM-16); Switch Control Module (Model SCM-8); LED Control Module (Model LCM-8); Fan Control Module (Model FCM-6); Supervised Input Module (Model SIM-16); Power Supply Extender (Model PSX-12); Remote Network Interface (Model RNI); Remote Printer Module (Model RPM); System Status Display (Model SSD); Multi-Point Digital Alarm Communicator (Model MDACT); Two-Module Remote Enclosure (Model REMBOX2); Four-Module Remote Enclosure (Model REMBOX4).

The XLS panel is compatible with a full line of intelligent initiating devices, highlighted by the *FirePrint* application-specified detectors: Models HFP-11 and HFPT-11. XLS is also compatible with the NCC series of graphics command centers.



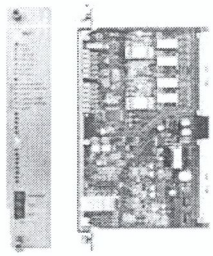
PMI Person Machine Interface

PMI Person Machine Interface

The Person Machine Interface (Model PMI) is the core of the FireFinder XLS system. Model PMI serves as both operator interface and central microprocessor for the FireFinder XLS system. From Model PMI, the end user can acknowledge events, control the system-notification appliance circuits and reset the system. Detailed information about the nature and location of the events can also be displayed.

Model PMI contains the site-specific program configuration created in the *Zeus* system software-programming tool. The controller in Model PMI provides all system logic and supervision. Model PMI contains a large, 6" (1/4 VGA) monochrome LCD display, touch screen and LEDs for displaying system status. A sound is made when there is any unacknowledged event from Model PMI. The display is surrounded by keys that are used to control the displayed information and to navigate through these screens. Keys are also provided to obtain and enter "Help" into the menu features of Model PMI.

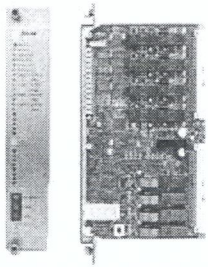
The FireFinder system is controlled and operated from Model PMI. The intuitive person machine interface uses large, lighted buttons to prompt users as to the next correct system operation that is available (*Acknowledge*, *Silence*, *Unsilence*, *Audible* or *Reset*).



DLC Device Loop Card

DLC Device Loop Card

The Device Loop Card (Model DLC) is the interface for connection with FireFinder XLS detectors and initiating devices — including manual stations, control and input devices. Model DLC plugs into one (1) slot of the CC-2 or CC-5 card cage. Programming Model DLC is accomplished using the FireFinder XLS *Zeus* system software-programming tool. Model DLC takes one (1) address on the network, and communicates with two (2) device circuits for a total of 252 detectors and devices. Model DLC has 12 LEDs for diagnostic purposes, and provides ground-fault detection and zone-isolation circuitry.



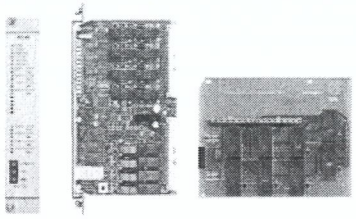
ZIC-4A Zone Indicating Card

ZIC-4A Zone Indicating Card

The Zone Indicating Card (Model ZIC-4A) provides four (4) fully supervised, programmable output circuits for use on the FireFinder XLS Fire Alarm Control Panel. Model ZIC-4A supplies four (4) Class B (Style Y) or Class A (Style Z) type output circuits, power limited to 3.0 amps maximum per circuit.

FireFinder XLS Components – (cont.'d)

Each circuit can be independently programmed for use with listed audible or visual notification appliances, listed emergency audio speakers, municipal tie boxes, leased lines, or as releasing circuits. Model ZIC-4A plugs into one (1) slot in the Model CC-5 or Model CC-2 card cage, and has on-board LEDs for system status and troubleshooting. Indication of power, communication, internal operation, and ground-fault conditions are provided, as well as indication of circuit activation or *Trouble* conditions.

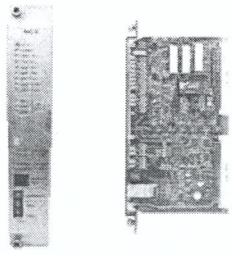


ZIC-8B / ZIC-2C Zone Indicating Cards

ZIC-8B / ZIC-2C

The Zone Indicating Card (Model ZIC-8B) provides eight (8) fully supervised, programmable output circuits for use on the FireFinder XLS fire-alarm control panel (FACP). Model ZIC-8B supplies eight (8) Class B (Style Y) type output circuits, power limited to 2.0 amps maximum per circuit. Each circuit can be independently programmed for use with listed audible or visual notification appliances, or listed emergency audio speakers. Model ZIC-8B plugs into one (1) slot in the Model CC-5 or Model CC-2 card cage, and has on-board LEDs for system status and troubleshooting.

Model ZIC-2C mounts directly on Model ZIC-8B, and allows each of the Model ZIC-8B output circuits to be used for two-channel voice applications. Indication of power, communication, internal operation, and ground-fault conditions are provided, as well as indication of circuit activation or *trouble* conditions.



NIC-C Network Interface Card

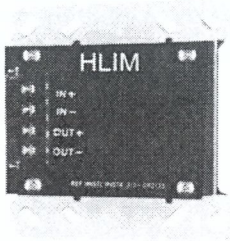
NIC-C Network Interface Card

The Network Interface Card (Model NIC-C) provides HNET or XNET network communications between enclosures. In addition to the HNET or XNET communication, Model NIC-C provides CAN network communication within an enclosure or external to the enclosure. HNET or XNET communication can be wired Style 4 or Style 7, but the CAN network can be wired Style 4 only.

When used for HNET communications, Model NIC-C provides communication between enclosures on a single system.

When Model NIC-C is used for XNET communications, Model NIC-C provides communication between systems. The maximum of XNET Model NIC-C cards on a single system (single node) is one (1), for a total of 64 XNET Model NIC-C cards on a peer-to-peer networked system.

Model NIC-C has diagnostic LEDs that indicate: Card Fail, CAN Fail, HNET Fail, XNET Fail, Ground Fault, Loop 'A' Fail and Loop 'B' Fail. Model NIC-C Card also has LEDs to indicate Power, Style and Active Networks.

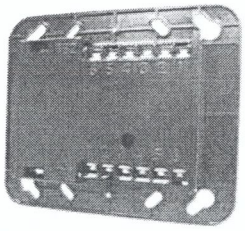


HLIM Line Isolator Module

HLIM Line Isolator Module

The loop-isolator module (Model HLIM) provides short-circuit protection on FireFinder XLS intelligent device circuits (see: Model DLC). When Model HLIM detects a short circuit, Model HLIM is able to isolate the affected segment of the circuit – allowing the remaining devices to continue operation. Model HLIM is self-restoring – automatically reconnecting to circuit segment when the fault is removed. Model HLIM can be wired in either a Style 4 or Style 6 configuration.

Model HLIM does not occupy a device address on the Model DLC circuit, and does not require programming. Up to 15 Model HLIM modules may be installed on each Model DLC loop.



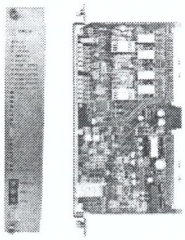
HCP Control Point Module

HCP Control Point Module

Model HCP provides an intelligent control point for the FireFinder XLS Control Panel. Model HCP can be programmed as an independent, remotely located telephone zone, speaker zone or notification appliance circuit. Model HCP is designed to be used with the Siemens – Fire Safety Notification-Appliance Circuits product line.

Model HCP communicates through the Model DLC analog loop, and can be wired either Class A (Style Z) or Class B (Style Y). The 24 VDC power input comes from either the control panel or from any ®UL Listed power-limited, auxiliary-power supply.

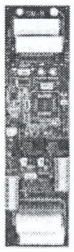
FireFinder XLS Components – (cont.'d)



CRC-6 Controllable Relay Card

CRC-6 Controllable Relay Card

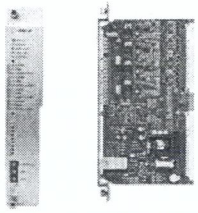
The Controllable Relay Card (Model CRC-6) is used with the FireFinder XLS FACP. Model CRC-6 is designed to provide auxiliary control of building functions, such as: door-holder release, elevator capture, smoke control, lock release, etc. Model CRC-6 plugs into one (1) slot in the Model CC-5 or Model CC-2 card cage. Model CRC-6 provides six (6), fully programmable relays. Each relay contains one (1) set of SPDT contacts rated at 4 Amps 30 VDC / 120VAC resistive and 3.5 amps 120VAC inductive (0.6 P.F.)



SIM-16 Supervised Input Module

SIM-16 Supervised Input Module

The Supervised input Module (Model SIM-16) is a remotely located, general-purpose input module. Model SIM-16 provides 16 input circuits for remote system monitoring. Each input can be individually programmed as supervised (dry-contact only) or unsupervised (general-purpose input.) Model SIM-16 has two (2) Form C relays. The relays and inputs are programmed using the *Zeus* system software-programming tool.



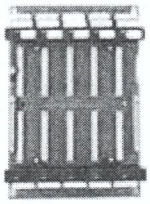
CDC-4 Conventional Detector Card

CDC-4 Conventional Detector Card

The Conventional Detector Card (Model CDC-4) is used to monitor Siemens Fire Safety conventional detectors on the FireFinder XLS system. Model CDC-4 can be used in applications where conventional detectors are more suited than addressable detectors, such as hallways or large meeting rooms. Also, Model CDC-4 can be used to upgrade Siemens conventional fire-alarm panels to the FireFinder XLS system without requiring detector replacement.



CC-2 Card Cage-2 Slots



CC-5 Card Cage-5 Slots

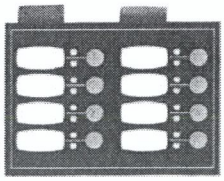
CC-5 / CC-2 Card Cages

The Models CC-5 / CC-2 card cages provide the physical mounting location and all wiring connection points for all fire-and-voice system options cards for the FireFinder XLS system. Model CC-5 has five (5) slots, while Model CC-2 has two (2) slots.

All cards plugged into the CC-5 / CC-2 card cage communicate with other FireFinder-XLS modules via a common data bus. Connectors are provided on the left and right side of the CC-5 to connect a 60-pin cable for communications with the FireFinder-XLS' operator interface, power supplies and amplifiers modules.

Field wiring to devices and circuits terminates on the Models CC-5 / CC-2 card cages. All cards designed for use with the Models CC-5 / CC-2 route their field wiring terminations to the 'top' of the Model CC-5 / CC-2 card cages. These connections are all power limited. Internal wiring connections distribute 24VDC to cards or high-level audio signals (depending on application used) connect to the 'bottom' of the Model CC-5 / CC-2 card cages. These connections are all non-power limited.

All wiring connections to the Model CC-5 / CC-2 card cages are to removable terminal blocks. Terminal blocks are rated for use with wire sized 12AWG to 24AWG. Each connector is numbered to make wiring terminations to the correct position on the terminal block simple in order to reduce potential wiring errors.



SCM-8 Switch Control Module

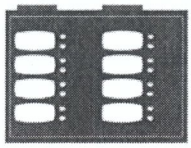
SCM-8 Switch Control Module

The Switch Control Module (Model SCM-8) is a FireFinder XLS-option module that provides manual control to the Emergency Voice Evacuation System (EVAC) or manual fire-system control. Each Model SCM-8 module provides eight (8) momentary push-button switches and 16 light-emitting diodes (LEDs) to indicate their status.

Each switch is assigned two (2) LEDs, as well as a label to indicate the switch's programmed usage. The label slides behind a clear protective membrane. One of the LEDs assigned to each switch is a dual-colored LED, which is used to indicate what type of signal is active.

FireFinder XLS Components – (cont.'d)

Each Model SCM-8 switch is fully programmable, and may be used to control speaker circuits and a wide range of general-system functions such as: *All Call*, *All Evac*, *Warden's Page*, *Speaker*, etc. Any number of circuits may be grouped and controlled by a single switch. Switch usages and zone groupings are assigned using the *Zeus* system software-programming software. Model SCM-8 modules are mounted on a hinged panel, as a part of the FireFinder XLS Command Console enclosure.

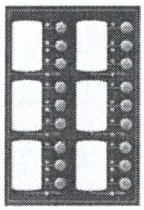


LCM-8 LED Control Module

LCM-8 LED Control Module

The LED Control Module (Model LCM-8) is a FireFinder XLS-option module that provides LED annunciation for FireFinder XLS system activity. Each LCM-8 module contains eight (8) groups of two (2) LEDs – each of which can be assigned to desired outputs using the *Zeus* system software-programming tool.

Eight (8) LEDs are dual-color capable (RED or GREEN / *flashing* or *steady*). The remaining LEDs are AMBER *flashing* or *steady*. A space is provided for labeling of LED functions. The label slides behind a clear, protective membrane. Model LCM-8 dimensions are identical to Model SCM-8, and Model LCM-8 is mounted on the same hinged panel, as a part of the FireFinder XLS Command Console enclosure.



FCM-6 Fan, Motor, Dampers Control Module

FCM-6 Fan, Motor, Dampers Control Module

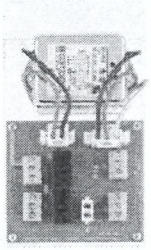
The Fan, Motor, Dampers Control Module (Model FCM-6) is a FireFinder XLS command-console option module that provides manual control of building HVAC system fans, motors, and dampers. Each Model FCM-6 module provides six (6) sets of three (3) push-button switches for manual-system control. Each switch has three (3), associated LEDs to indicate Fan / Damper / Motor status: OFF (Red LED), ON (Green LED), TROUBLE (Yellow LED).



PSC-12 Power Supply Charger Module

PSC-12 Power Supply Charger Module

The Power Supply Charger Module (Model PSC-12) is a high-current power supply that provides the FireFinder XLS primary-regulated 24VDC power to operate. Model PSC-12 is rated at 12Amps (Alarm) / 5Amps (Standby), and has a built-in battery charger, capable of charging up to 100 AH batteries. Model PSC-12 is an addressable-intelligent, microprocessor-controlled module that communicates its status to the system-operator interface (PMI). Model PMI is able to query the status of the power supply to obtain information regarding system-charging current, terminal-loading information, ground-fault conditions and more.



PTB Power Termination Board

PTB Power Termination Board

Model PSC-12 comes packaged with a module called the Power Termination Board (Model PTB). Model PTB is required for operation with Model PSC-12. Model PTB filters the power from the incoming AC mains, and distributes it to the Model PSC-12 power supply and the optional Model PSX-12 power-supply extender.

Model PTB has an optional connector that can be used during system installation, commissioning and service to provide the technician with a place to plug in their laptop PC, if required. Model AC-ADPT is an optional accessory cable that allows connection on one side to Model PTB, via a keyed connector and on the other end directly into to the laptop's transformer.

Most laptop-computer external power transformers have removable AC power cords, which can be replaced by the optional Model AC-ADPT to temporarily provide an AC power source for laptop-PC usage during system installation, service and maintenance calls when needed.

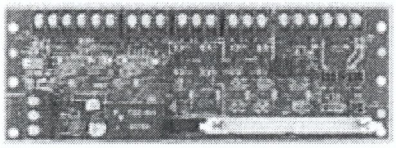


PSX-12 Power Supply Extender

PSX-12 Power Supply Extender

The Power Supply Extender (Model PSX-12) is a high-current, auxiliary power supply that expands the main Model PSC-12 power supply and battery charger of the FireFinder XLS system with an additional 24VDC power. Model PSX-12 is rated at 12 Amps.

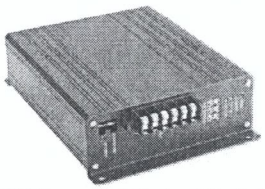
FireFinder XLS Components – (cont.'d)



RNI Remote Network Interface

RNI Remote Network Interface

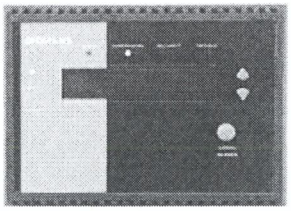
The Remote Network Interface (Model RNI) provides a connection point for use with equipment mounted in a remote-lobby enclosure on the FireFinder XLS FACP. Model RNI is used to provide additional input, output and control features to the system remotely, via the main control panel. These additional features may include control switches and indicators: (Models SCM-8, LCM-8 and FCM-6), remote-emergency paging microphones or telephones: (Models LVM, FMT), or controls used in graphic annunciators (Models SIM16, OCM-16) or system-status display with the ability to *acknowledge* alarms, *silence* audibles and *reset* the system (Model SSD-C-REM). Model RNI allows Model PMI to be mounted in the Model REMBOX2 or Model REMBOX4 remote lobby enclosure.



RPM Remote Printer Module

RPM Remote Printer Module

The Remote Printer Module (Model RPM) provides a means of connecting the FireFinder XLS system to a printer, such as Model PAL-1, for creating a hard copy of system status and configuration reports. Simultaneously, Model RPM provides an output port that can be configured to communicate with external systems.



System-Status Display

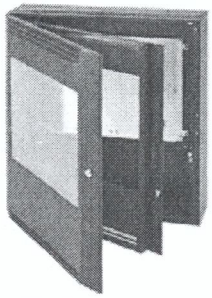
SSD-Series System-Status Display

The System Status Display (SSD-series model displays) is a remote LED / LCD display that shows the local status of a FireFinder XLS system. An LED illuminates when *Alarm*, *Supervisory*, *Trouble*, and *Security* events occur on the system. A (4) four-line liquid-crystal display (LCD) will give details of the event in alphanumeric form.

The display can be toggled to display additional events. Optional remote system control capabilities are available. Models SSD-C, SSD-C-INT, and Model SSD-C-REM have three (3) additional control buttons to *acknowledge* events, *silence* audible circuits, and *reset* the system.

Models SSD-C and SSD-C-INT have an integral keyswitch that enables these control buttons to operate.

Model SSD-C-REM is located within a locked cabinet. Hence, no additional keyswitch is required for enabling the control buttons.

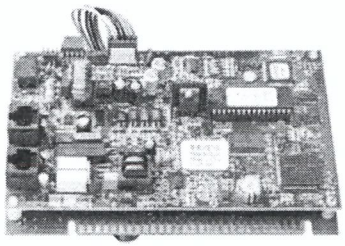


CAB1 Single Row Enclosure

CAB1 Single Row Enclosure

Model CAB 1, the smallest of the FireFinder XLS enclosures, can house a single Model CAB-MP cabinet mounting plate for mounting card cages, power supplies and bulk amplifiers. Model CAB1 also has four (4) mounting slots on the inner door for mounting Model PMI and Model ID-MP switch module brackets.

Model CAB1 comes complete with a black back box; black inner and outer doors; a single lock and key set on the outer door; a single, installed cabinet mounting plate (Model CAB-MP), and a single, installed outer door lens plate (Model OD-LP). A red version (Model CAB1-R) is also available – approximate size: 27" (68.6cm.) high, 26" (66cm.) wide, and 8" (20.3cm.) deep.



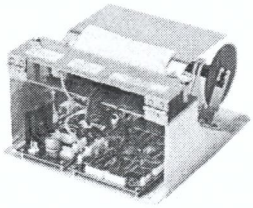
MDACT - Multi-Point Digital Alarm Communicator Transmitter

MDACT - Multi-Point Digital Alarm Communicator Transmitter

The Multi-Point Digital Alarm Communicator Transmitter (Model MDACT) is used in FireFinder XLS systems where point identification of *Alarm*, *Supervisory*, *Security* and *Trouble* events is required at Central or Remote Receiving Stations. An intelligent RS-485 communications protocol transmits all system information to Model MDACT.

The installer selects the specific event or groups of events that are set to transmit from Model MDACT over phone lines to listed receiving station equipment. In turn, Model MDACT can transmit point information, via the Ademco Contact ID and the SIA protocol. A Mounting Plate (Model MOM2-XMP), MOM-2 card cage, and an XMI Interface Card are required for installation.

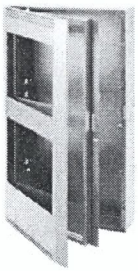
FireFinder XLS Components – (cont.'d)



TSP-40A Thermal Strip Printer

TSP-40A Thermal Strip Printer

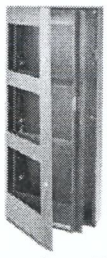
The thermal strip printer (Model TSP-40A) is designed for use with the FireFinder XLS system. Model TSP-40A acts as an event-logging device, providing a permanent history report of all system activity. Model TSP-40A mounts in the FireFinder XLS Model CAB 1, Model CAB2 or Model CAB3 enclosure, and its printout is visible through a window in the locked-door enclosure. Printouts are automatically spooled onto a take-up reel for tidy, uniformed records storage.



CAB2 Two-Row Enclosure

CAB2 Two-Row Enclosure

The Two-Row Enclosure (Model CAB2) is the mid-sized FireFinder XLS enclosure capable of housing up to two (2) Model CAB-MP cabinet mounting plates. The inner door has two (2) rows of four (4) mounting slots. The outer door has space for mounting two (2) outer door plates (Models OD-LP, OD-BP or OD-GP). The outer door can be configured to open from either side. Model CAB2 consists of the Model CAB2-BB back box, the Model CAB2-BD black inner and outer door package, and one (1) Model OD-LP lens plate. The outer door has a single lock and key set installed. A red version (Model CAB2R) is also available. Approximate size is 45" (114.3cm.) high, 26" (66cm.) wide, and 8" (20.3cm.) deep.



CAB3 Three-Row Enclosure

CAB3 Three-Row Enclosure

Model CAB3, the single largest FireFinder XLS enclosure available, can house a maximum three (3) Model CAB-MP cabinet mounting plates in the enclosure, and three (3) rows of inner-door mounting slots.

The outer door can be configured to open from either side. Model CAB3 consists of the Model CAB3-BB back box, the Model CAB3-BD black inner and outer door package, and one (1) Model OD-LP lens plate. The outer door has two (2) locks and key sets installed. A red version (Model CAB3R) is also available. Approximate size is 63" (160cm.) high, 26" (160cm.) wide, and 8" (20.3cm.) deep.

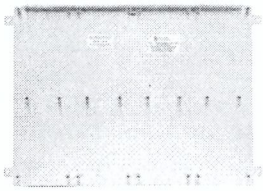
Enclosure Trim Kits

Trim kits are available for all system enclosures for semi-flush mounting applications. Model CAB1-TK (for black enclosures) and the Model CAB1R-TK (for red enclosures) fit inside the Models CAB1 and CAB1-R enclosures. Similarly, Models CAB2-TK and CAB-2R-TK fit inside the Model CAB-2 enclosure, while Models CAB3-TK and CAB3R-TK fit the Model CAB-3 enclosure.

Remote Transponders

The FireFinder XLS system can use remote transponders for mounting additional modules such as amplifiers without requiring Model PMI or any control switches. Special doors are available for systems using Model CAB-2 or Model CAB-3 remote transponders. These doors (Models CAB2-XBD and CAB3-XBD) omit the unused inner door, and come complete with ventilation louvers built into the door.

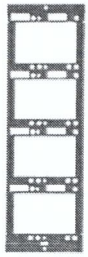
Model CAB2-XBD fits into Model CAB2-BB, and Model CAB3-XBD fits into Model CAB3-BB. Model CAB2-XBD and CAB3-XBD are supplied in black. Red versions (Models CAB2-XRD and CAB3-XRD) are also available. Complete box and door kits are available, Models CAB2-X and CAB3-X.



CAB-MP Cabinet Mounting Plate

CAB-MP Cabinet Mounting Plate

The Model CAB-MP cabinet mounting plate provides mounting for a single row of modules in a FireFinder XLS cabinet. Four (4) module spaces are available on Model CAB-MP, which is used to mount the Model CC-5 card cage; the Model CC-2 card cage; the Model PSC-12 power supply; the Model PSX-12 power-supply extender, and the Model ZAM-80 / 180-zone amplifiers.



ID-MP Inner Door Mounting Plate

FireFinder XLS Components – (cont.'d)

ID-MP Inner Door Mounting Plate

The inner door mounting plate (Model ID-MP) is mounted on the inner door of any given model CAB enclosure. Model ID-MP plates are used to mount switch-control modules (Model SCM-8); LED control modules (Model LCM-8), or fan-control modules (Model FCM-6).

Four (4) mounting plates are included in each Model ID-MP. Each mounting plate has four (4) spaces for control modules, and can hold either four (4) Model SCM-8 modules (one [1] control module space for each module); four (4) LCM-8 (one [1]control module space for each module), or two (2) Model FCM-6 modules (two [2] module spaces for each module).

Combinations are also allowed. Blank spaces in Model ID-MP can be covered using the blank-control-module plate (Model BCM). Up to four (4) Model ID-MP modules can be mounted in a single row on the inner door.



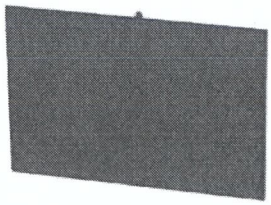
ID-SP Inner Door Blank Single Plate

ID-SP Inner Door, Blank Single Plate

The inner door, blank single plate (Model ID-SP) is used to cover any single-module blank spaces on the inner door not used to mount Model PMI or Model ID-MP. Up to four (4) Model ID-SP modules can be mounted in a single row on the inner door. Two (2) blank plates are included in each Model ID-SP.

ID-FP Inner Door Full-Blank Plate

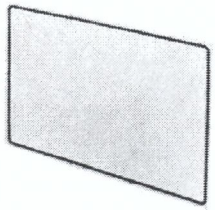
Model ID-FP is a blank plate that covers the full opening of the row on an inner door, and is used for applications requiring full, dead-front protection. A single, full blank plate is included in Model ID-FP.



BCM Blank Control Module Plate

BCM Blank Control-Module Plate

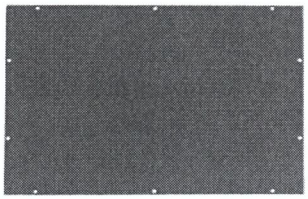
Model BCM plates can be mounted on a single ID-MP. Four (4) blank module plates are included in each Model BCM.



OD-LP Outer Door Lens Plate

OD-LP Outer Door Lens Plate

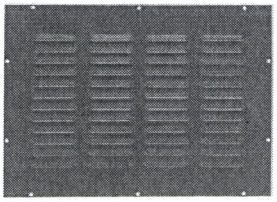
The Outer Door Lens Plate (Model OD-LP) is a clear plastic lens plate mounted on the outer door of a system cabinet. It is used to allow operators to see the system interface and controls mounted on the inner door, but restricts access to unauthorized users. It covers an entire row on the outer door. A single lens plate is included with each OD-LP.



OD-BP Outer Door Blank Plate

OD-BP Outer Door Blank Plate

The Outer Door Blank Plate (Model OD-BP) is used to cover an entire row on the outer door of a system cabinet. It is used when there is no PMI or control modules mounted on the adjacent row of the inner door. A single, blank plate is included in each Model OD-BP.



OD-GP Outer Door Grill Plate

OD-GP Outer Door Grill Plate

The Outer Door Grill Plate (Model OD-GP) also covers an entire row on the outer door of a system cabinet, but has four rows of ventilation louvers on it. The OD-GP is mounted in front of system bulk amplifiers, card amplifiers, or other modules that generate heat. Using the OD-GP will permit airflow across these modules to aid in heat dissipation. A single grill plate is included with each OG-GP.

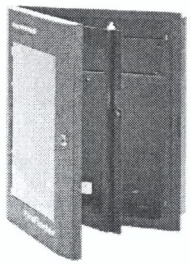
Remote System Enclosures

Models REMBOX2 and REMBOX4 are FireFinder XLS system enclosures that are used for remotely mounting inner-door modules like the Model PMI interface, switch modules, Model LVM live voice modules, and Model FMT firefighters master telephone modules. Models REMBOX2 and REMBOX4 are thinner than the regular CAB series of enclosures – just 5" (12.7cm.) deep overall, and are perfect for mounting in places where space is limited (e.g. – office-complex lobbies or behind a receptionist's desk).

FireFinder XLS Components – (cont.'d)

No card cages, power supplies or bulk amplifiers can be mounted in a given REMBOX because of their smaller depth. However, Model PMI and modules (e.g. – the remote network interface module [Model RNI], the output control module [Model OCM-16], and the supervised input module [Model SIM-16]) can be mounted in a given REMBOX.

Due to the depth of the live voice module and the firefighters' master telephone, no Model OCM-16 or Model SIM-16 modules can be used simultaneously with Model LVM or Model FMT. The REMBOX2 and the REMBOX4 are designed for flush mounting with no trim kit required. Both enclosures also come with a clear lens plate on the cover.

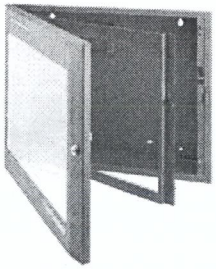


REMBOX2 Two Module Remote Enclosures

REMBOX2 Two Module Remote Enclosures

REMBOX2 has two (2) inner-door module spaces, and can hold a single Model PMI, up to two (2) switch module brackets and one (1) Model LVM. Combinations are also allowed.

REMBOX2 can also mount a single RNI remote network interface on a bracket included in the backbox. A bracket called the REMBOX2-MP can be used to mount up to four OCM-16 output control modules or SIM-16 supervised input modules. Model REMBOX2-MP must be purchased separately. Approximate size of REMBOX2 is 14-1/2" (36.8cm.) wide, 18-1/2" (47cm.) high and 5" (12.7cm.) deep.

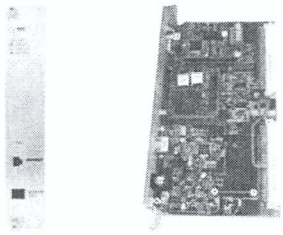


REMBOX4 Four-Module Remote Enclosures

REMBOX4 Four-Module Remote Enclosures

Model REMBOX4 has space for mounting four (4) inner-door modules. Any combination of Model PMI (two-module spaces); switch module brackets; Model LVM, or Model FMT (one-module space each) can be used. Unused module spaces can be covered with Model ID-SP blank plates. The REMBOX4 can also mount a single remote network interface (Model RNI) on a bracket included in the backbox.

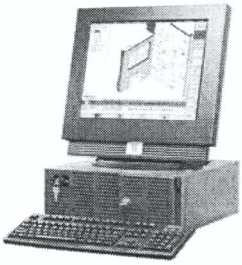
A bracket known as Model REMBOX4-MP can be used to mount up to eight (8) output control modules (Model OCM-16) or supervised input modules (SIM-16). The REMBOX4-MP must be purchased separately. Approximate size of the REMBOX4 is 24" (61cm.) wide, 18-1/2" (47cm.) high and 5" (12.7cm.) deep.



NRC Network Ring Card

NRC Network Ring Card

Model NRC (FM approval pending) provides XNET, peer-to-peer communication between FireFinder XLS systems. One (1) Model NRC is required for each XLS panel, in order to allow FireFinder XLS nodes to be wired in a Class A, Style 7 ring topology.

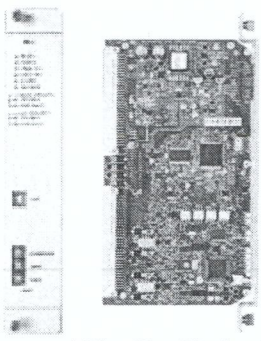


NCC-G - Network Color Graphics

NCC-G - Network Color Graphics

Model NCC-G is a PC-based, color-graphics command center designed for use with the XNET network, and provides full control and annunciation for a XNET network for a maximum 63 XLS, MXL-IQ or MXL systems. The NCC-G is used to monitor and control alarms, troubles, security, supervisory and all system events from one of many XLS systems.

Model NCC-G maintains an extensive history log of all system events and has extensive report generation capabilities. User programmable function buttons allow site specific control functions. Multiple NCC-Gs may be connected to XNET network. Each NCC-G ordered separately.

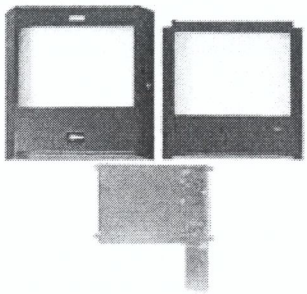


MLC - MXL Line Card [for FireFinder XLS]

FireFinder XLS Components – (cont.'d)

MLC - MXL Line Card [for FireFinder XLS]

The MXL Line Card (Model MLC) is an optional card for the FireFinder XLS panel that supplies two (2) intelligent analog circuits, utilizing the Model 'I' series; Model 'ID' series; Model 'IL' series or Model 'FP' series-type intelligent devices. Model MLC occupies two (2) addresses on the HNET network, and devices connected to the Model MLC circuits are dynamically supervised by FireFinder XLS through the use of a unique communications protocol.

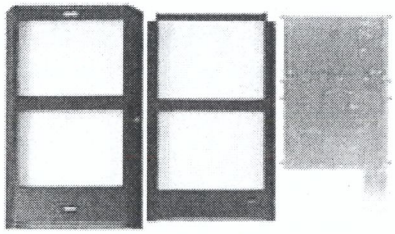


XLS-MSE2-ADPT

XLS-MSE2/R-ADPT – XLS MSE-2/R Enclosure Adapter

Model XLS-MSE2-ADPT, which must be used in conjunction with Model CAB-MP, is an adapter that allows FireFinder XLS cards to be mounted in older-generation MXL Model MSE-2 small black enclosures.

Model XLS-MSE2R-ADPT, which must be used in conjunction with Model CAB-MP, is an adapter that allows FireFinder XLS cards to be mounted in older-generation MXL Model MSE-2R small red enclosures.

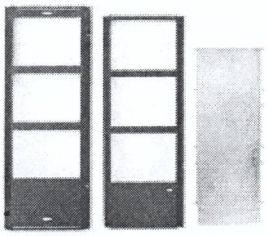


XLS-MME3-ADPT

XLS-MME3/R-ADPT – XLS MME-3/R or MBR-2 Enclosure Adapters

Model XLS-MME3-ADPT, which must be used in conjunction with Model CAB-MP, is an adapter that allows FireFinder XLS cards to be mounted in older-generation MXL Model MME-3 or Model MBR-2 medium black enclosures.

Model XLS-MME3R-ADPT, which must be used in conjunction with Model CAB-MP, is an adapter that allows FireFinder XLS cards to be mounted in older-generation MXL Model MME-3R medium red enclosures.

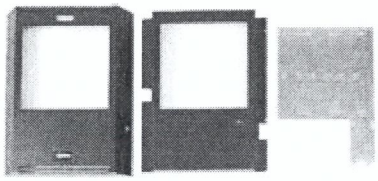


XLS-MLE6-ADPT

XLS-MLE6/R-ADPT – XLS MLE-6/R Enclosure Adapter

Model XLS-MLE6-ADPT, which must be used in conjunction with Model CAB-MP, is an adapter that allows FireFinder XLS cards to be mounted in older-generation MXL Model MLE-6 large black enclosures.

Model XLS-MLE6R-ADPT, which must be used in conjunction with Model CAB-MP, is an adapter that allows FireFinder XLS cards to be mounted in older-generation MXL MLE-6R large red enclosures.

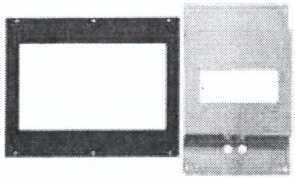


XLS-MSE3-ADPT

XLS-MSE3/R-ADPT – XLS MSE-3L/R or MSE-3M/R Enclosure Adapters

Model XLS-MSE3-ADPT is an adapter that allows FireFinder XLS cards to be mounted in older-generation MXL-IQ Model MSE-3L or Model MSE-3M black enclosure.

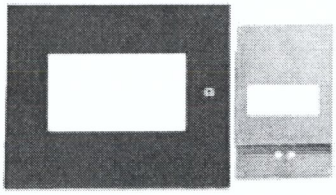
Model XLS-MSE3R-ADPT is an adapter that allows FireFinder XLS cards to be mounted in older-generation MXL-IQ Model MSE-3LR or Model MSE-3MR red enclosure.



XLS-RCC1-ADPT

XLS-RCC-1-ADPT – XLS RCC-1 Enclosure Adapter

Model XLS-RCC1-ADPT is an adapter that allows the FireFinder XLS Model SSD/-C series remote annunciator to be mounted in older-generation Model RCC-1 surface-mount enclosure.



XLS-RCC13F-ADPT

FireFinder XLS Components – (cont.'d)

XLS-RCC13F/R-ADPT – XLS RCC-1F/R or RCC-3F/R Enclosure Adapters

Model XLS-RCC13F-ADPT is an adapter that allows the FireFinder XLS Model SSD/-C series remote annunciator to be mounted in older-generation Model RCC-1F or Model RCC-3F black, flush-mount enclosure.

Model XLS-RCC13FR-ADPT is an adapter that allows the Model SSD/-C series to be mounted in older-generation RCC-1FR and RCC-3FR, red flush-mount enclosure.

Details for Ordering

Model Number	Part Number	Description
—	599-050092	PMI and GPMI
AC-ADPT	500-633992	Technician laptop power connector
BCM	500-033320	Blank control module plate, [four (4) per package]
CAB-1	500-633007	Complete single-row cabinet, black
CAB-1R	500-633728	Complete single-row cabinet, red
CAB1-TK	500-633013	Single-row trim-kit cabinet, black
CAB1R-TK	500-633729	Single-row trim-kit cabinet, red
CAB2-BB	500-633009	(2) Two-row back box, black
CAB2-RB	500-634941	(2) Two-row back box, red
CAB2-BD	500-633008	(2) Two-row inner & outer door set, black
CAB2-RD	500-633755	(2) Two-row inner & outer door set, red
CAB2-TK	500-633014	(2) Two-row trim-kit cabinet, black
CAB2R-TK	500-633753	(2) Two-row trim-kit cabinet, red
CAB2-XBD	599-633768	CAB2 transponder door
CAB2-X	599-034252	Complete CAB2 w/ transponder door [no inner door]
CAB2-XRD	500-633792	Medium-enclosure transponder door, red [mounts to CAB2-RB]
CAB3-BB	500-633011	(3) Three-row back box, black
CAB3-RB	500-634942	(3) Three-row back box, red
CAB3-BD	500-633010	(3) Three-row inner & outer door set, black
CAB3-RD	500-633757	(3) Three-row inner & outer door set, red
CAB3-TK	500-633015	(3) Three-row trim-kit cabinet, black
CAB3R-TK	500-633754	(3) Three-row trim-kit cabinet, red
CAB3-XBD	599-633769	CAB3 transponder door
CAB3-X	599-034253	Complete CAB3 w/ transponder door [no inner door]
CAB3-XRD	500-633793	Large-enclosure transponder door, red [mounts to CAB3-RB]
CAB-MP	500-633012	Back box module mounting plate
CCL	599-634214	CAN Cable 3 ft. (91.4 cm.) Length required for: SCM / LCM / FCM modules from Models CC-5 / CC-2 Inner Doors and from Row-to-Row on Model CAB-series Inner Doors
CC-2	500-633440	Two (2) slot card cage
CC-5	500-633037	Five (5) slot card cage
CDC-4	500-034200	Conventional detector card
CRC-4	500-033250	Controllable relay card
CSB	500-033130	CAN Sounder Board
DCT-P	500-699291	MDACT programmer
DLC	500-033090	Device loop card
FCM-6	500-033140	Fan-control-module switches {ON, OFF, AUTO}
GPMI-UK	500-650066	Software-upgrade kit for PMI {to allow global functionality}
HCP	500-034860	Intelligent control point
HLIM	500-033170	Line-isolator module
ID-FP	500-633029	(4) Four module inner-door blank plate
ID-MP	500-633027	Inner-door enclosure mounting plate, [four (4) per package]
ID-SP	500-633028	Single-module inner-door enclosure mounting plate, [two (2) per package]

Details for Ordering – (continued)

Model Number	Part Number	Description
LCM-8	500-033100	LED Annunciator Module [eight (8) LED sets]
MDACT	500-699254	Multi-point digital-alarm communication transmitter
MLC	S54431-B4-A1	MXL addressable-device line card [used for FireFinder XLS]
MOM2-XMP	500-634822	Mounting plate for Model MOM-2 [used for FireFinder XLS]
MOM-2	500-892766	MXL module card cage [one (1) full slot]
NIC-C	500-033240	Network interface card
NRC	500-050337	Network ring card
OD-BP	500-633017	Outer door blank plate
OD-BP-R	500-634919	Outer door blank plate, red
OD-GP-R	500-634920	Outer door grill plate, red
OD-GP	500-633018	Outer door grill plate
OD-LP	500-633016	Outer door lens plate
PAL-1	500-692407	®UL Listed parallel printer
PMI	500-033070	Person machine interface
PMI-INT	500-034160	Person machine interface [with multi-lingual overlays]
PSC-12	500-033340	Power supply with battery charger [12A @ 24VDC]
PSX-12	500-034120	Power supply extender [12A @ 24VDC]
PTB	500-033390	Power termination board
REMBOX2	500-633772	(2) Two-module remote lobby enclosure, black
REMBOX2R	500-650612	(2) Two-module remote lobby enclosure, red
REMBOX2-MP	500-634211	Mounting plate for Models OCM-16 / SIM-16 in Model REMBOX2
REMBOX4	500-633914	(4) Four-module remote lobby enclosure, black
REMBOX4-MP	500-634212	Mounting plate for Models OCM-16 / SIM-16 in Model REMBOX4
REMBOX4R	500-650613	(4) Four-module remote lobby enclosure, red
RNI	500-033420	Remote network interface module
RPM	500-033270	Remote printer module
SCM-8	500-033040	Switch module, eight (8) switches
SIM-16	500-034060	Supervised input module
SSD	500-034740	System-status display
SSD-C	500-648733	System-status display with control
SSD-INT	500-034740	System-status display with multi-lingual overlays
SSD-C-INT	500-034750	System-status display with control and multi-lingual overlays
SSD-C-REM	500-634773	System-status display with control for remote lobby enclosure
TSP-40A	500-634933	Thermal-strip printer
TSP-XB	500-849949	Brackets for thermal-strip printer
TSP-XC	500-849950	Cables for thermal-strip printer
XLS-MLE6-ADPT	S54430-C9-A1	MLE-6 enclosure adapter for XLS, black
XLS-MLE6R-ADPT	S54430-C9-A2	MLE-6R enclosure adapter for XLS, red
XLS-MME3-ADPT	S54430-C8-A1	MME-3 and MBR-2 enclosure adapters for FireFinder XLS, black
XLS-MME3R-ADPT	S54430-C8-A2	MME-3R enclosure adapter for XLS, red
XLS-MSE2-ADPT	S54430-C7-A1	MSE-2 enclosure adapter for XLS, black
XLS-MSE2R-ADPT	S54430-C7-A2	MSE-2R enclosure adapter for XLS, red
XLS-MSE3-ADPT	S54430-C14-A1	MXL-IQ MSE-3L and MSE-3M enclosure adapters for XLS, black
XLS-MSE3R-ADPT	S54430-C14-A2	MXL-IQ MSE-3LR & MSE-3MR enclosure adapters for XLS, red
XLS-RCC1-ADPT	S54430-Z14-A1	RCC-1enclosure adapter for XLS-SSD, black
XLS-RCC13F-ADPT	S54430-Z13-A1	RCC-1F & RCC-3F enclosure adapters, black
XLS-RCC13FR-ADPT	S54430-Z13-A2	RCC-1FR & RCC-3FR enclosure adapters, red
ZIC-2C	500-648671	(2) Two-channel adapter card, (ZIC-8B)
ZIC-4A	500-033050	(4) Four-circuit zone indicating card
ZIC-8B	500-648670	(8) Eight-circuit zone indicating card

Note: Products are ®UL 864 9th Edition Listed for indoor dry locations within a temperature range of 120+/-3°F (49+/-2°C) to 32+/-3°F (0+/-2°C) and a relative humidity of 93+/-2% at a temperature of 90+/-3°F (32+/-2°C).

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Notice: This marketing data sheet is not intended to be used for system design or installation purposes. For the most up-to-date information, refer to each product's installation instructions.

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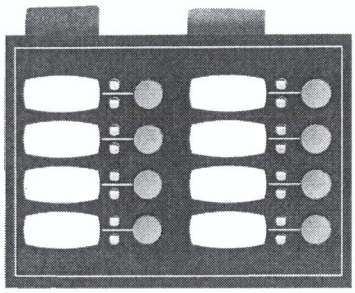
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October 2011
Supersedes sheet dated 8/11
(Rev. 7)

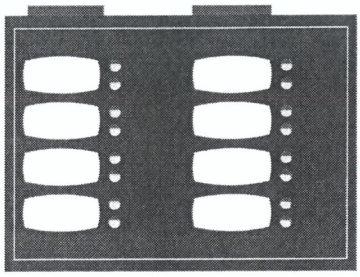
SCM-8/LCM-8/FCM-6

Switch Control Module/LED Control Module/Fan Control Module For the FireFinder XLS Control Panel

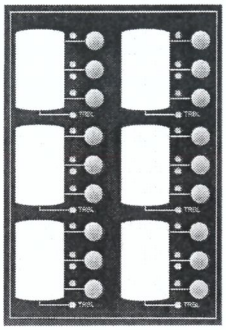
ENGINEER AND ARCHITECT SPECIFICATIONS



SCM-8



LCM-8



FCM-6

- Eight programmable switches (SCM-8)
- Protected space provided for labeling
- Discreet switches
- Multi-color LED's for clear indication of system status
- Modular
- Programmable LED annunciation
- Remotely mounted via CAN data bus
- Remote mounting in REMBOX2 or REMBOX4 enclosures

- Six sets of the push button programmable fan control switches (FCM-6)
- Manual on/off/automatic positions
- Positive feedback (supervised)
- LED indication of fan status (on/off and trouble)
- Protected label provided
- Modular
- Activation stagger timer
- UL Listed, ULC listed, NYMEA and CSFM pending

Description

SCM-8

The SCM-8 is a Siemens Building Technologies, Fire Safety Division FireFinder XLS option module which provides manual control of the Emergency Voice Evacuation System or manual fire system control. Each SCM-8 module provides eight momentary push button switches and 16 LED's to indicate their status. Each switch is assigned two LED's and a label to indicate the switch's programmed usage. The label slides behind a clear protective membrane.

One of the LED's assigned to each switch is a dual color LED used to indicate what type of signal is active. This LED may also be lighted steady or flashing to further indicate system status. For example, zones active to the Evacuation audio channel will have the LED lighted RED and steady; zones active to the Alert audio channel will have the LED lighted RED and flashing; zones selected for paging will have the LED lighted GREEN and flashing until the microphone key is pressed; when the zone transfer confirmation message is received by the XLS Command Console, the LED will change to steady GREEN, indicating that it is clear to page; telephone zones with a call-in in progress will have their LED flashing GREEN until selected at the Command Console at which time the LED will convert to steady GREEN etc. This allows the operator easy, clear access to the overall system condition at all times. The second LED is amber and is used to indicate a fault condition.

Each SCM-8 and each switch is fully programmable and may be used to control speaker circuits, and a wide range of general system functions such as All Call, All Evac, Warden's Page, Speaker, etc. Any number of circuits may be grouped and controlled by a single switch. Switch usage and zone groupings are assigned using the ZEUS system programming software.

The SCM-8s are mounted on a hinged panel as a part of the FireFinder XLS Command Console enclosure.

This equipment is approved for operation over the temperature range of 0°C to 49°C.

LCM-8

The LCM-8 is an FireFinder XLS option module which provides LED annunciation of system activity. Each LCM-8 module contains eight groups of 2 LED's, each of which can be assigned to desired outputs using the ZEUS programming software. Eight LED's are dual color capable of being lighted either RED or GREEN flashing or steady. The remaining LED's are AMBER flashing or steady.

A space is provided for labeling of LED functions. The label slides behind a clear protective membrane.

The LCM-8 dimensions are identical to the SCM-8 and is mounted on the same hinged panel as a part of the FireFinder XLS Command Console enclosure.

Any combination of SCM-8 and LCM-8 modules may be used.

This equipment is approved for operation over the temperature range of 0°C to 49°C.

FCM-6

The FCM-6 is an FireFinder XLS command console option module that provides manual control of building HVAC system fans, motors, and dampers. Each FCM-6 module provides (6) sets of (3) push button switches for manual system control. Each switch has 3 associated LEDs to indicate Fan/Damper/Motor status: OFF (Red LED), ON (Green LED), TROUBLE (Yellow LED).

When in the automatic position the red and green LEDs indicate fan/damper/motor status (On or Off) based on the system logic that can be programmed to automatically control the fan outputs. When manually switched to the Off position, the red LED will flash indicating that the output circuit used to turn off the Fan/Damper/Motor has activated. The red LED will light solid red to indicate positive feedback of the Fan/Damper/Motor actually turning off (via a monitored input). When manually switched to the On position, the green LED will flash indicating that the output circuit used to turn on the Fan/Damper/Motor has activated. The green LED will light solid green to indicate positive feedback of the Fan/Damper/Motor actually turning on (via a monitored input). See chart below.

During system reset when switches are turned manually to the "ON" or the "OFF" position their associated outputs do not change state. They stay either On or Off based on the switch's position. Outputs will only change state when manually controlled via the On/Off switch or based on system logic when switch is in the Auto position.

Switch Position	LED Indicators	Description
AUTO	OFF–Red Solid ON–Green Solid	Based on System Logic Driving Outputs
ON	Green Flashing Green Solid	Command Sent out to Turn On Outputs Output's On–Positive Feedback Received that Output is On
OFF	Red Flashing Red Solid	Command Sent Out to Turn Off Outputs Output's Off–Positive Feedback Received that Output is Off

The FCM-6's are mounted on a hinged panel as a part of the FireFinder XLS command console enclosure.

Any combination of the SCM-8, LCM-8 or FCM-6 modules may be mounted on the ID-MP. A six conductor cable is supplied for interconnection of the modules. A 30" cable (CCL) is available for connection between rows.

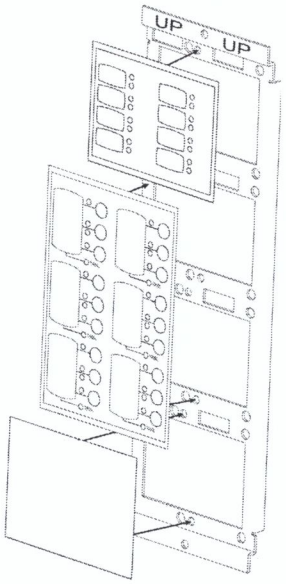
This equipment is approved for operation over the temperature range of 0°C to 49°C.

SCM-8, LCM-8, and FCM-6 can be remotely mounted up to 1000 feet from main enclosure. REMBOX2 and REMBOX4 lobby enclosures are required for remote SCM-8, LCM-8 and FCM-6 mounting. CSB sounder is optionally available for switch audible feedback for remote mounting applications.

Ordering Information

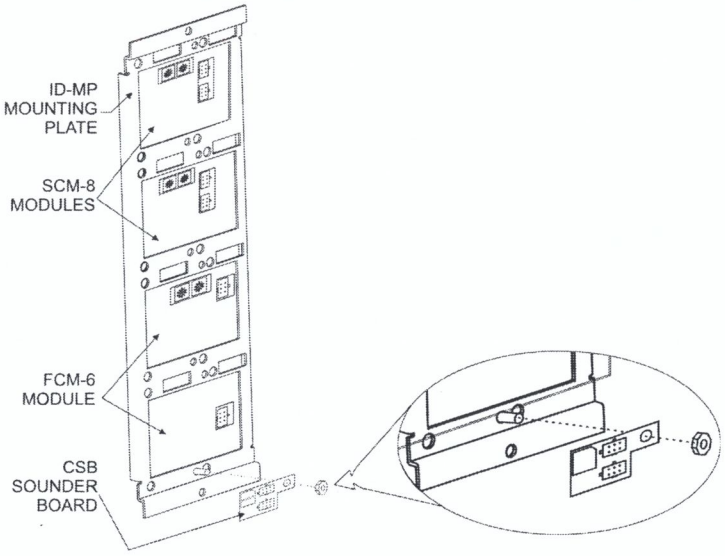
Model No.	Description	Part No.
SCM-8	Switch Module (8 Switches)	500-033040
LCM-8	LED Annunciator Module (8 LED Sets)	500-033100
FCM-6	Fan Control Module Switches (On–Off–Auto)	500-033140
ID-MP	Inner Door Mounting Plate (Accepts up to 4 Modules)	500-633027
CSB	CAN Sounder Board	500-033130
CCL	CAN-CABLE–Long 30 in. 6-Conductor	599-634214
BCM	Blank Plate	500-033320

Mounting Diagram



Installing FCM-6, LCM-8, SCM-8 Modules

Installation Diagram



Mounting the CSB

NOTICE: The use of other than Fire Safety detectors and bases with Fire Safety equipment will be considered a misapplication of Fire Safety equipment and as such void all warranties either expressed or implied with regard to loss, damage, liabilities and/or service problems.

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July 2003
Supersedes sheet dated 12/01

SIEMENS

Fire Safety

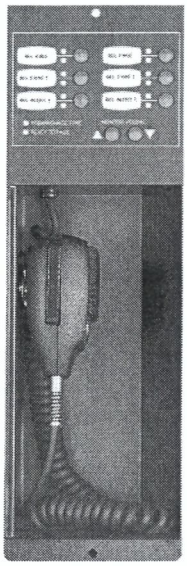
LVM

XLSV UPGRADE

Live Voice Module

ENGINEER AND ARCHITECT SPECIFICATIONS

- Dynamic Microphone with Push-To-Talk Switch
- Retractable Coil Cord
- Fully Supervised
- Preannounce Tone LED
- Ready to Page LED
- Six Programmable Switches Built-In
- Six Pairs of LEDS Built-In
- Speaker With Volume Control
- Mounts to the Inner Door of CAB1, CAB2, CAB3, or Remote Lobby Enclosure
- UL Listed, ULC Listed



Description

The Siemens Fire Safety Live Voice Module (LVM) provides a supervised high quality dynamic microphone to give fire fighters a means of sending live voice messages to specified audio zones. The LVM mounts on the Inner Door of a CAB1, CAB2, CAB3 or Remote Lobby Enclosure. It includes a microphone with a push-to-talk switch and retractable coiled cord. The microphone and push-to-talk switch are fully supervised.

The LVM also provides a green preannounce LED which indicates the preannounce signal is active at the selected zones and a green ready to page LED which indicates that selected zones are ready to be paged. The preannounce signal can be programmed as a tone or message and the duration is adjustable from 0 to 10 seconds in 1 second increments. A built-in speaker with volume control allows the monitoring of the audio channels.

The front panel of the LVM contains six switches and six pairs of LEDS. Each pair contains one bi-color (red/green) and one yellow LED. These switches can be programmed for manual voice functions as well as generic system functions. When the switches are used as generic switches all LEDS can be programmed for ON, OFF or FLASHING.

The Live Voice Module (LVM) is supervised by the DAC-NET Card and is assigned to one of the 99 DAC-NET sub addresses (CAN addresses).

Electrical Ratings

24V Current, 25ma max

Ordering Information

Model Number	Description	Part Number
LVM	Live Voice Module	500-034090

CATALOG NUMBER **6333**

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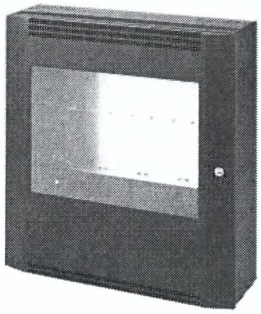
January 2003
New Issue

FireFinder XLS Fire Alarm Enclosures & Equipment

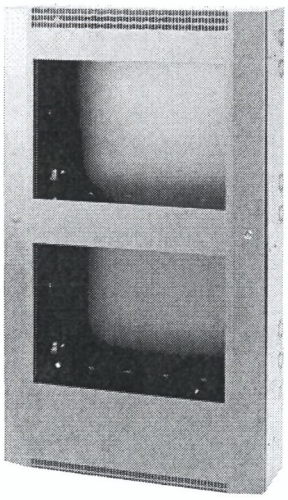
Models: CAB 1, CAB2-BB, CAB2-BD, CAB3-BB, CAB3-BD, CAB-MP, ID-MP, ID-SP, ID-FP, BCM, ID-LP, OD-BP, ID-GP, REMBOX2, and REMBOX4

ENGINEER AND ARCHITECT SPECIFICATIONS

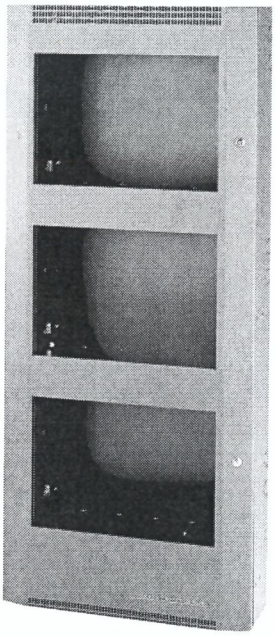
- 1, 2, and 3-row enclosures for the FireFinder XLS system
- Mounting plates for enclosure and inner door modules
- Blank plates for inner and outer doors
- Lens and grill plates for outer door
- Outer doors can open from either side
- UL, ULC Listed, FM Approval pending



CAB1



CAB2



CAB3

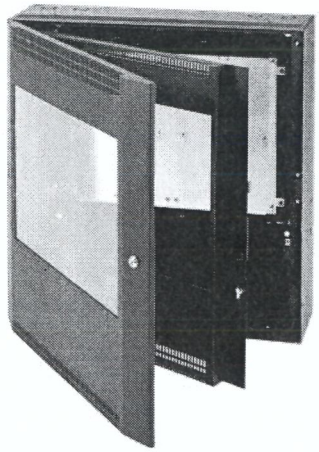
Description

The Models CAB1, CAB2, and CAB3 enclosures and their accessories provide a complete set of hardware for mounting all FireFinder XLS main system and remote transponder cards and modules. The hardware allows the FireFinder XLS system to be configured for a wide variety of applications and allows for future system upgrades. Included in the enclosure series are backbox and door sets, removable mounting plates and clear lenses, louvered ventilation grill plates, and blank plates for use with the enclosure doors. All enclosures come with ground straps for the inner and outer doors, shield termination lugs, grounding lugs, and tie wrap lances for securing wire. They can also mount system backup batteries up to 31 amp-hour in capacity. All equipment is approved for operation over the temperature range of 0°C to 49°C.

CAB1 Single Row Enclosure

The Model CAB1 is the smallest of the FireFinder XLS enclosures. It can house a single CAB-MP cabinet mounting plate for mounting card cages, power supplies and bulk amplifiers. The CAB1 also has four mounting slots on the inner door for mounting a PMI interface and Model ID-MP switch module brackets.

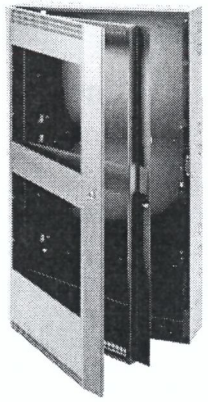
The CAB1 comes complete with a black back box, black inner and outer doors, a single lock and key set on the outer door, a single CAB-MP cabinet mounting plate (installed), and a single OD-LP outer door lens plate (installed). A red version called the CAB1-R is also available. Approximate size is 27" high, 26" wide, and 8" deep.



CAB1 Enclosure

CAB2 Two Row Enclosure

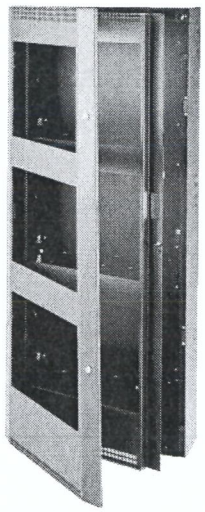
The Model CAB2 is the mid-sized FireFinder XLS enclosure capable of housing up to two CAB-MP cabinet mounting plates. The inner door has two rows of four mounting slots. The outer door has space for mounting two outer door plates (Models OD-LP, OD-BP or OD-GP). The outer door can be configured to open from either side. The CAB2 consists of the CAB2-BB back box, the CAB2-BD black inner and outer door package, two CAB-MP cabinet mounting plates, and one OD-LP lens plate. The outer door has a single lock and key set installed. Red doors are available in the CAB2-RD. Additional door mounting plates must be ordered separately. Approximate size is 45" high, 26" wide, and 8" deep.



CAB2 Enclosure

CAB3 Three Row Enclosure

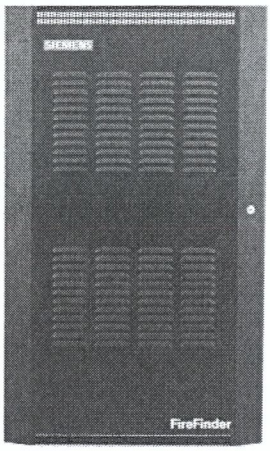
The Model CAB3 is the largest single FireFinder XLS enclosure available. It can house up to three CAB-MP cabinet mounting plates in the enclosure, and three rows of inner door mounting slots. The outer door can be configured to open from either side. The CAB3 consists of the CAB3-BB back box, the CAB3-BD black inner and outer door package, three CAB-MP cabinet mounting plates, and one OD-LP lens plate. The outer door has two locks and key sets installed. Red doors are available in the CAB3-RD. Additional door mounting plates must be ordered separately. Approximate size is 63" high, 26" wide, and 8" deep.



CAB3 Enclosure

Enclosure Trim Kits

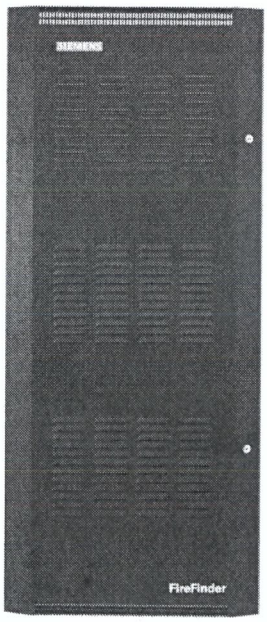
Trim kits are available for all system enclosures for semi-flush mounting applications. The Model CAB1-TK (for black enclosures) and the Model CAB1R-TK (for red enclosures) fit the CAB1 and CAB1-R enclosures. Similarly, the CAB2-TK and CAB2R-TK fit the CAB2 enclosure, and the CAB3-TK and CAB3R-TK fit the CAB-3 enclosure.



CAB2-XBD Door

Remote Transponders

The FireFinder XLS system can use remote transponders for mounting additional modules like amplifiers without requiring a PMI or any control switches. Special doors are available for systems using CAB2 or CAB3 remote transponders. These doors, Models CAB2-XBD and CAB3-XBD, omit the unused inner door and come complete with ventilation louvers built into the door. The CAB2-XBD fits on a CAB2-BB and the CAB3-XBD fits on a CAB3-BB. The transponder doors are supplied in black. Complete box and door kits are available as Model CAB2-X and Model CAB3-X.



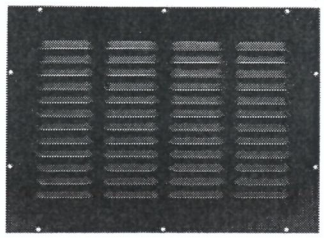
CAB3-XBD Door

Ordering Information

Model	Description	Part Number
CAB1	Complete single row black cabinet	500-633007
CAB1R	Complete single row red cabinet	500-633728
CAB2	Complete two-row black cabinet with back box, inner door, outer door, two CAB-MP mounting plates and one OD-LP lens plate	599-633762
CAB2R	Complete two-row red cabinet	599-633763
CAB2-BB	Two-row black back box	500-633009
CAB2-BD	Two-row black inner & outer door set	500-633008
CAB2-RD	Two-row red inner & outer door set	500-633755
CAB3	Complete three-row black cabinet with back box, inner door, outer door, three CAB-MP mounting plates and one OD-LP lens plate	599-633764
CAB3R	Complete three-row red cabinet	599-633765
CAB3-BB	Three-row black back box	500-633011
CAB3-BD	Three-row black inner & outer door set	500-633010
CAB3-RD	Three-row red inner & outer door set	500-633757
CAB1-TK	Single row cabinet black trim kit	500-633013
CAB1R-TK	Single row cabinet red trim kit	500-633729
CAB2-TK	Two-row cabinet black trim kit	500-633014
CAB2R-TK	Two-row cabinet red trim kit	500-633753
CAB3-TK	Three-row cabinet black trim kit	500-633015
CAB3R-TK	Three-row cabinet red trim kit	500-633754
CAB2-X	Complete CAB2 with transponder door (no inner door)	599-034252
CAB2-XBD	CAB2 transponder door	500-633768
CAB3-X	Complete CAB3 with transponder door (no inner door)	599-034253
CAB3-XBD	CAB3 transponder door	500-633769
CAB-MP	Back box module mounting plate	500-633012
ID-MP	Inner door module mounting plate (four per package)	500-633027
ID-SP	Inner door single module blank plate (two per package)	500-633028
ID-FP	Inner door four module blank plate	500-633029
BCM	Blank control module plate (four per package)	500-033320
OD-LP	Outer door lens plate	500-633016
OD-BP	Outer door blank plate	500-633017
OD-GP	Outer door grill plate	500-633018
REMBOX2	Two module black remote box lobby enclosure	500-633772
REMBOX2-MP	Mounting plate for OCM-16, SIM-16 in a REMBOX2	500-364211
REMBOX4	Four module black remote box lobby enclosure	500-633914
REMBOX4-MP	Mounting plate for OCM-16, SIM-16 in a REMBOX2	500-634212

OD-GP Outer Door Grill Plate

The Model OD-GP also covers an entire row on the outer door of a system cabinet, but has four rows of ventilation louvers on it. The OD-GP is mounted in front of system bulk amplifiers, card amplifiers, or other modules that generate heat. Using the OD-GP will permit airflow across these modules to aid in heat dissipation. A single grill plate is included with each OG-GP.



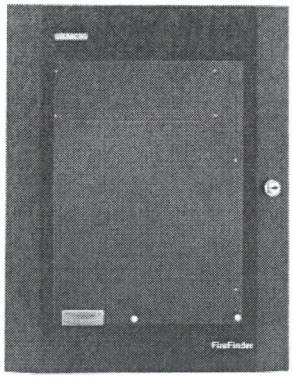
OD-GP

Remote System Enclosures

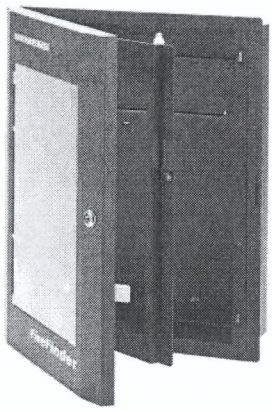
The Models REMBOX2 and REMBOX4 are FireFinder XLS system enclosures that are used for remotely mounting inner door modules like the PMI interface, switch modules, Model LVM live voice modules, and Model FMT firefighters master telephone modules. They are thinner than the regular CAB enclosures (just 5" deep overall) and are perfect for mounting in places where space is limited (like lobbies or behind a receptionist's desk). Due to their smaller depth, no card cages, power supplies or bulk amplifiers can be mounted in a REMBOX. However, modules such as the RNI remote network interface module, the OCM-16 output control module, and the SIM-16 supervised input module can be mounted in a REMBOX. Due to the depth of the live voice module and the firefighters master telephone, no OCM-16s or SIM-16s can be used simultaneously with the LVM or the FMT. Both the REMBOX2 and the REMBOX4 are designed for flush mounting with no trim kit required. Both enclosures also come with a clear lens plate on the cover.

REMBOX2 Two Module Remote Enclosure

The REMBOX2 has two inner door module spaces, and can hold a single PMI, up to two switch module brackets, one LVM live voice module, or one FMT firefighters master telephone. Combinations are also allowed. The REMBOX2 can also mount a single RNI remote network interface on a bracket included in the backbox. A bracket called the REMBOX2-MP can be used to mount up to four OCM-16 output control modules or SIM-16 supervised input modules. The REMBOX2-MP must be purchased separately. Approximate size of the REMBOX2 is 14-1/2" wide, 18-1/2" high and 5" deep.



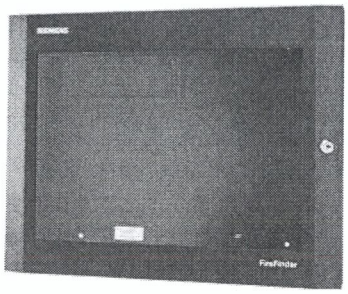
REMBOX2
Doors Closed



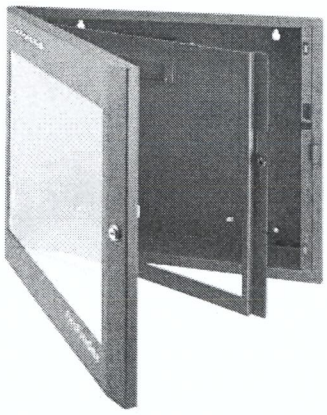
REMBOX2
Doors Open

REMBOX4 Four Module Remote Enclosure

The REMBOX4 has space for mounting four inner door modules. Any combination of PMIs (two module spaces), switch module brackets, LVMs or FMTs (one module space each) can be used. Unused module spaces can be covered with Model ID-SP blank plates. The REMBOX4 can also mount a single RNI remote network interface on a bracket included in the backbox. A bracket called the REMBOX4-MP can be used to mount up to eight OCM-16 output control modules or SIM-16 supervised input modules. The REMBOX4-MP must be purchased separately. Approximate size of the REMBOX4 is 24" wide, 18-1/2" high and 5" deep.



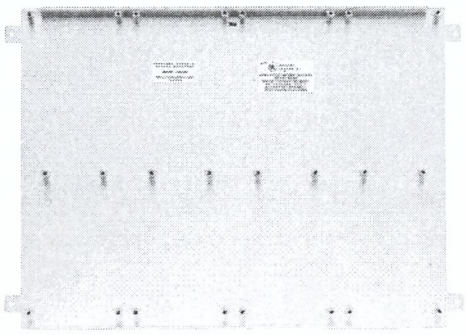
REMBOX4
Doors Closed



REMBOX4
Doors Open

CAB-MP Cabinet Mounting Plate

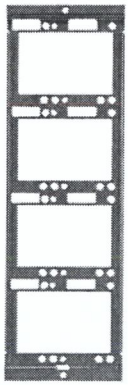
The Model CAB-MB cabinet mounting plate provides mounting for a single row of modules in a FireFinder XLS cabinet. Four module spaces are available on the CAB-MP. The CAB-MP is used to mount the CC-5 card cage, the CC-2 card cage, the PSC-12 power supply, the PSX-12 power supply extender, and the ZAM-80/180 zone amplifiers.



CAB-MP

ID-MP Inner Door Mounting Plate

The Model ID-MP inner door mounting plate is mounted on the inner door of a CAB enclosure. ID-MPs are used to mount Model SCM-8 switch control modules, Model LCM-8 LED control modules, or Model FCM-6 fan control modules. Four mounting plates are included in each Model ID-MP. Each mounting plate has four spaces for control modules, and can hold either four SCM-8s (one control module space each), four LCM-8 (one control module space each), or two FCM-6s (two module spaces each). Combinations are also allowed. Blank spaces in the ID-MP can be covered using the Model BCM blank control module plate. Up to four ID-MPs can be mounted in a single row on the inner door.



ID-MP

ID-SP Inner Door Blank Single Plate

The Model ID-SP is used to cover any single module blank spaces on the inner door not used to mount the PMI or an ID-MP. Up to four ID-SPs can be mounted in a single row on the inner door. Two blank plates are included in each Model ID-SP.



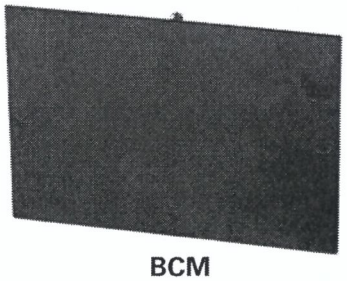
ID-SP

ID-FP Inner Door Full Blank Plate

The Model ID-FP is a blank plate that covers the full opening of the row on an inner door. It is used for applications requiring full dead front protection. A single full blank plate is included in the ID-FP.

BCM Blank Control Module plate

The Model BCM is used on the ID-MP to cover any blank areas where control modules are not used. Up to four BCMs can be mounted on a single ID-MP. Four blank module plates are included in each Model BCM.



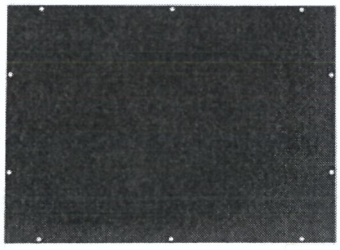
BCM

OD-LP Outer Door Lens Plate

The Model OD-LP is a clear plastic lens plate mounted on the outer door of a system cabinet. It is used to allow operators to see the system interface and controls mounted on the inner door, but restricts access to unauthorized users. It covers an entire row on the outer door. A single lens plate is included with each OD-LP.

OD-BP Outer Door Blank Plate

The Model OD-BP is used to cover an entire row on the outer door of a system cabinet. It is used when there is no PMI or control modules mounted on the adjacent row of the inner door. A single blank plate is included in each OD-BP.



OD-BP

NOTICE: The use of other than Fire Safety detectors and bases with Fire Safety equipment will be considered a misapplication of Fire Safety equipment and as such void all warranties either expressed or implied with regard to loss, damage, liabilities and/or service problems.

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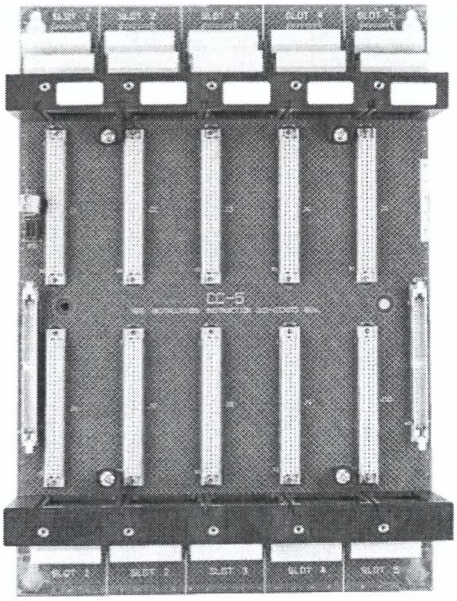
January 2003
Supersedes sheet dated 12/01

FireFinder XLS

Card Cage-5 Slots
Model CC-5

ARCHITECT AND ENGINEER SPECIFICATIONS

- Common card cage for all FireFinder XLS / V option cards
- Five (5) slots to mount any option cards – with no restrictions
- Mounts on back box or CAB-MP (two-module spaces)
- Removable terminal blocks
- Numbered terminal blocks
- All field-wiring terminations on top (power limited)
- All internal-wiring terminations on bottom (non-power limited)
- Molded card guides for card mounting
- Card-position locator label on card guide
- All cards communicate via common 60-pin power / data bus
- Screw terminals wire sizes supported: 12 AWG – 24AWG
- DIN connectors
- ®UL 864 9th Edition Listed and ULC Listed; FM, CSFM & NYMEA Approved



Product Overview

The Model CC-5 card cage provides the physical mounting location and all wiring connection points for all fire and voice system options cards for the FireFinder XLS system.

Specifications

All cards plugged into the Model CC-5 card cage communicate with other modules of the FireFinder XLS panel – via a common, 60-pin data bus. This 60-pin bus runs through the card cage; making all communication data buses and signals available to all cards. Connectors are provided on the left and right side of Model CC-5 to connect a 60-pin cable for communications with the FireFinder XLS operator interface, power supplies and amplifiers modules. There are no active components on Model CC-5.

Field wiring to all devices and circuits terminates at the Model CC-5 card cage.

All cards designed for use with Model CC-5 route their field wiring terminations to the 'top' of Model CC-5 – these connections are all power limited. Internal wiring connections distribute 24VDC to cards or high-level audio signals (depending on application used) connected to the "bottom" of Model CC-5 – these connections are all non-power limited.

All wiring connections to Model CC-5 are made to removable terminal blocks. Terminal blocks are rated for use with wire-sized 12AWG to 24AWG. Each terminal block comes with a protective cover that also serves as a handle to allow easy terminal-block removal when wires are connected.

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Building Technologies Division

Specifications – (continued)

Each connector is numbered to make wiring terminations to the correct position on the terminal block simple and reduce the potential for wiring errors.

Model CC-5 is shipped with two (2) card guides (top and bottom) that mount to the Model CC-5 PCB. The 'top' card guide contains a blank label for use by the installer to indicate the location or card-slot position. The blank label serves as a reminder to the installer to ensure the proper card goes in the correct card slot – this is important during commissioning when cards may be installed after the field-wiring terminations have been made – and when cards are removed for service.

All field-wiring terminations are typically made to the Model CC-5 terminal blocks before the card guides are mounted and the option cards are installed. Model CC-5 mounts in two (2) of the four (4) available module spaces directly on the back box or optional Model CAB-MP for installation in the CAB-1, CAB-2 or CAB-3 enclosures.

Compatible FireFinder XLS Cards

Any combination of the following (5) option cards can be installed in the CC-5:

Fire System Cards:

Model No.	Part No.	Description
DLC	500-033090	Device Loop Card
ZIC-4A	500-033050	Zone Indicating Card 4 Circuits
CRC-6	500-033250	Controllable Relay Card
NIC-C	500-033240	Network Interface Card
CDC-4	500-034200	Conventional Detector Card

Voice System Cards:

Model No.	Part No.	Description
DAC-NET	500-035100	Digital Audio Card-Network
AIC	500-035300	Audio Input Card
ZAC-40	500-035400	40-Watt Zone Amplifier Card
TZC-8B	500-034110	Telephone Zone Card

Details for Ordering

Model No.	Part No.	Description
CC-5	500-633037	Card Cage 5 Slots

Refer to Installation Instruction: 315-033035

Temperature and Humidity Range

Products are ®UL 864 9th Edition listed for indoor dry locations within a temperature range of 120+/-3°F (49+/-2°C) to 32+/-3°F (0+/-2°C) and at a relative humidity of 93+/-2% at a temperature of 90+/-3°F (32+/-2°C).

Notice: This marketing catalog sheet is not intended to be used for system design or installation purposes. For the most up-to-date information, refer to each product's installation instructions.

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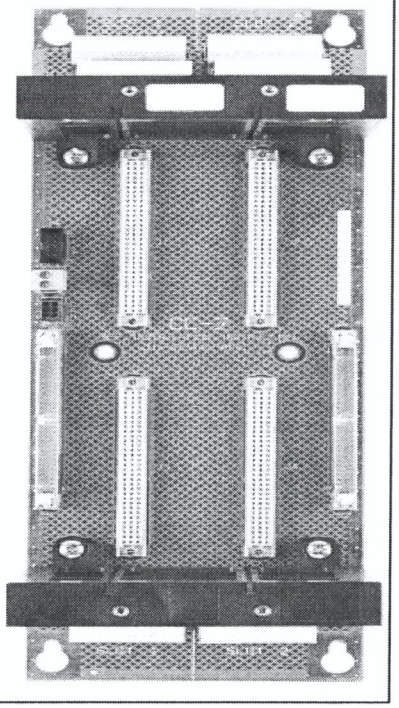
May 2010
Supersedes sheet dated 7/09
(Rev. 2)

FireFinder XLS

Card Cage-2 Slots
Model CC-2

ARCHITECT AND ENGINEER SPECIFICATIONS

- Common card cage for all FireFinder XLS fire-and-voice option cards
- Two (2) slots to mount any option cards – with no restrictions
- Mounts on back box or optional Model CAB-MP (1-module space)
- Removable terminal blocks
- Numbered terminal blocks
- All field-wiring terminations on top (power limited)
- All internal-wiring terminations on bottom (non-power limited)
- Molded card guides for card mounting
- Card-position-locator label on card guide
- All cards communicate via common 60-pin power / data bus
- Screw terminals wire sizes supported: 12 AWG – 24AWG
- DIN connectors
- ®UL 864 9th Edition Listed and ®ULC Listed; FM, CSFM & NYMEA Approved



Product Overview

The CC-2 card cage provides the physical mounting location and all wiring connection points for all fire and voice system options cards for the FireFinder-XLS system.

Specifications

All cards plugged into the CC-2 card cage communicate with other FireFinder-XLS modules via a common 60-pin data bus. This 60-pin bus runs through the card cage making all communication data buses and signals available to all cards. Connectors are provided on the left & right side of the CC-2 to connect a 60-pin cable for communications with the FireFinder XLS' operator interface, power supplies and amplifiers modules. There are no active components on the CC-2.

Field wiring to all devices and circuits terminates on the CC-2 card cage. All cards designed for use with the CC-2 route their field wiring terminations to the 'top' of the CC-2 – these connections are all power limited.

Internal wiring connections distribute 24VDC to cards or high-level audio signals (depending on application used) connect to the 'bottom' of the CC-2 – these connections are all non-power limited.

All wiring connections to the CC-2 are to removable terminal blocks. Terminal blocks are rated for use with wire-sized 12AWG to 24AWG. Each terminal block comes with a protective cover that also serves as a handle to allow easy terminal-block removal when wires are connected.

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Specifications — (continued)

Each connector is numbered to make wiring terminations to the correct position on the terminal block simple and reduce the potential for wiring errors.

The CC-2 is shipped with two card guides (top and bottom) that mount to the CC-2 PCB. The "top" card guide contains a blank label for use by the installer to indicate the location or card-slot position. This label serves as a reminder to the installer to insure the proper card goes in the correct card slot – this is important during commissioning when cards may be installed after the field-wiring terminations have already been made – also for when cards are removed for service.

All field-wiring terminations are typically made to the CC-2 terminal blocks before the card guides are mounted and the option cards are installed.

The CC-2 mounts in one of the four available module spaces directly on the back box or optional CAB-MP for installation in the CAB-1, CAB-2 or CAB-3 enclosures.

Compatible FireFinder-XLS Cards

Any combination of the following (2) option cards can be installed in the CC-2:

Fire System Cards:

Model No.	Part No.	Description
DLC	500-033090	Device Loop Card
ZIC-4A	500-033050	Zone Indicating Card 4 Circuits
CRC-6	500-033250	Controllable Relay Card
NIC-C	500-033240	Network Interface Card
CDC-4	500-034200	Conventional Detector Card

Voice System Cards:

Model No.	Part No.	Description
DAC-NET	500-035100	Digital Audio Card-Network
AIC	500-035300	Audio Input Card
ZAC-40	500-035400	40-Watt Zone Amplifier Card
TZC-8B	500-034110	Telephone Zone Card

Details for Ordering

Model No.	Part No.	Description
CC-2	500-633440	Card Cage 2 Slots

Refer to Installation Instruction: 315-033035

Temperature and Humidity Range

Products are ®UL 864 9th Edition listed for indoor dry locations within a temperature range of 120+/-3°F (49+/-2°C) to 32+/-3°F (0+/-2°C) and at a relative humidity of 93+/-2% at a temperature of 90+/-3°F (32+/-2°C).

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May 2010
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SIEMENS XLSRV **Catalog Sheet**
Fire Safety & Security Products

FireFinder XLS

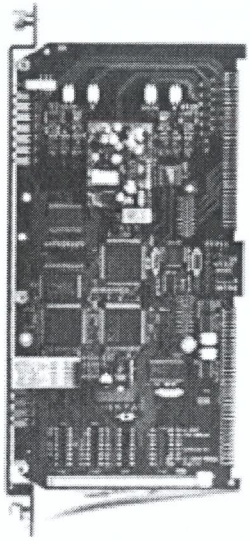
Digital Audio Card and Local Page Board
Models DAC-NET and LPB

ARCHITECT AND ENGINEER SPECIFICATIONS

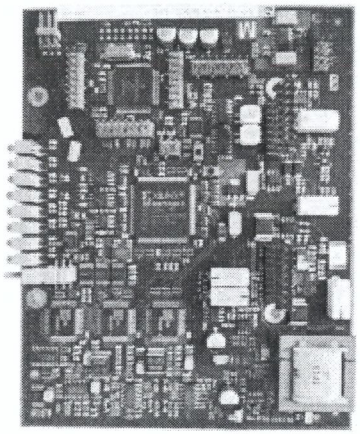
- Audio signal source
- Transmits 8 audio channels
- Class B (Style 4) via two pairs of wires
- Class A (Style 7) via four pairs of wires
- Programmable, custom messages or tones
- (5) minutes of message / tone-storage memory
- On-board microprocessor
- Built-in, ground-fault Detection
- Provides communication with a max. 99 types of the following modules, via the CAN bus:
  - SCM-8
  - FCM-6
  - TZC-8B
  - ZAC-40
  - LCM-8
  - FMT
  - LVM
  - ZAM-180
- ®UL 864 9th Edition Listed & ®ULC Listed; FM, CSFM & NYMEA Approved



DAC-NET
Front View



DAC-NET
Side View



LPB
Side View

Product Overview

The Digital Audio Card (Model DAC-NET) provides the audio source for the FireFinder XLS Voice Evacuation System, and provides D-NET network communication to and from the PMI and between enclosures.

The DAC-NET is capable of transmitting eight digital channels of audio, via two pairs of wire. One (1) DAC-NET is required in each XLS Voice enclosure, and can be wired Class A (Style 7) – four pairs of wires, or Class B (Style 4) – two pairs of wires.

The DAC-NET Card plugs into one slot in the CC-5 or CC-2 Card Cage. It has on-board LEDs for system status and troubleshooting. Indication of power, communication, internal operation, ground fault, and trouble conditions are also provided.

The DAC-NET Card contains an on-board microprocessor that provides communication with switch modules, LED modules, microphone, telephone zone cards, and zone amplifiers across the Control Area Network CAN Bus. It can supervise up to (99) CAN address modules.

The DAC-NET contains on-board tones and pre-recorded EVAC and ALERT messages. In addition, custom messages or tones can be downloaded to the DAC-NET using the XLS software tool, Zeus, for a total of five minutes of storage memory.

The D-NET is supervised for open, short and ground fault. Each input / output is electrically isolated. The maximum distance between two DAC-NETs is 2,300 feet (14 AWG to 18 AWG twisted, unshielded wire.)

A maximum wiring length can be up to 23,000 feet of twisted, unshielded wire through the entire D-NET network, totaling (32) DAC-NET nodes.

SIEMENS Industry, Inc.
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Product Overview — (continued)

The Local Page Board (Model LPB) is used to connect the microphone – mounted inside the Live Voice Module (Model LVM) – and the voice-internal telephone system. Model LPB is a plug-on board to Model DAC-NET, and converts the two (2) analog input signals into the system's internal digital format.

Up to five (5) Model LVMs can be connected to Model LPB. Additionally, Model LPB provides one (1) analog output to connect to the monitor speaker, which is mounted inside Model LVM.

The one (1) analog output is one (1) of eight (8) voice-internal audio channels selectable at the XLSV fire-alarm panel.

Temperature and Humidity Range

Products are ®UL 864 9th Edition listed for indoor dry locations within a temperature range of 120+/-3°F (49+/-2°C) to 32+/-3°F (0+/-2°C) and at a relative humidity of 93+/-2% at a temperature of 90+/-3°F (32+/-2°C).

Electrical Ratings

Power Consumption (DAC-NET)	
24V Back Plane Current	230mA
24V Screw Terminal Current	0
6.2V Back Plane Current	0
24V Standby Current	230mA

Details for Ordering

Model Number	Part Number	Description
DAC-NET	500-035100	Digital Audio Card
LPB	500-035200	Local Page Board

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(Rev. 2)

FireFinder XLS

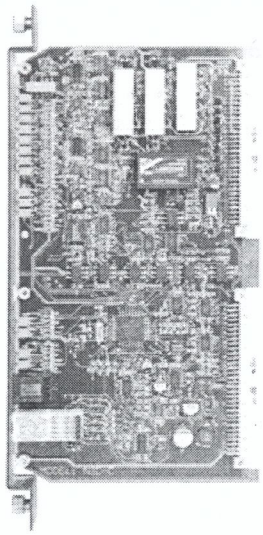
Network Interface Card
Model NIC-C

ARCHITECT AND ENGINEER SPECIFICATIONS

- HNET communications
- XNET communications
- CAN network communications
- Supports Class B - Style 4 or Class A - Style 7 wiring for XNET or HNET
- Supervises the HNET or XNET and CAN networks
- Diagnostic LEDs
- Isolates short circuit faults
- Ground-fault detection
- Network repeater
- Downloadable firmware
- ®UL 9th Edition Listed & ULC Listed; FM, CSFM and NYMEA Approved



Model NIC-C
(Front View)


Model NIC-C
(Side View)

Product Overview

The Network Interface Card (Model NIC-C) provides HNET or XNET network communications between enclosures. In addition to the HNET or XNET communication, Model NIC-C provides CAN network communication within an enclosure or external to the enclosure. The HNET or XNET can be wired Class B - Style 4 or Class A - Style 7, but the CAN network can only be wired Class B - Style 4.

Specifications

A single Model NIC-C can provide either HNET or XNET communications. The CAN interface is available regardless of the HNET or XNET usage.

When Model NIC-C is used for HNET communications, Model NIC-C provides communication between enclosures within a single system. The maximum HNET Model NIC-C cards on a single system (single node) is 50. Model NIC-C supervises the HNET network to insure proper operation. Model NIC-C also isolates a short-circuit fault to each individual segment of the HNET network. Model NIC-C provides an electrical repeater for each HNET pair.

When Model NIC-C is used for XNET communications, Model NIC-C provides communication between systems. The maximum XNET Model NIC-C cards on a single system (single node) is one (1) - for a total of (59) XNET Model NIC-C cards on a peer-to-peer, networked system. The XNET Model NIC-C card must reside in the same enclosure as the Person Machine Interface (Model PMI).

Model NIC-C supervises the XNET network to ensure proper operation. Model NIC-C also isolates a short-circuit fault to each individual segment of the XNET network. Model NIC-C provides an electrical repeater for each XNET pair. MXL systems may also reside on the same XNET with FireFinder XLS systems.

The FireFinder XLS will also report all events over the XNET to the Network Command Center for display. Events are displayed on Model NCC-G: *Trouble*, *Acknowledge*, *Alarm-Silence* and *System-Reset* commands are also initiated at Model NCC. Model NCC can also be used to perform maintenance commands on an individual Fire Finder XLS on the XNET.

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Specifications – (continued)

The NIC-C Card takes one card slot and mounts in a CC-2 or CC-5 Card cage inside a CAB-1, CAB-2, or CAB-3 Enclosure.

The NIC-C provides the CAN network which supports the LCM-8 / SCM-8 / FCM-6 / OCM-16 / SIM-16 CAN modules. Up to (99) CAN module addresses are available per enclosure.

The NIC-C Card has diagnostic LEDs that indicate Card Fail, CAN Fail, HNET Fail, XNET Fail, Ground Fault, Loop-A Fail and Loop-B Fail, as well as LEDs to indicate Power, Style and Active Networks.

Details for Ordering

Model Number	Part Number	Description
NIC-C	500-033240	Network Interface Card

Temperature and Humidity Range

Products are ®UL 864 9th Edition listed for indoor dry locations within a temperature range of 120+/-3°F (49+/-2°C) to 32+/-3°F (0+/-2°C) and at a relative humidity of 93+/-2% at a temperature of 90+/-3°F (32+/-2°C).

Electrical Ratings

Input Power	
24V Back Plane Current	120mA
Screw Terminal 24V Current	0
6.2V Back Plane Current	0
24V Standby Current	120mA

Output Power	
Each HNET/XNET And CAN Network Pair	8V peak to peak max.
	75mA max. (during msg transmission)

Notice: This marketing catalog sheet is not intended to be used for system design or installation purposes. For the most up-to-date information, refer to each product's installation instructions.

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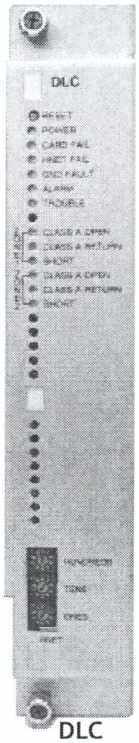
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Fire Safety & Security Products

FireFinder® XLS

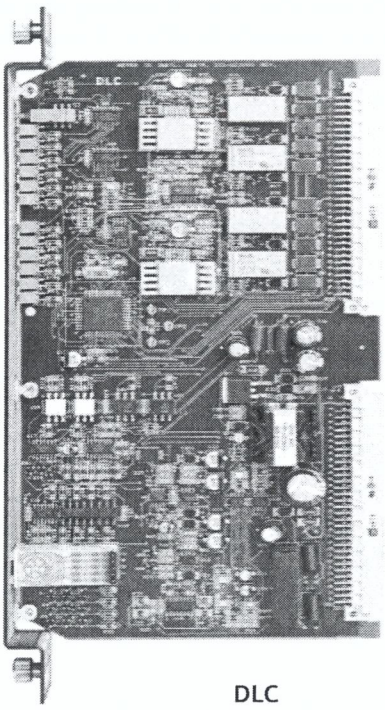
Device Loop Card
Model DLC

ARCHITECT AND ENGINEER SPECIFICATIONS

- Quantity 252 addressable points
- Provides two (2) intelligent addressable circuits
- Compatible with 'H'-series, Desigo™ Fire Safety-series and Cerberus™ PRO-series of intelligent detectors
  - Multi-criteria / Carbon Monoxide (CO) Detector with ASA*technology*™
  - Multi-criteria Detector
  - Multi-criteria Detector with ASA*technology*
  - Photoelectric Smoke detector
  - Quad Interface module
  - Thermal (Heat) detector
- Polarity insensitive via *SureWire*™ technology
- Quantity 12 diagnostic light-emitting diodes (LEDs) for easy circuit diagnosis
- Supports T-Tapping
- Onboard, ground-fault detection and short-circuit isolation
- Onboard microprocessor for dependable, efficient device communication
- Degrade mode
- Supports 'Class B' or 'Class A' wiring
- ®UL 864 9th Edition Listed & ®ULC Listed; FM, CSFM, & NYC Fire Department Approved



DLC
[Front View]



DLC
[Side View]

Product Overview

The Device Loop Card (Model DLC) is the interface used for connection of Desigo and Cerberus PRO intelligent detectors and initiating devices to a single FireFinder XLS fire-alarm control panel (FACP). Model DLC also can work with Siemens input devices, manual stations and control devices.

Each Model DLC plugs into one (1) slot of the Model CC-2 or Model CC-5 card cage. Programming for Model DLC is accomplished via the XLS FACP custom-configuration tool, *Zeus*. Model DLC takes one (1) address on the network, communicating up to a total 252 detectors and devices. Model DLC has 12 LEDs for diagnostic purposes, and provides ground-fault detection and zone-isolation circuitry.

Specifications

Model DLC initializes, operates and maintains all devices residing on its two (2) circuits. Model DLC communicates all relevant device and event information (*Alarm*, *Trouble* and *Supervisory* commands) to FireFinder XLS, and supervises the device loop circuit.

Model DLC is polarity insensitive via *SureWire* technology, which greatly reduces commissioning time normally spent tracing down crossed-field wiring. Model DLC communicates detector information, such as sensitivity of intelligent fire detectors and logic-function data, to the Person Machine Interface, which is located within the FireFinder XLS system.

Each device loop card supports two (2), isolated circuits up to a total of 252 addressable devices – as well as relay and audible bases, remote lamps and duct-detector housings in any combination. The microprocessor controls the onboard isolation in case there is a short in any of the circuits, thus allowing the other circuit to continue operating. For continuous protection, the on-board microprocessor continues to operate even in the event of a XLS CPU failure.

Device Loop Card 6312

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Temperature and Humidity Range

The Device Loop Card is ®UL 864 9th Edition Listed for indoor dry locations within a temperature range of 120+/-3°F (49+/-2°C) to 32+/-3°F (0+/-2°C) and a relative humidity of 93+/-2% at a temperature of 90+/-3°F (32+/-2°C).

Electrical Ratings

24V Current Draw: [Backplane]	0
24V Current Draw: [Screw Terminal]	100mA + 1.4mA per device
24V Current Draw: [Standby]	145mA + 1.8mA per device
6.2V Current Draw: [Backplane]	200mA
Device Loop Draw: [at 30VDC, max]	375mA, max. [power limited]

Details for Ordering

— Desigo Series —

Model Number	Part Number	Description
FDCIO422	S54322-F4-A1	Quad Interface Module
FDOT421	S54320-F6-A1	Addressable Multi-Criteria Detector
FDO421	S54320-F4-A1	Photoelectric Smoke Detector
FDT421	S54320-F5-A1	Thermal (Heat) Detector
FDOOTC441	S54320-F8-A1	Multi-Criteria Fire / CO Detector w/ ASA*technology*
FDOOT441	S54320-F7-A1	Multi-Criteria Fire Detector w/ ASA*technology*

Details for Ordering — (continued)

— 'H'-Series —

Model Number	Part Number	Description
HFP-11	500-033290	*FirePrint* Detector
HFPT-11	500-033380	Thermal Detector
HMS-D	500-033400	Dual-Action Manual Station
HMS-M	500-033450	Manual Station, Metal
HMS-S	500-033200	Single-Action Manual Station
HMS-SA	500-034150	Single-Action Manual Station (Auxiliary Contact), [Canada only]
HMS-2S	500-033460	Two-Stage Manual Station [Canada only]
HTRI-D	500-033360	Dual-Input Module
HTRI-M	500-034000	Mini-Input Module
HTRI-R	500-033300	Single-Input w/ Relay
HTRI-S	500-033370	Single-Input Module

— Cerberus PRO Series —

Model Number	Part Number	Description
FDCIO422	S54322-F4-A1	Quad Interface Module
HI921	S54320-F5-A2	Thermal (Heat) Detector
OH921	S54320-F6-A2	Addressable Multi-Criteria Detector
OP921	S54320-F4-A2	Photoelectric Smoke Detector
OOHC941	S54320-F8-A2	Multi-Criteria Fire / CO Detector w/ ASA*technology*
OOH941	S54320-F7-A2	Multi-Criteria Fire Detector w/ ASA*technology*

— Other Modules and Devices —

Model Number	Part Number	Description
ILED-HC	500-048637	Intelligent Remote Lamp, Ceiling Mount
ILED-HW	500-048809	Intelligent Remote Lamp, Wall Mount
DLC	500-033090	Device Loop Card
PMI	500-033070	Operator Interface / System CPU
PMI-2	S54430-C1-A1	Person Machine Interface 2

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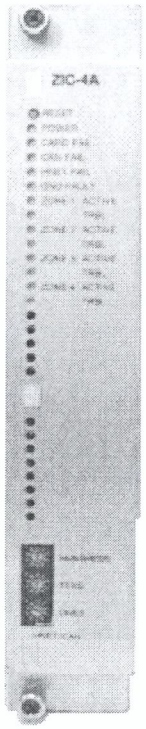
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FireFinder XLS

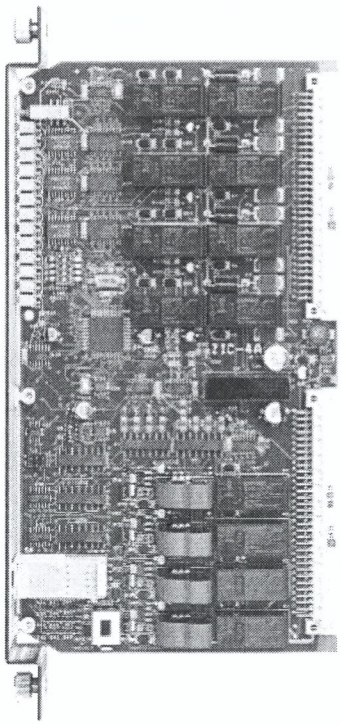
Zone-Indicating Card
Model ZIC-4A

ARCHITECT AND ENGINEER SPECIFICATIONS

- Operates audible or visual notification appliances
- Three (3) unique signals from each circuit
- Operates audio speakers (25V or 70VRMS)
- One (1) or (2) two-channel voice operation
- Four (4) Class A or Class B circuits
- 24 VDC at 3.0 Amps per circuit
- City-tie or leased-line output
- Releasing service
  - (FM approved for Single and Double Interlock Pre-action System Operation)
- Fully programmable
- Coded audibles available
- Built-in strobe synchronization
- Bell-follower application available
- March time / Uniform Code 3
- Selectable degrade operation
- Silenceable / non-silenceable option
- Automatic / manual control
- On-board microprocessor
- Built-in, ground-fault detection
- Circuits power limited per NEC 760
- NFPA 13, pre-action and deluge
- NFPA 2001, FM-200 Releasing
- ®UL 864 9th Edition Listed & ®ULC Listed; FM, CSFM, & NYMEA Approved



ZIC-4A
(Front View)



ZIC-4A
(Side View)

Product Overview

The Zone-Indicating Card (Model ZIC-4A) provides four (4), fully supervised and programmable output circuits for use on the FireFinder XLS Fire Alarm Control Panel. Model ZIC-4A supplies four (4) Class B or Class A-type output circuits — power limited to 3.0 Amps maximum per circuit. Each circuit can be independently programmed for use with listed audible or visual notification appliances, listed emergency-audio speakers, municipal tie boxes, leased lines, or as releasing circuits. Model ZIC-4A plugs into one (1) slot in the CC-5 or CC-2 Card Cage, and has on-board LEDs for system status and troubleshooting. Indication of power, communication, internal operation, and ground-fault conditions are provided, as well as indication of circuit activation or trouble conditions.

All system-status conditions are also reported to the system Person-Machine Interface (Model PMI.) Each circuit or output may be controlled automatically with system-logic programming, via the ZEUS programming tool or manually, using the FireFinder XLS keypad on the PMI. Automatic control may also be time based. Each circuit or output can be manually 'Armed' or 'Disarmed' through the Model PMI keypad. When any circuit or output has been 'Disarmed,' the Model PMI display will indicate the affected circuit or output, and the 'Partial System Disable' LED will illuminate — until the circuit or output has been returned to the 'Armed' condition. Model ZIC-4A circuits can also be manually energized or de-energized when in the 'Disarmed' state using Model PMI.

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Product Overview – (continued)

Model ZIC-4A contains a microprocessor which allows notification-circuit outputs to function in a degrade mode – even if the main FireFinder XLS processor or the local-network communication link has failed. In a degrade mode, Model ZIC-4A will respond to an *Alarm* or *Trouble* from any intelligent-addressable initiating device or conventional-zone initiating device connected in the same local enclosure.

Standard NAC zone – Each of the four (4) circuits on Model ZIC-4A can be configured for use as a standard Notification Appliance Circuit. The NAC output can be used as a steady, strobe-synchronized, or zone-coded output. Available coding includes ANSI Temporal, March Time 120-pulse-per-minute (PPM), March Time 60 PPM, March Time 30 PPM, Canadian Two-stage 30 PPM, Canadian Two-stage 120 PPM and custom coding. Outputs may be programmed through logic to transmit up to three (3) different signal types, depending on event priority. For instance, the same circuit can be programmed to transmit the ANSI Temporal pattern for evacuation, March Time 120 PPM for tornado notification, and a custom code for recall.

Standard speaker zone – Each of the four (4) circuits on Model ZIC-4A can be configured for use as a standard speaker circuit in single or dual-channel systems. Model ZIC-4A can be used with the Model ZAM-180 bulk amplifier, or Model ZAC-40 amplifier card. Each circuit on Model ZIC-4A is limited to 96 Watts per zone.

Releasing zone – Each of the four (4) circuits on Model ZIC-4A can be configured for use as a releasing circuit. This circuit can be used to release FM-200. For proper supervision of a releasing circuit, the Model REL-EOL module must be used. Model REL-EOL can use power directly from the FireFinder XLS system. No external, regulated power supply is required.

Municipal Tie – Each of the four (4) circuits on Model ZIC-4A can be configured so that it can be connected to and activate a municipal city tie box. The circuit meets the requirement of some jurisdictions to allow the box to be reset before the fire-alarm control panel. A leased-line module (Model LLM-1) is required for this feature.

Leased Line – Each of the four (4) circuits on Model ZIC-4A can be configured for connection to a leased line. The circuits can be programmed to transmit *Alarm*, *Supervisory*, or *Trouble* signals. A leased-line module (Model LLM-1) is required for this feature.

Bell Follower – Each of the four (4) circuits on Model ZIC-4A can be configured as a NAC that can follow the input from another NAC in an external fire-alarm control panel. Circuit 1 on a Model ZIC-4A card within a FireFinder XLS system enclosure can be configured as the Bell Follower – Master and is connected to the external NAC.

Any other ZIC-4A circuit in that enclosure can be configured to follow the state of the Master. This feature can be used to synchronize coded or ANSI Temporal patterns for audible sounds with another fire-alarm control panel.

Controls and Indicators

RESET switch	Re-initializes Model ZIC-4A card only
POWER LED	Indicates that power is applied to Model ZIC-4A
CARD-FAIL LED	Illuminates when the card microprocessor has failed
CAN-FAIL LED	Illuminates when the CAN communication fails and Model ZIC-4A is in degrade mode
HNET-FAIL LED	Illuminates when the HNET communication fails and Model ZIC-4A is in degrade mode
GND-FAULT LED	Indicates the detection of a ground-fault condition (either negative or positive) on the field wiring of Model ZIC-4A
ZONE-ACTIVE LEDs	Illuminates to indicate that the zone has been activated either automatically or manually. There is one (1) LED for each zone.
TROUBLE LEDs	Indicates the presence of a *Trouble* condition (either an open circuit or a short circuit) on the zone. There is one (1) LED for each zone.

Temperature and Humidity Range

Products are ®UL 864 9th Edition listed for indoor dry locations within a temperature range of 120+/-3°F (49+/-2°C) to 32+/-3°F (0+/-2°C) and at a relative humidity of 93+/-2% at a temperature of 90+/-3°F (32+/-2°C).

Details for Ordering

Model Number	Part Number	Description
ZIC-4A	500-033050	Zone Indicating Card
REL-EOL	500-696359	Releasing End-of-Line Module

Electrical Ratings

24V Back Plane or External Power Current	See NOTE below
Screw Terminal 24V Current	Total Device Current
6.2V Back Plane Current	0
24V Standby Current	89mA

NOTE: The 24V current is dependent on the usage and wiring type of each ZICCkt of the ZIC-4A. Listed below are the required current draws for each zone's usage and wiring type.

ZIC-4A Current Requirement		
Zone Usage	**Output Current Requirement**	**Class A Current Requirement**
Not Used	0	0
NAC	17mA	6mA
Strobe - Sync.	17mA	6mA
Strobe - Unsync.	17mA	6mA
Municipal Tie - USA	34mA	0
Municipal Tie - Canada	17mA	0
Releasing Zone	17mA	0
Leased Line - Alarm	17mA	0
Leased Line - Trouble	17mA	0
Leased Line - Supv	17mA	0
Bell Follower - Master	0	0
Bell Follower - Slave	17mA	6mA
Speaker Zone	34mA	6mA
NAC - Coded	17mA	6mA

ZIC-4A Standby Current = 89mA

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FireFinder® XLSV

Zone-Amplifier Card (40-Watt)

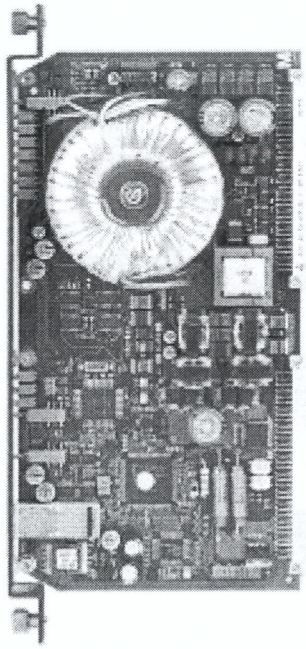
Model ZAC-40

ARCHITECT AND ENGINEER SPECIFICATIONS

- 40-Watt, plug-in audio amplifier
- Selectable audio levels
  - 25VRMS 40 Watts
  - 70VRMS 40 Watts
  - 100VRMS 40 Watts
- Local audio input
- Speaker lines supervised when active or inactive
- Style "Y" or "Z", power-limited wiring
- Split-zone (A / B) wiring on Style "Y"
- Plugs into CC-5 or CC-2 Card Cage
- Supports and switches up to eight (8) digital-audio channels
- Internal amplifier supervision
- Back-up amplification available
- ®UL 864 9th Edition Listed and ®ULC Listed; FM, CSFM & NYC Fire Department Approved



ZAC-40
(Front View)



ZAC-40
(Side View)

Product Overview

The Zone-Amplifier Card (Model ZAC-40) is a combination 40-Watt, amplifier / speaker zone for use with FireFinder XLS panels. Style Y, Z or "A / B" speaker-zone wiring configurations are supported. Model ZAC-40 is power limited, and can be configured to provide 40 Watts of audio at 25VRMS, 70VRMS or 100 VRMS.

Model ZAC-40 is a plug-in card that mounts in a Model CC-5 or CC-2 card cage. Model ZAC-40 is capable of amplifying any of the (8) eight digital-audio channels that are transmitted from the Digital Audio Card (Model DAC-NET), via the digital-audio bus Audio Serial Interface (Model ASI). Model ZAC-40 amplifier is supervised for functionality.

Model ZAC-40 can be used as a single, 40-Watt speaker zone for (1) one-to-eight (8) channel applications, or as a bulk amplifier for one-or-two-channel applications - feeding high-level audio to Models ZIC-4A and ZIC-8B, or for single-channel applications - feeding high-level audio to Model HCP. Model ZAC-40 can also send audio to additional speaker zones, via the use of the Model EBA2004-A1 booster amplifier.

The speaker lines are supervised for open, short-circuit and ground fault. The speaker lines are also supervised in both the active and inactive states.

To provide amplifier backup, additional Model ZAC-40 cards can be used to achieve the desired amplifier backup ratio of 1-to-1 or 1-to-many.

Model ZAC-40 takes one (1) sub-module address of Model DAC-NET, and receives control and communication data from Model DAC-NET, via the CAN bus on Model DAC-NET.

Model ZAC-40 contains an inherent 'Degrade Mode' backup tone (Slow Whoop) that serves as a secondary backup to the primary backup tone or digital message provided by Model DAC-NET.

A local audio input is provided to connect an external audio source. The local audio input is activated via an external contact, and has the lowest priority of all signals.

Model ZAC-40 is FM (#3015946, #3026902); CSFM (#6812-0067:237), and FDNY (#6160) Approved.

40W Zone-Amplifier Card 6331

Product Overview – (continued)

Additionally, the Zone Amplifier Card meets the ®UL464 requirement for 520 Hz low-frequency signal tone, as described in the section for **Determination of Low Frequency Signal Format** in the **Standard for Audible Signal Appliances** – when used with Models 'SEH' and 'SEFH' series of Siemens high-fidelity notification appliances.

Typical Applications

Emergency

* Fire Evacuation
* Tornado Alert
* Terror Alert
* Building Emergency

Non-Emergency

* Convenience Paging
* Background Music

Temperature and Humidity Range

Model ZAC-40 is ®UL864 9th Edition Listed for indoor dry locations within a temperature range of 120+/-3°F (49+/-2°C) to 32+/-3°F (0+/-2°C) and a relative humidity of 93+/-2% at a temperature of 90+/-3°F (32+/-2°C).

Electrical Ratings

Input Power		
24V Back Plane Current		0mA
Screw Terminal (24V Current)	@ 40W	2.3A
	@ 20W	1.2A
	@ 10W	0.7A
	@ 0W	0.15
6.2V Back Plane Current		0mA
24V Current (Standby)		150mA

Dry Contact Input	24V / 10mA, power limited

Related Documentation

Product	Data Sheet #
HiFi Notification Appliances: 'SEH' Series'	2589
HiFi Notification Appliances: 'SEFH' Series'	2590
Desigo Fire Safety Booster Amplifier	6823
Cerberus PRO Booster Amplifier	9823

Details for Ordering

Model	Part Number	Description
ZAC-40	500-035400	40-Watt Zone Amplifier

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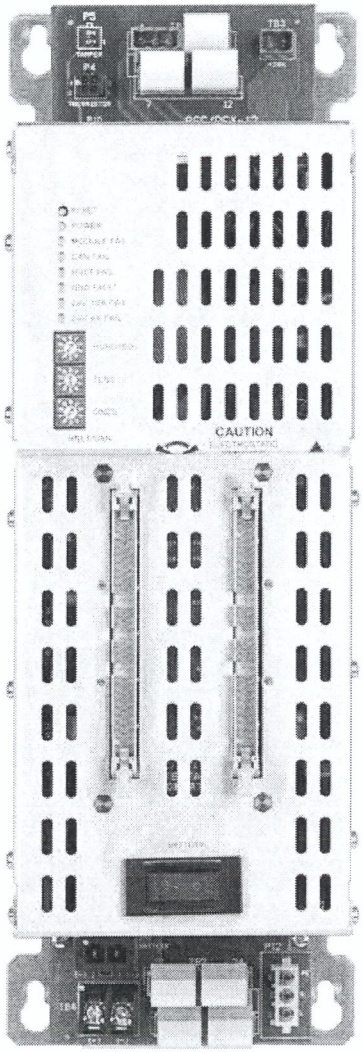
July 2015
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(Rev. 4)

FireFinder® XLS

Power-Supply Charger, Power-Termination Board Module & Power-Supply Extender Models PSC-12, PTB and PSX-12

ARCHITECT AND ENGINEER SPECIFICATIONS

- Main-system power supply
- Total power output 12 Amp @ 24VDC
- Built-in charger for up to 100AH batteries
- Universal AC power input: 120VAC - 240VAC @ 50/60Hz
- Off-line, switch-mode power converter
- Filtered & regulated 24VDC
- Mounts on back box or optional CAB-MP in one (1) module space
- Common *Alarm* & common *Trouble* relays (Form 'C' rated @ 2A)
- Two (2) Programmable relays (Form 'C' rated @ 2A)
- Provides 12-Amp, non-power-limited 24 VDC output (internal use)
- Provides 24VDC and 6.2VDC power to all modules connected to a 60-pin bus
- 4-Amp, power-limited 24VDC output (external use)
- Supervised Intelligent Module with plain, decimal addressing
- Communicates with PMI / CPC, via common 60-pin power / data bus
- Ground-fault detection circuitry
- Optional enclosure tamper switch connection point (Model HTSW-1)
- Includes PTB Power Termination Board for AC field connections
- Optional 24VDC system power expansion with the power-supply extender (Model PSX-12)
- Models PSC-12 and PSX-12 share common batteries
- Up to three (3) Model PSX-12s connected to Model PSC-12
- ®UL 864 9th Edition Listed & ULC Listed; FM, CSFM, NYC Fire Department Approved



Model PSC-12

Product Overview — (Model PSC-12)

The Model PSC-12 Power-Supply Charger is a high-current power supply that provides FireFinder XLS with primary, regulated 24VDC power to operate at 12 Amps (*Alarm*) / 5 Amps (*Standby*).

Model PSC-12 has a built-in battery charger, capable of charging up to 100AH batteries.

Model PSC-12 is an addressable-intelligent, microprocessor-controlled module that communicates its status to the system-operator interface (PMI).

Model PMI is able to query the status of the power supply to obtain information regarding system charging current, terminal loading information, ground fault-conditions and more.

S Industry, Inc.
Building Technologies Division

Product Overview — (continued)

Model PSC-12

Model PSC-12 is a universal power supply; accepting AC power-input levels from 120VAC - 240VAC @ 50 / 60Hz. No special configuration is required - Model PSC-12 is designed to operate across these AC input ranges.

Model PSC-12 has an off-line, switch-mode power converter and a power-factor-correction circuit to improve conductive RF emissions at low frequency.

Model PSC-12 communicates with the H-Net protocol with other system cards and modules, via the common 60-pin power / data bus. Model PSC-12 also provides the FireFinder XLS system with 6.2VDC (2Amps) and 24VDC (2Amps) – via the 60-pin bus – to provide basic power to cards and modules. This 24VDC and 6.2VDC power is also referred to as 'back-plane current.'

Combined with the 'back-plane current,' the PSC-12 provides 12Amps of power @ 24VDC. Two (2) separate power-output terminals are available: one (1) power limited with 4A max @ 24VDC capacity and one (1) non-power limited with 12A max @24VDC capacity (the total not to exceed 12A). Model PSC-12 also provides two (2) connection points for the 60-pin power / data bus.

The 24 VDC outputs for Model PSC-12 provide auto-resettable current protection circuits for overload and short-circuit conditions.

The battery sizes installed are entered in the software configuration tool. Model PSC-12 can charge 15AH, 31AH, 75AH or 100AH batteries. The charger monitors and maintains the battery. The charger has three (3) charge modes – depending on the state of the batteries: Bulk (full) Charge State, Trickle Charge State and Float (maintenance) State. The charger monitors the batteries and automatically determines which of the charging modes to activate.

Model PSC-12 can charge lead-acid batteries only.

Model PSC-12 mounts on one (1) of four (4) available module spaces directly on the back box or optional Model CAB-MP module mounting plate, which then mounts inside of Models CAB-1, CAB-2 or CAB-3 system enclosures.

Model PSC-12 has four (4) Form 'C' relays rated at 2 Amps each. A relay is dedicated to automatically operate on "**Any System *Alarm***" - this is the Common *Alarm* Relay. Another is dedicated to automatically operate on "**Any System *Trouble***" - this is the Common *Trouble* Relay.

Two (2) additional relays are available to be programmed for activation based on system control logic.

When a door-tamper switch is required in any of the CAB enclosures, the Model HTSW-1 tamper switch can be optionally connected to Model PSC-12 to provide this functionality.

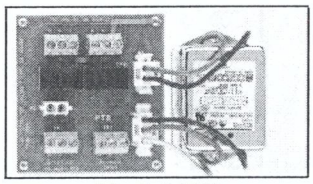
Model PSC-12 has diagnostics LEDs to indicate 'Power On', 'Module Failure' (internal module failure), 'H-NET Failure' (network-communication failure), 'Ground Fault' (internal to enclosure or on any 24VDC output circuits), '24VDC 12A Fail' and '24VDC 4A Fail.' Model PSC-12 module is addressed using plain, decimal-address switches, which clearly state the address of the module.

As an option, an extender cable (Model PSC-ISO-CBL) can allow usage of two (2) XLS universal power supplies (Model PSC-12) in one (1) Model CAB-series enclosure.

Model PTB

Model PSC-12 Power-Termination Board comes packaged with a module known as Model PTB. Model PTB is the Power-Termination Board, and is required for operation with the PSC-12. Model PTB must be mounted in the lower-right corner of the CAB enclosures. Mounting studs are provided in all enclosures to mount to Model PTB.

Model PTB contains screw terminals for AC input power to be connected. Model PTB contains an AC-line filter and AC-line power breaker rated at 5A. From another connector on Model PTB, AC power is connected directly to Model PSC-12, via a keyed-cable harness. Each Model PTB supports building AC-power-connection circuits for two (2) power supplies - either one (1) for Model PSC-12 and one (1), optionally, for the Power Supply extender (Model PSX-12.) When more than one (1) Model PSX-12 Power Supply extender is used, a second Model PTB is required, and must be ordered separately.

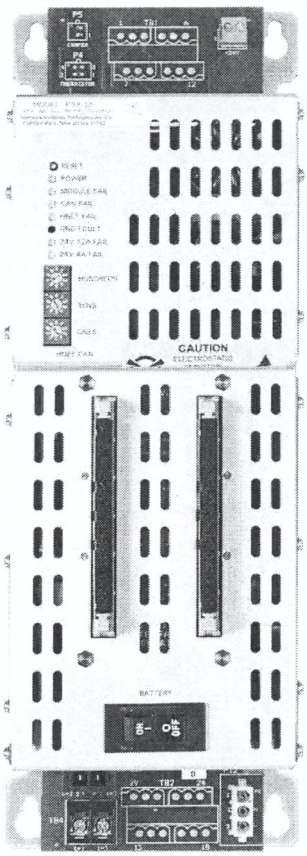


Model PTB

Model PTB has an optional connector that can be used during system installation, commissioning and service to provide the technician with a place to plug in their laptop computer, if required. Model AC-ADPT is an optional accessory cable that allows connection on one side to Model PTB, via a keyed connector, and on the other end directly into to the laptop's transformer. Most PC external power transformers have removable AC power cords which can be replaced by Model AC-ADPT to temporarily provide an AC power source for PCs used during system installation, service and maintenance calls, when needed.

PSX-12 Power-Supply Extender

- Auxiliary 24VDC Power Supply
- Total power output 12 Amp @ 24VDC
- Universal AC power input 120VAC – 240VAC @ 50/60Hz
- Off-line Switch Mode Power Converter
- Filtered & Regulated @ 24VDC
  - Provides 12A non-power limited @ 24 VDC output (internal use)
  - Provides 4-Amp, power-limited @ 24VDC output (external use)
- Mounts on CAB-MP one (1) module space
- Supervised Intelligent Module – plain, decimal addressing
- Communicates with PMI / CPC, via common 60-pin power / data bus
- Ground-fault detection circuit
- PTB Power Termination Board for AC field connections
- Models PSC-12 and PSX-12 share common back-up batteries
  - Up to three (3) PSX-12s connected to a PSC-12 charger
- ®UL 864 9th Edition Listed & ®ULC Listed; FM, CSFM, NYC Fire Department Approved



Model PSX-12

Product Overview – (Model PSX-12)

The Model PSX-12 Power-Supply Extender is a high-current, auxiliary-power supply that expands the main Model PSC-12 power supply and battery charger for the FireFinder XLS system with an additional 24VDC power. Model PSX-12 is rated at 12Amps.

Model PSX-12 is an addressable intelligent microprocessor-controlled module that communicates its status to the system-operator interface (PMI) to report fault conditions. Model PMI is able to query the status of the power supply to obtain information regarding terminal-loading information, ground-fault conditions and more.

Model PSX-12 is a universal power supply; accepting AC power-input levels from 120VAC – 240VAC, and has an off-line, switch-mode power converter and power-factor-correction circuit to improve conductive RF emissions at low frequency. No special configuration is required.

Model PSX-12 communicates via H-Net protocol with other system cards and modules, via the system's common 60-pin power/data bus. Model PSX-12 provides a full 12 Amps of power @ 24VDC.

Two (2) separate power-output terminals are available: one that is power limited with 4A max @24VDC capacity and one non-power limited with 12A max @24VDC capacity (total is not to exceed 12A). Model PSX-12 also provides two (2) connection points for the 60-pin power / data bus.

Model PSX-12 mounts on one (1) of four (4), available module spaces directly on the back box or optional Model CAB-MP module mounting plate, which then mounts inside of Models CAB1, CAB2 or CAB3 system enclosures.

Model PSX-12 has diagnostics LEDs to indicate 'Power On', Module Failure (internal module failure), H-NET Failure (network communication failure), Ground Fault (internal to enclosure or on any 24VDC output circuits), 24VDC 12A fail and 24VDC 4A fail. Model PSX-12 is addressed using plain, decimal-address switches, which clearly state the address of the module.

Details for Ordering

Model Number	Part Number	Description
AC-ADPT	500-633992	Technician Laptop-Power Connector
BP-61	175-387194	24VDC, 15AH Battery
BTX-1	175-083897	Set of 12V, 31AH Batteries
BTX-2	175-083898	Set of 12V, 55AH Batteries
BTX-3	599-034220	Set of 12V, 100AH Batteries
CAB-BATT	500-633917	Battery Enclosure for 75AH or 100AH Batteries
HTSW-1	500-033350	Door Tamper Switch
PSC-12	500-033340	Power Supply and Battery Charger, 12A @ 24VDC
PSC-ISO-CBL	S54430-K4-A1	Optional Extender Cable (used for holding two [2] Model PSC-12 power supplies in one [1] Model CAB-series enclosure
PSX-12	500-034120	Power Supply Extender, 12A @ 24VDC
PTB	500-033390	Power Termination Board [only required for applications with more than two (2) Model PSX-12 extenders]

Temperature and Humidity Range

Products are ®UL 864 9th Edition Listed for indoor dry locations within a temperature range of 120+/-3°F (49+/-2°C) to 32+/-3°F (0+/-2°C) and a relative humidity of 93+/-2% at a temperature of 90+/-3°F (32+/-2°C).

Electrical Ratings

	Model PSC-12	Model PSX-12
Input Voltage	120VAC @ 50/60 Hz. 220VAC @ 50/60 Hz. 240VAC @ 50/60 Hz.	120VAC @ 50/60 Hz. 220VAC @ 50/60 Hz. 240VAC @ 50/60 Hz.
Input Current	3.5A, max. @ 120VAC 2.5A, max. @ 220VAC 2.0A, max. @ 240VAC	3.5A, max. @ 120VAC 2.5A, max. @ 220VAC 2.0A, max. @ 240VAC
24VDC Back Plane Current	2A, max.	Not Applicable
Screw Terminal [24V Current]	**Power Limited:** 4A, max. **Non-Power Limited:** 12A, max.	**Power Limited:** 4A, max. **Non-Power Limited:** 12A, max.
6.2VDC Back Plane Current	2A, max.	Not Applicable
24V Standby Current	150mA + 20mA per active relay	150mA
Output Power [Each HNET / XNET and CAN Network Pair]	8V peak-to-peak max. 75mA, max. during msg. transmission	8V peak-to-peak max. 75mA, max. during msg. transmission

Model PTB	
AC Mains Rating	**{Each Model PSC-12 / Model PSX-12}**
120VAC @ 50/60 Hz.	3.5A, max.
220VAC @ 50/60 Hz.	2.5A, max.
240VAC @ 50/60 Hz.	2.0A, max.

Notice: This marketing data sheet is not intended to be used for system design or installation purposes. For the most up-to-date information, refer to each product's installation instructions.

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Building Technologies Division

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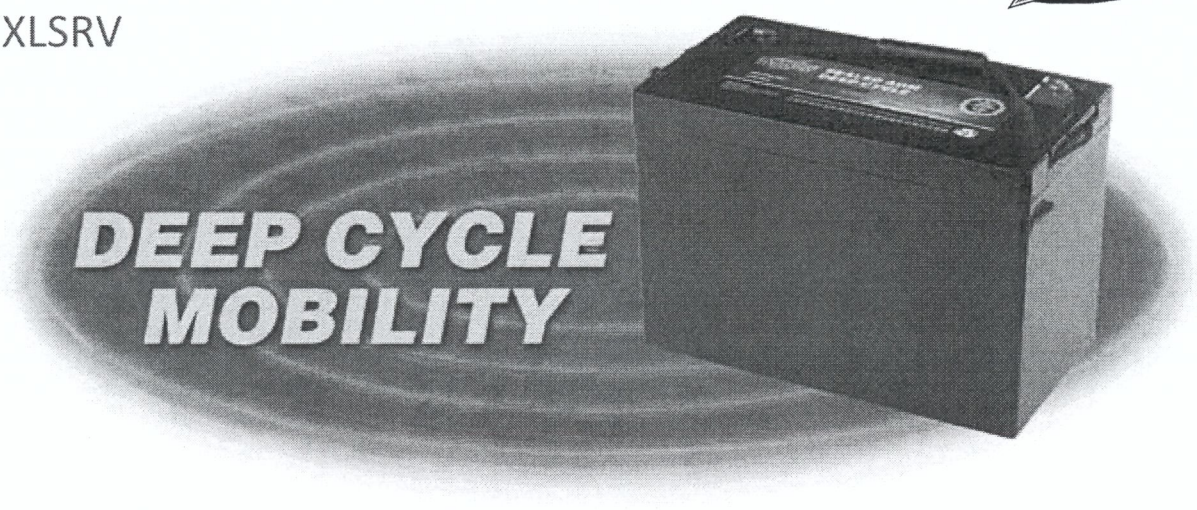
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February 2014
Supersedes sheet dated 8/11
(Rev. 5)

DCM0090

XLSRV



DCM0090
VALVE-REGULATED LEAD-ACID BATTERY FOR DEEP-CYCLE APPLICATIONS

FEATURES

- Robust plate for extended cycle life.
- Computer-generated grid design optimized for high-power density.
- Low-calcium grid alloy for reduced gas emissions and ease of recycling.
- Flame-arresting, one-way pressure-relief vent for safety and long life.
- UL-recognized component.
- Multicell design for economy of installation and maintenance.
- Case and cover available in standard polypropylene.
- Thermally welded case-to-cover bond to eliminate leakage.
- Removable handles.
- Can be used in any orientation. Upright, side or end mounting recommended.
- Absorbent Glass Mat (AGM) technology for efficient gas recombination of up to 99% and freedom from electrolyte maintenance.
- Not restricted for air transport — complies with IATA/ICAO Special Provision A67.
- Not restricted for surface transport — classified as nonhazardous material as related to DOT-CFR Title 49 parts 171-189.
- Not restricted for water transport — classified as nonhazardous material per IMDG Amendment 27.
- Longest cycle life available.
- Manufactured by an ISO9001 certified facility.

12 Volts – 90 Ampere-Hour Capacity @ 20-Hour Rate

Ampere-Hour Capacity to 1.75 Volts per Cell @ 77°F (25°C)
10.5 Volts per 12 Volt Battery

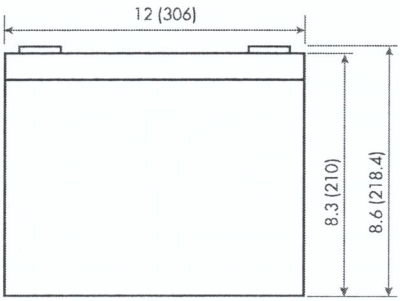
Approximate Discharge in Hours	20	10	5	1
Amp-Hour Capacity	92	84	67	46

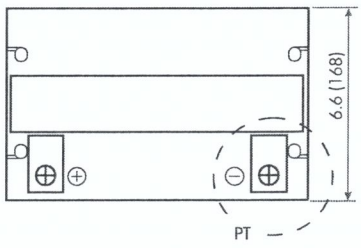
Interstate Battery System of America, Inc.
12770 Merit Drive, Suite 1000
Dallas, TX 75251
Customer Service: 1-888-772-3600

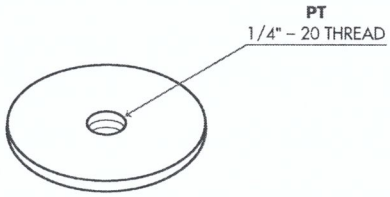
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interstatebatteries.com

DCM0090







DCM0090 – Specifications

*All dimensions in inches and (millimeters). All dimensions are for reference only. Contact an Interstate representative for complete dimensional information.

Cells Per Unit	Voltage Per Unit	Weight	Electrolyte	Max. Discharge Current	Short Circuit Current	Ohms Imped. 60 Hz
6	12	60.2 lbs. 27.3 kg	Absorbed H_2SO_4 SG = 1.30	450 Amps	1350 Amps @ 0.1 sec.	8 mΩ

Capacity	90 Ah @ 20 hr. rate to 1.75 volts per cell @ 77˚F (25˚C)
Operating Temperature Range (with temperature compensation)	Discharge: -40˚F (-40˚C) to +160˚F (71˚C) Charge: -10˚F (-23˚C) to +140˚F (60˚C)
Recommended Operating Temperature Range	+74˚F (23˚C) to +80˚F (27˚C)
Equalization and Cycle Service Charging and Current Limits	≤ 36 A, 14.5 V – 14.9 V
Self Discharge	Interstate batteries may be stored for up to six months at 77˚F (25˚C), and then a freshening charge is required. For higher temperatures, the time interval will be shorter.
Terminal	Insert, threaded female, 1/4" – 20 (hardware included)

Constant Current Discharge Ratings – Amperes @ 77˚F (25˚C)

End Point Volts/Cell		Operating Time to End Point Voltage (in hours)											
		5 min	10 min	15 min	30 min	1 hr	2 hr	3 hr	4 hr	5 hr	8 hr	10 hr	20 hr
9.60V	A	309.3	225.7	158.8	96.1	50.2	29.3	21.5	16.7	13.8	9.7	8.8	4.7
	W	3284.6	2480.4	1687	1020.8	581	338.6	249.1	194	159.7	112.9	102	54.9
10.20V	A	272.5	205.7	142.1	91.1	47.2	27.9	20.9	16.3	13.5	9.5	8.5	4.6
	W	3025.5	2283.1	1577.5	1011.6	545.9	323.5	242.4	188.9	125.5	110.4	99.5	53.5
10.50V	A	262.5	195.6	133.8	88.6	46	27.3	20.4	16.1	13.4	9.4	8.4	4.6
	W	2977	2218.7	1516.5	1004.9	528.4	316	236.6	185.6	154.7	109.5	97.8	52.8
10.80V	A	252.5	185.6	125.4	86.1	44.3	26.6	19.9	15.8	13	9.2	8.4	4.5
	W	2938.5	2160.2	1459.7	1002.4	514.1	309.3	231.6	182.2	152.2	107	97	52.6
11.10V	A	242.4	175.6	117	83.6	42.6	25.9	19.2	15.3	12.7	8.9	7.9	4.3
	W	2885	2089.2	1392.8	994.8	507.5	308.5	229.1	181.4	151.3	106.2	94.5	51

SIEMENS

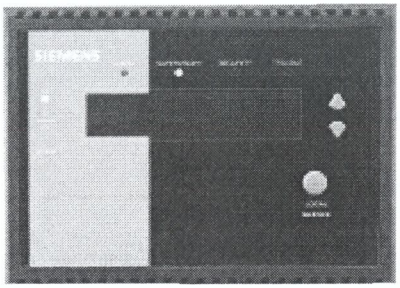
Fire Safety

SSD Series

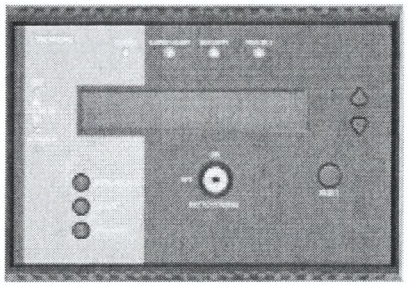
Models SSD, SSD-C, SSD-INT, SSD-C-INT, SSD-C-REM System Status Display for the FireFinder XLS System

ENGINEER AND ARCHITECT SPECIFICATIONS

- 4 x 40 Backlit LCD display
- Event and Audible status LEDs
- Scroll buttons to view additional events
- Local sounder
- Supports Style 4 or Style 7 wiring
- Built-in transient protection
- Mounts in its own enclosure or REMBOX
- Optional local system control
- Downloadable firmware
- UL, ULC Listed



SSD



SSD-C with Control

Introduction

The SSD Series System Status Display is a remote LED/LCD display that shows the local status of a FireFinder XLS system. An LED illuminates when alarm, supervisory, trouble, and security events occur on the system. A four-line LCD will give details of the event in alphanumeric form. The display can be toggled to display additional events. Optional remote system control capabilities are available.

Description

The SSD Series display has separate LEDs for alarm, supervisory, trouble, and security events on the system. Each LED will flash when unacknowledged events of that type are present on the system. The LED will change to steady upon acknowledgment of the event. Also, there are two LEDs that indicate the state of audible circuits on the system: one LED to indicate that the circuits are active, and one to indicate that the circuits have been silenced.

The LCD display on the SSD Series display has four lines of forty characters each. When the FireFinder XLS system is in its normal supervisory state with no events present, the display will annunciate the system ID information along with the date and time. When an event occurs on the system, the LCD display will show the event type and address, the time of the event, the custom message for that address, the usage of the device, and whether the event is acknowledged or not. Additionally, the display will show the total number of all types of events present on the system. The display has a backlight feature that operates upon receiving any event information or when any operator buttons are pressed.

A local sounder is included with the SSD Series display that operates when any events are displayed on the system. The sounder can be optionally disabled through software programming. When an event is present, pressing any operator buttons will silence the local sounder.

The SSD Series display has two display control buttons that are used to display the next or the previous event information in the sequence, and a local sounder silence button. Programming for the SSD display is done with the Zeus programming tool.

CATALOG NUMBER **6326**

Models SSD-C, SSD-C-INT, and Model SSD-C-REM have three additional control buttons for acknowledging events, silencing audible circuits, and resetting the system. The SSD-C and SSD-C-INT have an integral keyswitch that enables these control buttons to operate. The SSD-C-REM is located within a locked cabinet, so no additional keyswitch is required for enabling the control buttons.

The SSD Series display is remotely connected to the H-Net communication bus from any NIC-C interface in a FireFinder XLS system enclosure using Style 4 or Style 7 wiring. 24VDC is required to run the SSD Series display, and it can be provided from a Model PSC-12 Power Supply or PSX-12 Power Supply Extender in the FireFinder XLS system enclosure. Power from other UL Listed 24VDC power sources is also acceptable. The SSD Series display has screw terminals capable of supporting 12 to 22 gage wires. The H-Net communication from the FireFinder XLS system can be terminated on the SSD Series display, or may pass through for communication with other modules. Diagnostic LEDs on the SSD Series display indicate power and communication status.

Models SSD, SSD-C, and SSD-C-INT can be mounted in a 2-gang electrical box or a 4-inch square electrical box. No flush trim kit is required. The unit is approximately 10-1/2" wide, 6-1/8" high, and 1-1/2" deep.

The Model SSD-C-REM is mounted in a Model REMBOX2 or REMBOX4 Remote Lobby Enclosure, or any CAB enclosure inner door. The SSD-C-REM requires two module spaces in the remote lobby enclosure, and its bracket supports the mounting of four inner door modules (such as SCM-8s or LCM-8s) below the display. The inner door module spaces are arranged in two rows of two module spaces.

Ordering Information

Model Number	Description	Part Number
SSD	System Status Display	500-034170
SSD-C	System Status Display w/control	500-648733
SSD-INT	System Status Display w/international language overlays	500-034740
SSD-C-INT	System Status Display w/control & international language ovrlys.	500-034750
SSD-C-REM	System Status Display w/control for remote lobby enclosure	500-634773
REMBOX2	Small remote lobby enclosure	500-633772
REMBOX4	Large remote lobby enclosure	500-633914
BCM	Blank Control Module plate	500-033320

Electrical Ratings

24V Back Plane Current: 0

Screw Terminal 24V Current: 200mA

6.2V Back Plane Current: 0

24V Standby Current: 200mA

NOTICE: The use of other than Fire Safety detectors and bases with Fire Safety equipment will be considered a misapplication of Fire Safety equipment and as such void all warranties either expressed or implied with regard to loss, damage, liabilities and/or service problems.

Siemens Building Technologies
Fire Safety

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SFS-IG
Printed in U.S.A.

June 2006
Supersedes sheet dated 1/03

SIEMENS

Data Sheet
Fire Safety & Security Products

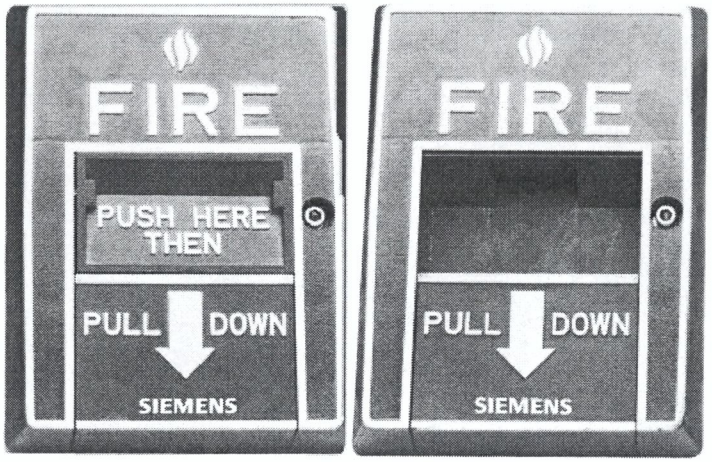
Intelligent Initiating Devices

HMS-Series

Models HMS-D, HMS-S

ARCHITECT AND ENGINEER SPECIFICATIONS

- Durable design
- Shock-and-vibration resistant
- Pull-down lever is down, until manually reset
  - Reset with Allen Key
  - No break rods necessary
- Custom microcomputer-chip technology
- Dynamic supervision to the fire-alarm control panel (FACP)
- Polarity insensitive via *SureWire*™ technology
- Two-wire operation
- Surface or semi-flush installation
- Model DPU programs and verifies address and tests functionality of each device
  - Electronic-address programming is easier, more efficient and more dependable
- Comes in single-action (Model HMS-S) and double-action (Model HMS-D) stations
- ®UL Listed;
  FM, CSFM & NYC Fire Dept. Approved



Model HMS-D
Dual-Action Station

Model HMS-S
Single-Action Station

Product Overview

The Siemens intelligent manual fire-alarm boxes (Models HMS-S and HMS-D) provide the most advanced method of address programming and supervision. Each Model HMS-series manual box achieves the state of an 'intelligent-initiating device' by incorporating custom microcomputer-chip technology with sophisticated, bi-directional communication capabilities with the FACP.

Specifications

Models HMS-S and HMS-D are constructed of durable, molded polycarbonate material that is matte finished in red with raised white lettering. The housing accommodates a 'pull-down' lever, which — when operated — locks into position; indicating the manual fire-alarm box has been activated.

The pull down lever remains down / in the 'locked' position, until the fire-alarm box is manually reset. The manual fire alarm box can only be reset by opening the hinged housing cover with an Allen key; followed by closing and locking the cover.

Models HMS-S and HMS-D operate with Siemens — Fire Safety FACPs. The microcomputer chip to the manual fire-alarm box has the capacity of storing — in memory — identification information as well as important operating-status data.

Innovative technology from Siemens — Fire Safety also allows all Model HMS-series intelligent manual fire-alarm boxes to be programmed via the Device Programmer / Test Unit (Model DPU). Model DPU is a compact, portable and menu-driven accessory that makes programming and testing of a manual fire-alarm box device faster, easier and more dependable than previous methods.

The programmer / tester eliminates the need for mechanical-addressing mechanisms of a device because Model DPU electronically sets the address of the manual fire-alarm box into its microcomputer chip, non-volatile memory. Hence, vibration, corrosion and other conditions that can compromise or even deteriorate mechanical-addressing mechanisms are no longer a cause for concern.

SIEMENS Industry, Inc.
Building Technologies Division

Specifications — (continued)

Models HMS-S and HMS-D are fitted with screw terminals for connection to an addressable circuit, and can be either surface or semi-flush mounted.

The Model HMS-series manual fire-alarm boxes derive their power, communicate information and receive commands over a single pair of wires.

The Model HMS-series is compatible on the same circuit with all Model 'H'-series detectors, interfaces or addressable, conventional zone modules.

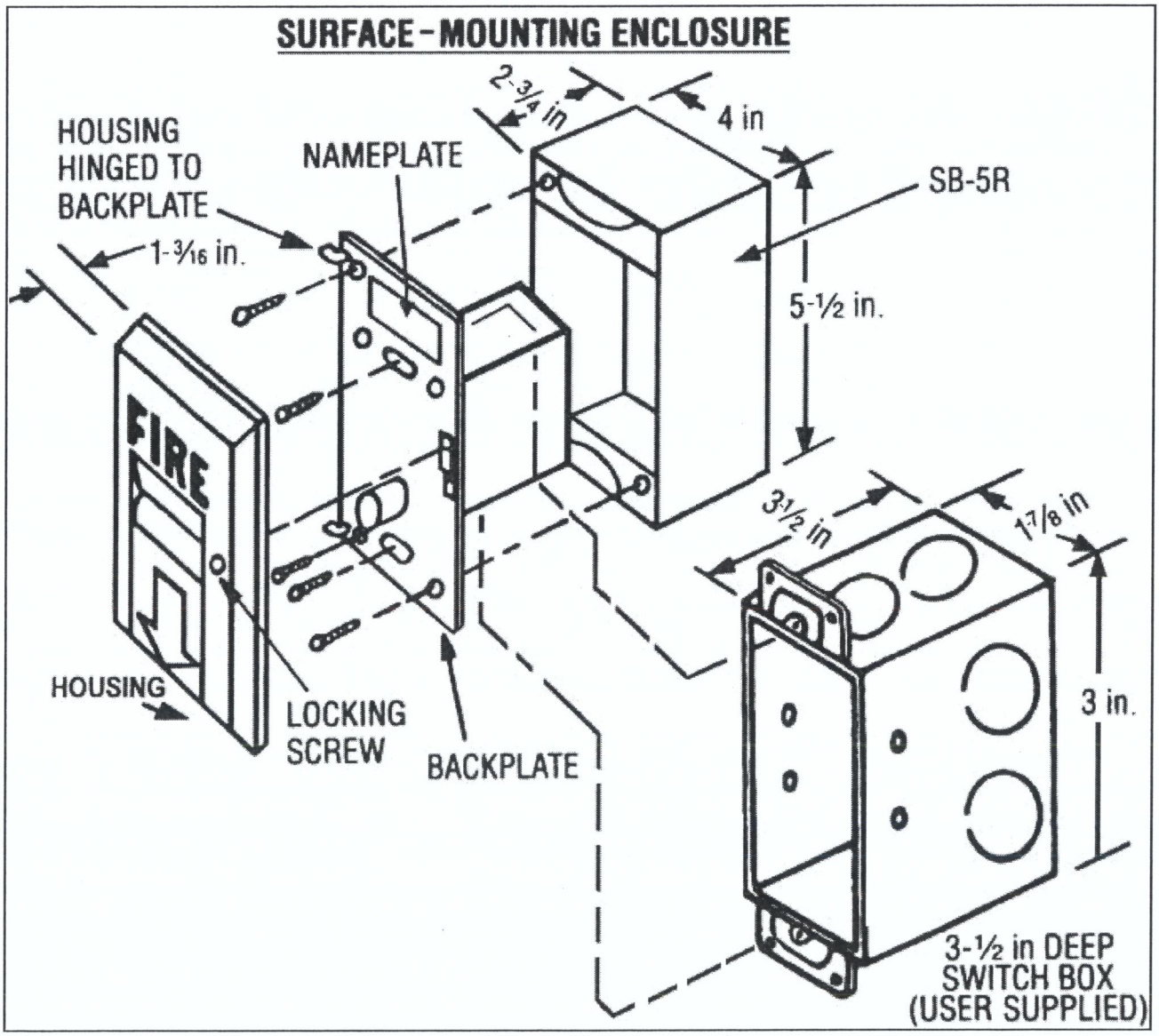
Electrical Ratings

Current Draw (Active or Standby) — 1.5mA

Details for Ordering

Model Number	Part Number	Description	Shipping Weight	
HMS-D	500-033400	Addressable Manual Fire Alarm Box, Dual Action	2.5 Lbs.	1.13 Oz.
HMS-S	500-033200	Addressable Manual Fire Alarm Box, Single Action	2.0 Lbs.	0.9 Oz.
LTP	500-620490	Reset Tool Package [contains two (2) tools]	0.5 Lb.	0.23 Oz.
SB-5R	310-019860	Surface-Mounting Box	1.5 Lbs.	0.7 Oz.

Mounting Diagram



Notice: This marketing data sheet is not intended to be used for system design or installation purposes. For the most up-to-date information, refer to each product's installation instructions.

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Building Technologies Division

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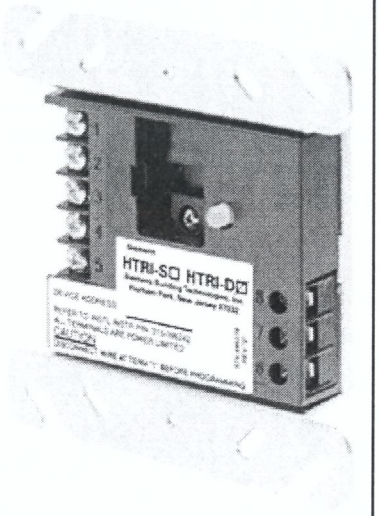
Data Sheet
Fire Safety Products

HTRI-Series Interface Modules

Models HTRI-D, HTRI-R and HTRI-S (and USCG-HPLATE for Marine installs)

ARCHITECT AND ENGINEER SPECIFICATIONS

- Interfacing and supervising normally open (N.O) or normally closed (N.C) contacts
- Integral single-pole, double-throw (SPDT) relay on Model HTRI-R (up to 4 amps)
- Dual input on Model HTRI-D, using a single address
- Polarity insensitive with *SureWire*™ technology
- Dynamic supervision
- Two-wire operation
- Multi-color light-emitting diode (LED) indicates system status:
  - GREEN | AMBER | RED
- Mounts in a 4-inch (10.2 cm.) square, 2-¼" (5.7 cm.) deep single-gang or double-gang back box
- Easy front access to programming port and wiring terminals
- Comes with 5"–*x*– 5" (12.7 –*x*– 12.7 cm.) plastic faceplate
  - Separate metal cover plate required for use in Marine installations
- Electronic address programming is easy and dependable
- Device Programmer / Tester programs and verifies address of the device and tests for proper functionality



- Electronic address programming is easy and dependable
- ®UL Listed & ®ULC Listed; FM, CSFM and NYCFD Approved

Product Overview

The Siemens — Fire Safety HTRI-series Intelligent interface modules are designed to provide the means of interfacing direct shorting devices to the fire-alarm control panel (FACP) loop circuit.

The HTRI-series modules provide the most advanced method of address programming and supervision on the market — combined with sophisticated control panel communication. Each HTRI-series interface module incorporates a microcomputer chip, and each interface module achieves the state of an 'intelligent device' through its microcomputer-chip technology, combined with its sophisticated, bi-directional communication capabilities with the FACP.

Specifications

The Siemens Mode HTRI-series intelligent interface modules are available in three (3) types: Model HTRI-D, as well as Models HTRI-S and HTRI-R, which are both designed to monitor a (N.O) or (N.C) dry contact.

The interface module reports the status of the (N.O) or (N.C) contact to the control panel.

Model HTRI-S can only monitor and report the status of the contact, while Model HTRI-R incorporates an addressable 'Form C' relay.

The Model HTRI-R relay and contact device input are controlled at the same address. For the FACP, the relay and input contact can be controlled as a separate function. The relay is typically used where control or shunting of external equipment is required.

The Model HTRI-D is a dual-input module that is designed to supervise and monitor two (2) sets of dry contacts. Model HTRI-D only requires one (1) address, but responds independently to each input. Model HTRI-D is ideal for monitoring a water-flow switch and its respective valve tamper switch.

Model HTRI-D flashes twice — once for each address, and Model HTRI-R LED indicates a change of state in the relay. The device's microcomputer chip has the capacity of storing, in memory, identification information; as well as important operating-status data.

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Building Technologies Division

Specifications (continued)

Each Model HTRI device has a multi-color LED that flashes GREEN when operating in Normal; AMBER if unit is in *Trouble* condition, and RED to indicate a change of state.

Field-Device Programmer

Siemens — Fire Safety innovative technology allows HTRI-series intelligent interface modules to be programmed via the Device Programming / Test Unit: a compact, portable and menu-driven accessory that makes programming and testing an interface device faster, easier and more dependable than previous methods.

The programmer / tester eliminates the need for mechanical addressing mechanisms, such as: program jumpers, DIP switches or rotary dials, since Model DPU electronically sets the HTRI-series interface address into the non-volatile memory of the interface microcomputer-chip.

Vibration, corrosion and other conditions that deteriorate mechanical addressing mechanisms are no longer a cause for concern.

The HTRI-series is fitted with screw terminals for connection to an addressable circuit, and is fully compatible on the same Siemens FACPs with Siemens Model 'H'-series intelligent detectors; Model 'HMS'-series addressable manual stations, or any other addressable intelligent modules (e.g. — Model HZM or Model HCP).

Temperature and Humidity Range

Model HTRI-series intelligent interface modules are ®UL Listed. Environmental operating conditions for HTRI-D, HTRI-R and HTRI-S modules are 32°F (0°C) to 120°F (49°C) with a relative humidity of no greater than 93%, non-condensing.

Electrical Ratings

Current Draw (Active or Standby)	1.3mA

Relay Ratings, Model HTRI-R

Resistive:	4 Amps, 125 VAC
	4 Amps, 30 VDC

Electrical Ratings

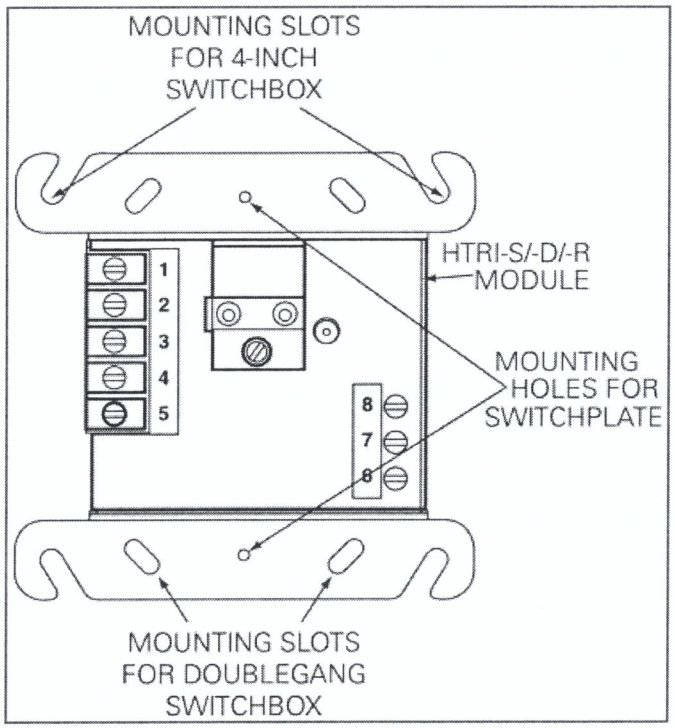
Relay Ratings, Model HTRI-R – (cont.'d)

Inductive:	3.5A, 120 VAC (0.6P.F.)
	3.0A, 30 VDC (0.6P.F.)
	2.0A, 120 VAC (0.4P.F.)
	2.0A, 120 VAC (0.35P.F.)
	2.0A, 30 VDC (0.35P.F.)

Mounting Diagram

Models HTRI-S, HTRI-D and HTRI-R mount directly into a 4-inch (10.2 cm.) square, 2 ¼" (5.7 cm.)–deep box back box, or to a user-supplied double-gang back box. A 5" (12.7 cm.) square, off-white faceplate is included with each HTRI-series module.

Note: For Marine installations, a metal cover faceplate (Model USCG-HPLATE) is available separately. The faceplate must be used to protect Siemens HTRI-series interface modules from receiving radio-frequency interference (RFI).



Details for Ordering

Model	Part Number	Description
HTRI-R	500-033300	Single Input Module with Relay
HTRI-D	500-033360	Dual Input Module
HTRI-S	500-033370	Single Input Module
USCG-HPLATE	S54319-F22-A1	*Metal Cover Plate for HTRI Series Interface Modules

**denotes for required use with Marine-only installations / applications*

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Fire Safety Products

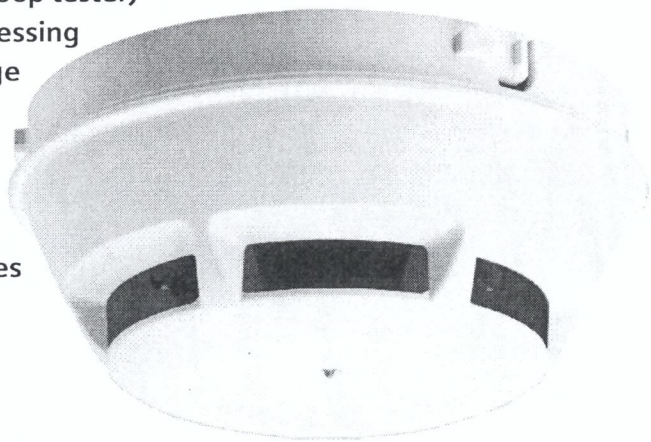
Intelligent Detection Devices

Photoelectric Smoke Detector

Model FDO421

ARCHITECT AND ENGINEER SPECIFICATIONS

- Compatible with Siemens Model 'H'-series devices on the same loop (with Desigo fire-alarm control panels [FACPs] or FireFinder® XLS FACPs)
- Compatible with Model DPU (device programmer / loop tester)
- Utilizes advanced microprocessor-based signal processing
- Extended temperature and humidity operating range
- Each detector is self-testing:
  - Self monitored for sensitivity within ®UL Listed limits
  - Complete diagnostics performed every 10 seconds
- Polarity insensitive utilizing *SureWire*™ technology
- Compatible with Model DB-11–series mounting bases
- Tri-color detector-status LED with 360° viewing
- Field-selectable application sensitivity profiles
- Remote sensitivity-measurement capability
- Utilizes advanced signal processing
- Superior EMI / RFI immunity
- RoHS compliant



- Automatic environment compensation
- ®UL268A Listed [for direct air-duct use], ®ULC Listed; FM (#3230, 3210), CSFM (#7272-0067:0258) Approved

Product Overview

The Model FDO421 Photoelectric Smoke Detector uses state-of-the-art microcontroller circuitry and surface-mount technology for maximum reliability. Model FDO421 incorporates an optical sensor using a light-scattering detection principle. The device utilizes advanced software algorithms to analyze the signals, and provides highly stable and accurate smoke detection.

Further, Model FDO421 uses state-of-the-art microprocessor circuitry with error check; detector self-diagnostics, and supervision programs.

Field-Device Programmer

Model FDO421 is compatible with the Siemens – Fire Safety field-device programmer / test unit (Model DPU), which is a compact, portable and menu-driven accessory for electronically programming and testing detectors easily and reliably.

Model DPU eliminates the need for cumbersome, unreliable mechanical programming methods – such as dials or switches – and reduces installation and service costs by electronically programming and testing the detector prior to installation.

For proper operation of Model DPU, the technician selects the accessory's program mode, and enters the desired address. In turn, Model DPU automatically sets and verifies the address, as well as tests the detector. When in the 'test' mode, Model DPU will perform a series of diagnostic tests without altering the address or other stored data, allowing technicians to determine if the detector is operating properly.

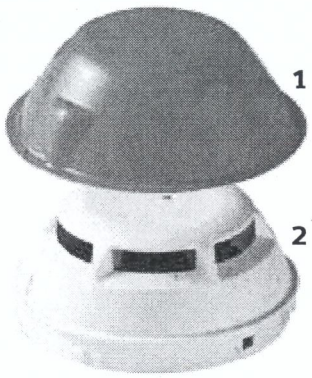
Model DPU operates on AC power or rechargeable batteries, providing flexibility and convenience in programming and testing equipment from practically any location.

SIEMENS Industry, Inc.
Building Technologies Division

Product Overview — (continued)

Model FDO421 is a plug-in, two-wire and addressable photoelectric smoke detector. Model FDO421 is ®Underwriters' Laboratories Listed [®UL268A Listed for direct in-air duct usage], as well as FM and CSFM Approved.

Each detector consists of a dust-resistant photoelectric chamber-and microprocessor-based electronics with a low-profile plastic housing. Every Model FDO421 fire detector is shipped with a protective dust cover:

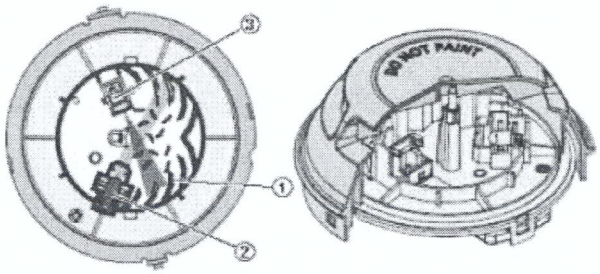


1. Dust cover
2. Smoke detector

Operation

Model FDO421 is a wide-spectrum, photoelectric smoke detector incorporating an infrared light-emitting diode (IRLED), and infrared light-sensing photodiode. Under normal conditions, light transmitted by the LED is directed away from the photodiode and scattered through the smoke chamber in a controlled pattern.

The smoke chamber is designed to manage light dissipation and extraneous reflections from dust particles or other non-smoke, airborne contaminants in such a way as to maintain stable, consistent detector operation. When smoke enters the detector chamber, light emitted from the IRLED is scattered by the smoke particles, and is received by the photodiode:



1. Labyrinth
2. Optical transmitter
3. Optical receiver

Sensitivity Settings

Application Parameter Sets

Model FDO421 provides four (4) pre-programmed sensitivity parameter sets that can be selected by the FACP to match the expected application or environmental conditions:

- Sensitive
- Standard
- Robust
- Air-duct

Sensitive: This application parameter set is practically suitable for areas where few misleading sources of false alarm are present, and is appropriate where priority is given to detecting open fires as soon as possible (e.g. – typically a clean application with controlled environmental conditions.)

Standard: This application parameter set is practically apt for normal office, hotel-lobby-type applications, and is the default setting.

Robust: This application parameter set offers improved resistance to false alarms in areas where misleading sources, such as cigarette smoke or exhaust fumes, may cause a nuisance alarm.

Air-Duct: This application parameter set is used when the detector is used a ®UL268A (DI) compliant direct in-air duct application without a duct housing.

Model FDO421 does not require a field sensitivity test. Model FDO421 is ®UL Listed as a self-testing device and complies with NFPA 72 as a self monitoring detector and control panel arrangement. Additionally, this parameter set is also used when Model FDO421 is used in air-duct housings (Models FDBZ492 and FDBZ492-HR).

The visible LED flashes green every 10 seconds to indicate communication with the FACP, and to notify Model FDO421 has passed its self-test. Should Model FDO421 sense a fault or failure within its system, the LED will flash amber, and the detector will transmit the data to the FACP.

A quick visual inspection is sufficient to indicate the condition of Model FDO421 at any time. If more detailed information is required, a printed report can be provided from the compatible FACP, indicating the status and settings assigned to each individual detector. When Model FDO421 moves to the *alarm* mode, the detector will flash red and continue flashing until the system is reset at the FACP. At that same time, any user-defined, system-alarm functions programmed into the system are activated.

Model FDO421 contains a tri-color LED indicator, capable of flashing any one (1) of three (3) distinct colors: GREEN, YELLOW, or RED. During each flash interval, the microprocessor-based detector monitors the following:

- Smoke sensitivity is within the range indicated on the nameplate label
- Smoke in its sensing chamber
- Internal sensors and electronics are functional

Operation — (continued)

Based on the monitoring results, the LED indicator flashes the following colors based on the following conditions:

Flash Color	Condition	Flash Interval (in seconds)
Green*:	Normal supervisory operation. Smoke sensitivity is within rated limits.	10
Yellow:	Detector is in trouble and needs replacement.	4
Red:	Alarm condition.	1
No Flash:	Detector is not powered.	— —

* LED can be turned OFF.
Please follow the corresponding description of the panel used.

A quick visual inspection is sufficient to indicate the condition of the detector at any time. If more detailed information is required, a printed report can be provided from the respective Desigo FACP that indicates the status and settings assigned to each individual detector.

Installation

All Model FDO421 detectors use a surface-mounting base, Model DB-11 or Model DB-11E, which mounts on a 4-inch octagonal, square or single-gang electrical box. The base utilizes screw-clamp contacts for electrical connections and self-wiping contacts for increased reliability.

The Model DB-11 base can be used with the optional Model LK-11 detector locking kit, which contains 50 detector locks and an installation tool to prevent unauthorized removal of the detector head. Model DB-11 has decorative plugs to cover the outer mounting screw holes.

Model FDO421 may be installed on the same initiating circuit with the following Siemens Model 'H'-series detectors [when used with the Desigo FACPs] —

- Model HFP-11
- Model 'HMS'-series manual stations
- Model 'HTRI'-series interfaces
- Model HCP output-control devices
- Model 'HZM'-series of addressable, conventional zone modules

Application Data

Installation of Model FDO421 detectors requires a (2) two-wire circuit. In many retrofit cases, existing wiring may be used. 'T-tapping' is permitted only for 'Style 4' (Class B) wiring. Model FDO421 is polarity insensitive, which allows a substantial reduction in installation and debugging time.

Model FDO421 can be applied within the maximum 30-feet center spacing (900 sq. ft. areas,) as referenced in NFPA 72. This application guideline is based on ideal conditions — specifically, smooth ceiling surfaces, minimal air movement, and no physical obstructions between potential fire sources and the actual detector.

Do not mount detectors in close proximity to ventilation or heating and air-conditioning outlets. Exposed joints or beamed ceilings may also affect safe spacing limitations for detectors.

Should questions arise regarding detector placement, observe NFPA 72 guidelines. Good fire-protection system engineering and common sense dictate how and when fire detectors are installed and used. Contact your local Siemens Industry — Fire Safety distributor or sales office whenever you need assistance applying Model FDO421 in unusual applications. Be sure to follow NFPA guidelines and ®UL Listed / ®ULC Listed installation instructions — included with every Siemens — Fire Safety detector — and local codes as for all fire protection equipment.

Technical Data

Operating Temperature Range: +32°F (0°C) to 120°F (49°C)

Relative Humidity: 0 — 95%; non-condensing

Air Pressure: No effect

Air Velocity: 0 — 4,000 ft. / min (0-20m / sec)

Input Voltage Range: 16VDC — 30VDC

***Alarm* Current (max.):** 280µA

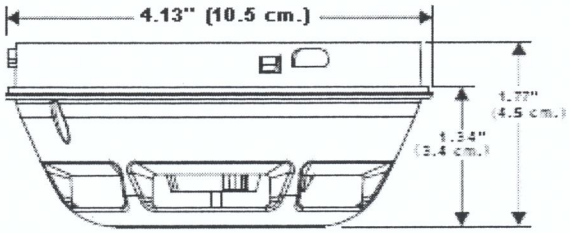
Standby Current (max.): 280µA, max. (Average)

Maximum Spacing: 30-foot centers (900 sq. ft.), per NFPA 72

Detector Weight: 0.317 Lbs. (0.144 Kg.)

Mechanical Protection Guard:
®UL Listed /®ULC Listed
[with STI Guard Model STI-9604]

Mounting Diagram
Dimensions



Compatible FACPs

Model	Data Sheet Number	Description
—	6300	FireFinder® XLS (system overview)
FC2005	6813	50-point addressable panel
FC2025	6815	252-point addressable system
FC2050	6815	504-point addressable system
FV2025	6821	252-point intelligent voice communication system
FV2050	6821	504-point intelligent voice communication system

Details for Ordering

Model	Part Number	Description
FDO421	S54320-F4-A1	Photoelectric Smoke Detector
DB-11	500-094151	Detector Mounting Base
DB-11E	500-094151E	Detector Base {small}
DB2-HR	S54320-F12-A1	Relay Base
RL-HC	500-033230	Remote Alarm Indicator: 4" octagon-box mount, red
RL-HW	500-033310	Remote Alarm Indicator: Single-gang box mount, red
FDBZ492	S54319-B22-A1	Addressable Air-Duct Housing
FDBZ492-HR	S54319-B23-A1	Addressable Air-Duct Detector with Relay
LK-11	500-695350	Base Locking Kit

STI-9604	— —	STI Mechanical Protection Guard

See: www.STI-USA.com for further details on ordering Model STI-9604

In Canada, order:

Model	Part Number	Description
DB-11C	500-095687	Detector Mounting Base for ULC (Listed)

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Fire Safety Products

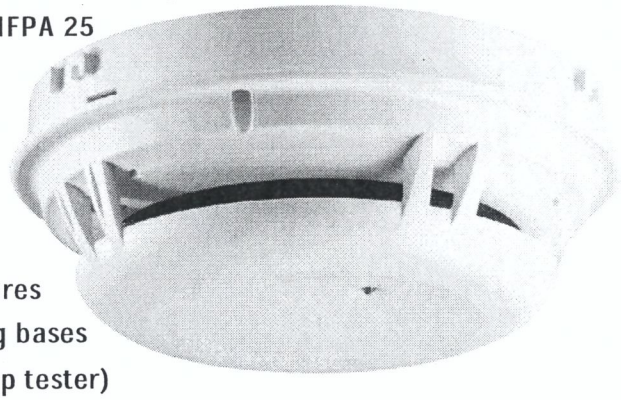
Intelligent Detection Devices

Multi-Criteria Fire / CO Detector [with ASA*technology*™]

Model FDOOTC441

ARCHITECT AND ENGINEER SPECIFICATIONS

- Advanced multi-criteria fire detector that has optical, thermal and CO sensors
- Differentiates between deceptive phenomena and an actual fire (nuisance-alarm avoidance)
- Provides enhanced detection via forward-and-backward light-scattering technology
- Supervisory feature for temperature and CO-concentration-threshold monitoring
- Complies with NFPA 76 (Telco standard) as 'VEWFD' high-sensitivity detector
- ®UL Listed and FM Approved as a multi-criteria and 'VEWFD' fire detector
- Compatible with Siemens Model 'H'-series devices on the same loop
- Low-temperature warning for sprinkler systems, per NFPA 25
- ®UL 268A Listed for direct air-duct (4,000 FPM) use
- Remote sensitivity-measurement capability
- Tri-color detector-status LED with 360° viewing
- Environmental alternative to ionization detectors
- Polarity insensitive utilizing *SureWire*™ technology
- Responds to both flaming and smoldering-fire signatures
- Compatible with legacy Model DB-11–series mounting bases
- Compatible with Model DPU (device programmer / loop tester)
- Meets ®UL, NFPA 72 requirements for sensitivity self-monitoring
- ®UL 2075 and NFPA 720 CO life-safety compliant
- Automatic environment compensation
- Up to 26 application profiles
- ®UL 268 compliant



- Restriction of Hazardous Substances (RoHS) complaint
- ®UL Listed and ®ULC Listed; FM (#3230, 3210), CSFM (#7272-0067:0258) Approved

Product Overview

The Model FDOOTC441 is an advanced, multi-criteria fire / CO detector that incorporates a redundant, optical / thermal sensor with a carbon monoxide (CO) sensor. Model FDOOTC441 uses a unique forward / backward light-scattering technology that provides high-tech, unparalleled fire detection to the widest range of fire types.

Model FDOOTC441 is programmable as a high-sensitivity detector, and meets the requirements of NFPA 76 Standard (*for the Fire Protection of Telecommunications Facilities*) as a Very Early Warning Fire Detector (VEWFD).

The Model FDOOTC441 detector is a flexible, multi-purpose detector providing a universal solution to meet fire and CO life-safety gas-detection needs. The Multi-Criteria Fire / CO Detector can be field programmed for simultaneous and / or independent functionality, depending on the exact customer / application requirements.

For instance, the detector can utilize the optical, heat and CO sensors together for enhanced fire detection (multi-criteria) and simultaneously provide independent outputs for CO gas life-safety and heat detection. Any combination of the sensors is possible.

S Industry, Inc.
Building Technologies Division

Product Overview — (continued)

Model FDOOTC441 is extremely versatile and meets the following standards:

- Multi-criteria fire detector (®UL 268)
- Carbon Monoxide (CO) Gas detector (®UL 2075)
- Heat detector (®UL 521) with five (5) possible field-selectable temperatures; combined with four (4) rate-of-rise options
- Direct in-duct (plenum) detector (®UL 268A)
- *Supervisory* monitoring for CO levels and temperature ranges
- NFPA 76 (Telco Standard) as VEWFD
- Low-temperature warning signal at 40°F (4.4°C) — for sprinkler systems, per NFPA 25 / NFPA 72

Model FDOOTC441 — which provides extremely accurate and reliable fire detection with built-in redundancy — utilizes advanced, multi-criteria detection technology known as **ASA** (Advanced Signal Analysis) that allows the detector to distinguish non-threatening deceptive phenomena.

For instance, the signals from the detector's sensors are monitored and processed via the **ASA** patented-algorithm technology, which combines the signals into a neural network to create an intelligent, multi-criteria detector.

The encompassing result is a detector that provides enhanced detection to a wide range of products of combustion — while offering unsurpassed rejection to nuisance-alarm sources, such as: dust, steam, aerosols and other deceptive phenomena that could cause false alarms.

Since the multi-criteria, CO detector is a (2) two-wire, addressable device, it is then able to function as a multi-purpose detector — satisfying fire, heat and carbon monoxide (CO) gas detection in a singular, aesthetically pleasing package. Further, Model FDOOTC441 serves as an extremely cost-effective, viable solution that saves product, installation and maintenance costs (compared to other multiple-detector alternatives). Each detector fits into one (1) wall-or-ceiling footprint, and only occupies one (1) address on the signal-line circuit (SLC).

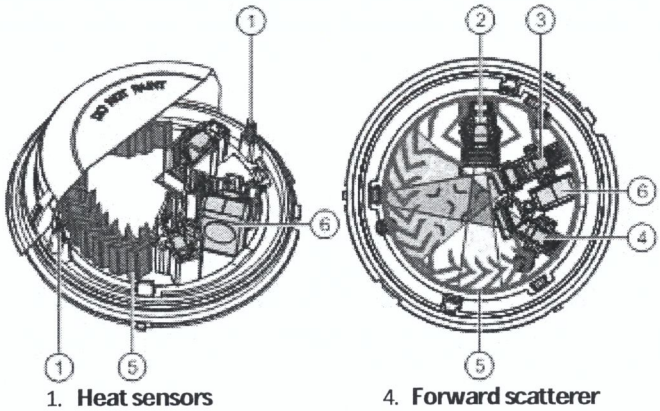
A patented forward-and-backward, light-scattering technology — which is able to distinguish both small and large products of combustion — operates at the core of each Model FDOOTC441 detector.

Additionally, each Model FDOOTC441 provides an environmental-friendly solution to ionization detectors, eliminating the need for a radioactive source and eventual disposal requirements. Thus, each detector is capable of detecting both smoldering and flaming fire — all in ecologically efficient manner — and is a valid, RoHS-compliant (Restriction of Hazardous Substances) detection alternative to ionization detectors.

Two (2) thermal sensors and an electromechanical CO sensor are also included, making each Model FDOOTC441 detector a robust, reliable device suitable for the most challenging applications. Model FDOOTC441 also works as a carbon monoxide (CO) life-safety gas detector, compliant with NFPA 720 and ®UL 2075.

Operation

Forward-and-Backward Light-Scattering Technology (with CO sensor)



1. **Heat sensors**
2. **Receiver**
3. **Backward scatterer**
4. **Forward scatterer**
5. **Labyrinth**
6. **CO sensor**

The high-quality, optical-electronic measuring chamber for each Model FDOOTC441 houses the following components:

- ✓ Two (2) optical transmitters
- ✓ One (1) optical receiver
- ✓ Two (2) thermal sensors
- ✓ One (1) CO sensor

The transmitters illuminate the smoke particles from different angles: one sensor acts as forward scatterer, the other sensor as a backward scatterer. The scattered light then hits the receiver (photodiode) and generates a measurable electric signal. The combination of a forward-and-backward scatterer facilitates optimum detection, as well as differentiates between light-and-dark particles / particle size. This type of detection creates standardized, responsive behavior and optimizes the differentiation between wanted signals and deceptive phenomena. In addition, the heat sensors make it possible to detect fires without smoke generation.

The CO sensor enables faster detection of fires with incomplete combustion, as well as fires with the development of high levels of CO. The combination of optical, thermal and CO sensor signals optimizes detection reliability.

Operation — (continued)

This scenario generates the following advantages:

- ✓ Early detection of all fire types of fire — whether they generate light-or-dark smoke, or no smoke
- ✓ The fire detector can be operated at a lower sensitivity level, thus achieving a higher immunity against false alarms that may otherwise be caused by cold aerosols (e.g. — by smoking, electrical welding, etc.)

In the case of an open fire, the smoke sensitivity is heightened by a temperature increase — a detection-reliability level that is comparable to a wide-spectrum smoke detector — that can be achieved and maintained.

Model DPU

Model FDOOTC441 is compatible with the Device Program / Test Unit accessory, which is used to program and verify the address of the detector. The technician selects the accessory's program mode, and enters the desired address. Model DPU automatically sets and verifies the address and tests the detector.

Model DPU eliminates the need for cumbersome, unreliable mechanical programming methods — such as dials or switches — and reduces installation and service costs by electronically programming and testing the detector prior to installation.

Model DPU operates on AC power or rechargeable batteries, providing flexibility and convenience in programmer and testing equipment from practically any location.

When in 'test' mode, Model DPU will perform a series of diagnostic tests without altering the address or other stored data, allowing technicians to determine if the detector is operating properly.

Field-selectable application profiles

Model FDOOTC441 provides 26 user-friendly, field-selectable application profiles, indentified with universally known names (e.g. — Hotel, Telco, Office, Parking Garage, Dormitory, and Data Center etc.) Refer to installation manual: **P/N — A6V10324657** for a complete list and description of application profiles.

Due to generic-name classification, no cross-reference tables are required as the application name resides in the panel's configuration tool. This user-friendly feature — along with the algorithms provided by **ASA***technology* — provides a reliable, field-configurable detector suitable for an array of applications.

Field-selectable temperature settings

Model FDOOTC441 provides five (5) field-selectable temperature thresholds, ranging from 135°F to 175°F (57°C to 79°C), with fixed and rate-of-rise options. These ranges provide maximum flexibility to program and easily adjust the temperature settings that suit multiple application needs within a building or changing environmental conditions.

Additionally, Model FDOOTC441 can be configured to provide a low-temperature warning signal at 40°F (4.4°C).

Model FDOOTC441 occupies only one (1) address on the SLC and provides a CO cell end-of-life warning and fault condition meeting NFPA 720 and ®UL 2075 requirements.

Model FDOOTC441 — in combination with FireFinder® XLS, as well as the Models FC2025 and FC2050 fire-safety systems from Siemens — provides an ideal NFPA 720-compliant system with separate, distinct signaling for the carbon monoxide (CO) life-safety and fire signals.

This configuration (along with connection to a compatible fire alarm control panel {FACP}) meets NFPA 72 requirements for sprinkler-temperature monitoring, and serves as prevention of water freezing in pipes for water-based suppression systems.

Ambient supervisory feature for temperature and for Carbon Monoxide (CO)

Another highlight for Model FDOOTC441 is supervision of ambient temperatures, allowing the end user to set an unique, specified warning point at a customized temperature threshold ranging from -4°F to 120°F (-20°C to 49 °C). This feature is practical for monitoring of machinery; special processes, or for environments where maintaining a temperature is critical as an early-warning supervisory signal.

Optionally, Model FDOOTC441 also provides supervision of the carbon-monoxide (CO) level selected by the customer. The CO supervision is provided in addition to the normal ®UL 2075 and NFPA 720 alarm levels, and is customizable by the user for special applications. Configurable range is 30 — 600 PPM with a compatible FACP.

CO Detection

In addition to the multi-criteria functionality, the Model FDOOTC441 detector provides an independent carbon monoxide (CO) life-safety signal that meets the requirements of NFPA 720 and ®UL 2075, and meets CO sensitivity limits of ®UL 2034 standard. The detector operates from a reliable electrochemical CO cell, transmitting CO concentration on an independent signal separate from the fire-detection signals to the FACP.

This method is especially useful for any building that uses fossil-burning fuel sources, due to the potential of increased CO intoxication risk. Some application examples include: hotel; heating rooms; car parks; combustion power plants; automotive workshops; chemical labs, or production sites.

Operation — (continued)

Self-monitoring for smoke-sensor sensitivity

Model FDOOTC441 provides an automatic self-monitoring sensitivity check that complies with the NFPA72 sensitivity requirements. When connected with a compatible FACP, it provides automatic and dynamic sensitivity verification within the agency-listed-and-approved limits. Besides checking for sensor integrity and automatic environmental compensation, Model FDOOTC441 provides a display and report of sensitivity in percent-per-foot (or percent-per-meter) at the FACP.

Profile Overview

The Multi-Criteria / CO detector contains a tri-color LED indicator, capable of flashing any one (1) of three (3) distinct colors: Green, Yellow, or Red. During each flash interval, the microprocessor-based detector monitors the following:

- Smoke in its sensing chamber
- Smoke sensitivity is within the range indicated on the nameplate label
- Internal sensors and electronics

Based on the results of the monitoring, the LED indicator flashes the following:

Flash Color	Condition	Flash Interval (in seconds)
Green*:	Normal supervisory operation. Smoke sensitivity is within rated limits.	10
Yellow:	Detector is in trouble and needs replacement.	4
Red:	Alarm condition.	1
No Flash:	Detector is not powered.	— —

* LED can be turned OFF.
Please follow the corresponding description of the panel used.

Installation

All Model FDOOTC441 detectors use a surface-mounting base (Model DB-11 or Model DB-11E), which mounts on a 4-inch octagonal, square or single-gang electrical box. The base utilizes screw-clamp contacts for electrical connections and self-wiping contacts for increased reliability.

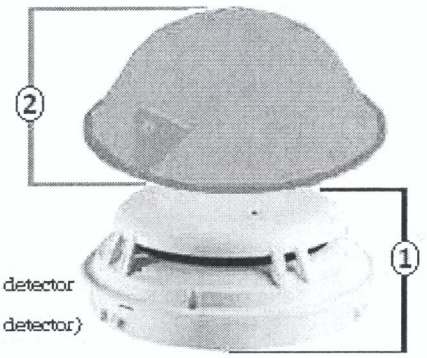
The Model DB-11 base can be used with the optional Model LK-11 detector locking kit, which contains 50 detector locks and an installation tool to prevent unauthorized removal of the detector head. Model DB-11 has decorative plugs to cover the outer mounting screw holes.

Model FDOOTC441 may be installed on the same initiating circuit with the Siemens Model 'H'-series detectors (Models HFP-11 and HFPT-11); Model 'HMS'-series manual stations; Model 'HTRI'-series interfaces; Model HCP output-control devices, or Model 'HZM'-series of addressable, conventional zone modules.

Each detector consists of the following:

- Dust-resistant photoelectric chamber
- Solid state, non-mechanical thermal sensor
- CO sensor
- Microprocessor-based electronics with a low-profile plastic housing

Each Model FDOOTC441 fire detector is shipped with a protective dust cover:



1) Model FDOOTC441 detector
2) Dust cover
(provided with each detector)

All Model FDOOTC441 detectors are approved for operation within the ®UL-specified temperature range of 32° to 120°F (0° to 49°C) — depending on heat-detector configuration (see to installation manual: **P/N A6V10324657**) for details.

Application Data

Installation of the Model FDOOTC441 series of fire detectors requires a two-wire circuit. In many retrofit cases, existing wiring may be used. 'T-tapping' is permitted only for Style 4 (Class B) wiring. Model FDOOTC441 is polarity insensitive, which can greatly reduce installation and debugging time.

Model FDOOTC441 fire detectors can be applied within the maximum 30-feet center spacing (900 sq. ft. areas,) as referenced in NFPA 72. This application guideline is based on ideal conditions — specifically, smooth ceiling surfaces; minimal air movement, and no physical obstructions between potential fire sources and the actual detector. Do not mount detectors in close proximity to ventilation or heating and air conditioning outlets. Exposed joists or beamed ceilings may also affect safe spacing limitations for detectors.

Should questions arise regarding detector placement, observe NFPA 72 guidelines. Good fire-protection system engineering and common sense dictate how and when fire detectors are installed and used. Contact your local Siemens — Fire Safety distributor or sales office whenever you need assistance applying Model FDOOTC441 in unusual applications. Be sure to follow NFPA guidelines and ®UL Listed / ULC Listed installation instructions — included with every Siemens – Fire Safety detector — and local codes as for all fire-protection equipment.

Technical Data

Operating Temperatures: +32°F (0°C) to 120°F (49°C)
depending upon heat-detector configurations (see to installation manual: **P/N A6V10324657***) for details*

Heat-Detector Range: +135°F (57°C) to 175°F (79°C)

Thermal Rating:

Field-Selectable Temperature Profiles

Fixed Temperature, 135°F
Fixed Temperature, 145°F
Fixed Temperature, 155°F
Fixed Temperature, 165°F
Fixed Temperature, 175°F
Fixed Temperature, 135°F + Rate-of-Rise (R-o-R) 15°F
Fixed Temperature, 175°F + Rate-of-Rise (R-o-R) 15°F
Fixed Temperature, 135°F + Rate-of-Rise (R-o-R) 20°F
Fixed Temperature, 175°F + Rate-of-Rise (R-o-R) 20°F

Field-Selectable, Alarm-Threshold Setting Profiles

2.5 % / ft. threshold
3.0 % / ft. threshold
2.5 % / ft. threshold (verified)
3.0 % / ft. threshold (verified)

Detector Sensitivity Range: ®UL: 0.77% to 3.82% / ft.
NFPA 76 (Telco) VEWFD:
0.2% / ft. Pre-*alarm*,
1.0% / ft. *Alarm*

Application Profiles: 26 (field configurable)

Programmable Supervisory Temperature Warning
Available with compatible FACPs:
-4°F (-20°C) to 120°F (49°C)

Programmable Supervisory CO-gas Warning
Available with compatible FACPs:
30 – 600ppm

CO Concentration Response Times:
70±5 PPM in 60 – 240 minutes
150±5 PPM in 10 – 50 minutes
400±10 PPM in 4 – 15 minutes

Note: Meets ®UL 2075 Standard and has been tested to the sensitivity limits defined in ®UL 2034 Standard. Additionally complies with NFPA 720 code.

Relative Humidity: 0-95%; non-condensing

Air Velocity –
(Open Area): 0–4,000 feet-per-minute (fpm)
Direct-in-Duct: 0–4,000 (fpm)

Air Pressure: No effect

Maximum Spacing: 30-foot centers (900 sq. ft.), per NFPA 72 and ULC-S524 Listed

Input Voltage Range: 13VDC – 32VDC

***Alarm* Current:** 650µA, max.

Quiescent (Standby) Current: 320µA – 400µA

Detector Weight: 0.281 lbs. (0.128 kg.)

Approvals / Standards

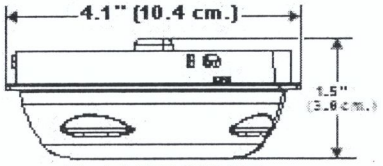
FM	3210, 3220
CSFM	7272-0067:0260
®UL 268	NFPA 25
®UL 268A	NFPA 72
®UL 521	NFPA 76
®UL 2075	NFPA 720

— meets CO sensitivity limits of ®UL 2034 standard
ULC-S524 Listed

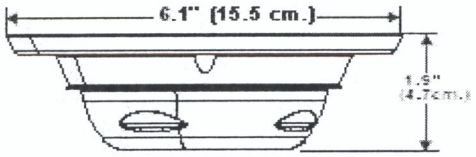
Mechanical Protection Guard:
®UL Listed /ULC Listed
with STI Guard Model STI-9604

Mounting Diagram

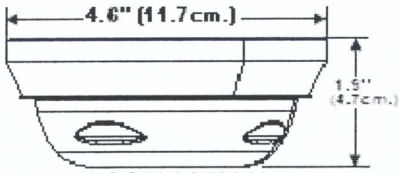
Dimensions



Model FDOOTC441



Model FDOOTC441
with Model DB-11 base



Model FDOOTC441
with Model DB-11E base

Compatible FACPs

Model Number	Data Sheet Number	Description
—	6300	FireFinder XLS (System Overview)
FC2005	6813	50-point addressable panel
FC2025	6815	252-point system (networkable)
FC2050	6815	504-point system (networkable)

Details for Ordering

Model Number	Part Number	Description
FDOOTC441	S54320-F8-A1	Multi-Criteria Fire / CO Detector with **ASA***technology*™
DB2-HR	S54370-F12-A1	Detector Mounting Base with Relay
DB-11	500-094151	Detector Mounting Base for Series 11
DB-11E	500-094151E	Detector Base {small}
RL-HC	500-033230	Remote Alarm Indicator: 4" octagon-box mount, red
RL-HW	500-033310	Remote Alarm Indicator: single-gang box mount, red
LK-11	500-695350	Base Locking Kit for Series 11 Detectors

STI-9604	—	STI Mechanical Protection Guard

See: www.STI-USA.com for further details on ordering Model STI-9604.

Notice: This marketing data sheet is not intended to be used for system design or installation purposes. For the most up-to-date information, refer to each product's installation instructions.

s Industry, Inc.
Building Technologies Division

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URL: www.Siemens.CA

March 2014
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(Rev. 4)

S

Data Sheet
Fire Safety Products

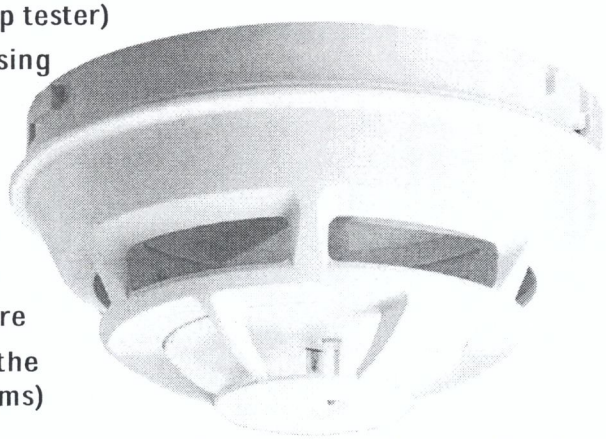
Intelligent Detection Devices

Thermal (Heat) Detector

Model FDT421

ARCHITECT AND ENGINEER SPECIFICATIONS

- Provides seven (7) field-selectable settings in the 135° – 174°F (57.2° – 78.9°C) temperature range
- Tri-color detector-status light-emitting diode (LED) with 360° viewing
- Compatible with Model DPU (device programmer / loop tester)
- Utilizes advanced microprocessor-based signal processing
- Polarity insensitive utilizing *SureWire*™ technology
- Provides a low-temperature warning at 40°F (4.4°C)
- Each detector is self-testing:
  - complete diagnostics performed every 10 seconds
- Compatible with Model DB-11–series mounting bases
- Field programmable as rate-of-rise or fixed temperature
- Compatible with Siemens Model 'H'-series devices on the same loop (with FireFinder® XLS and Desigo fire systems)
- Superior EMI / RFI immunity
- Restriction of Hazardous Substances (RoHS) compliant



- ®UL521 Listed and ®ULC Listed; FM (#3230, 3210), CSFM (#72720067:0258) Approved

Product Overview

The Model FDT421 Intelligent Thermal (Heat) Detector provides an advanced method of detection, address programming and supervision – combined with sophisticated FACP communication. Model FDT421 uses a state-of-the-art thermistor, microprocessor and advanced signal analysis, providing high reliability and accuracy.

Further, Model FDT421 is a cost-effective two-wire / addressable thermal detector that provides a unique, advanced feature: field-selectable temperature settings specially tailored for application-specific detection needs.

Model FDT421 provides seven (7) field-selectable temperature-range settings: 135°F (57°C) – 174°F (79°C) with fixed and rate-of-rise programmability. This variance provides the customer with maximum flexibility to program the temperature settings to suit multiple application needs and changing environmental conditions.

Additionally, Model FDT421 can be configured to provide a low-temperature warning signal at 40°F (4.4°C). With use of a compatible FACP (FireFinder XLS and Desigo Fire Safety panels), this feature serves as prevention of water freezing in pipes for sprinkler systems, and meets NFPA 72 code.

Model DPU

Model FDT421 is compatible with the Siemens field-device programmer / test unit (Model DPU), which is a compact, portable, menu-driven accessory for electronically programming and testing detectors, easily and reliably.

Model DPU eliminates the need for cumbersome, unreliable mechanical programming methods – such as dials or switches – and reduces installation and service costs by electronically programming and testing the detector prior to installation. Each detector consists of a solid state, non-mechanical thermal sensor, and microprocessor-based electronics with a low-profile plastic housing.

Model FDT421 is ®Underwriters' Laboratories (®UL521) Listed as a thermal (heat) detector.

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Building Technologies Division

Product Overview — (continued)

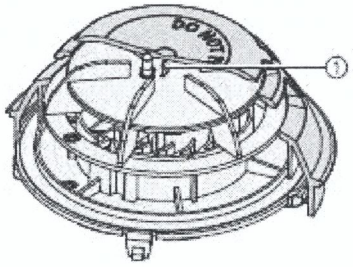
Each Model FDT421 detector base also contains a provision for an optional, concealed locking mechanism to prevent unauthorized removal of the detector head (Model LK-11.)

For proper operation of Model DPU, the technician selects the accessory's program mode, and enters the desired address. In turn, Model DPU automatically sets and verifies the address, as well as tests the detector. When in the 'test' mode, Model DPU will perform a series of diagnostic tests without altering the address or other stored data, allowing techs to determine if the detector is operating properly.

Model DPU operates on AC power or rechargeable batteries, providing flexibility and convenience in programming and testing equipment from practically any location.

Operation

Model FDT421 also utilizes a modern, accurate and shock-resistant thermistor to sense temperature changes:



1 Thermister

Each Model FDT421 detector provides seven (7) pre-programmed, FACP-selectable parameter sets.

Detector Supervision and Testing

Model FDT421, which is listed as a self-testing device, contains a tri-color light emitting diode (LED) indicator, capable of flashing any one (1) of three (3) distinct colors: Green, Yellow, or Red. During each flash interval, the microprocessor-based detector monitors the following:

- Temperatures reaching programmed thresholds
- Internal sensors and electronics are functional

Based on the monitoring results, the LED indicator flashes the following colors based on the following conditions:

Flash Color	Condition	Flash Interval (in seconds)
Green*:	Normal supervisory operation. Temperature has not reached programmed alarm thresholds or set points.	10
Yellow:	Detector is in trouble and needs replacement.	4
Red:	*Alarm* condition.	1
No Flash:	Detector is not powered.	—

* LED can be turned OFF.
Please follow the corresponding description of the panel used.

A quick visual inspection is sufficient to indicate the condition of the detector at any time. If more detailed information is required, a printed report can be provided from the Model FC20-series FACPs indicating the status and settings assigned to each individual detector.

Installation

All Model FDT421 detectors use a surface-mounting base, Model DB-11 or Model DB-11E, which mounts on a 4-inch octagonal, square or single-gang electrical box. The base utilizes screw-clamp contacts for electrical connections and self-wiping contacts for increased reliability.

The Model DB-11 base can be used with the optional Model LK-11 detector locking kit, which contains 50 detector locks and an installation tool to prevent unauthorized removal of the detector head. Model DB-11 has decorative plugs to cover the outer mounting screw holes.

Model FDT421 may be installed on the same initiating circuit with the following Siemens Model 'H'-series detectors [when used with FireFinder XLS and Desigo Fire Safety panels] —

- Model HFP-11
- Model 'HMS'-series manual stations
- Model 'HTRI'-series interfaces
- Model HCP output-control devices
- Model 'HZM'-series of addressable, conventional zone modules

Application Data

Installation of Model FDT421 detectors requires a (2) two-wire circuit. In many retrofit cases, existing wiring may be used. 'T-tapping' is permitted only for Style 4 (Class B) wiring. Model FDT421 is polarity insensitive, which allows a substantial reduction in installation and debugging time.

Model FDT421 can be applied within the maximum 50-feet center spacing (2,500 sq. ft. areas), per ®UL. This application guideline is based on ideal conditions — specifically, smooth ceiling surfaces, minimal air movement, and no physical obstructions between potential fire sources and the actual detector. Do not mount detectors in close proximity to ventilation or heating and air conditioning outlets. Exposed joints or beamed ceilings may also affect safe spacing limitations for detectors.

Should questions arise regarding detector placement, observe NFPA 72 guidelines. Good fire-protection system engineering and common sense dictate how and when fire detectors are installed and used. Contact your local Siemens — Fire Safety distributor or sales office whenever you need assistance applying Model FDT421 in unusual applications. Be sure to follow NFPA guidelines and ®UL Listed /®ULC Listed installation instructions — included with every Siemens – Fire Safety detector — and local codes as for all fire protection equipment.

Specifications

Model FDT421 is a plug-in, (2) two-wire thermal (heat) detector, compatible with FireFinder XLS and Desigo Fire Safety panels. Each Model FDT421 detector has microcomputer-chip technology and highly stable, solid-state electronic circuitry.

The Model FDT421 detector utilizes a modern, accurate and shock-resistant thermistor to sense temperature changes.

This electronic-sensing method virtually eliminates thermal lag associated with mechanical temperature-sensing devices, and provides almost instantaneous temperature status to the FACP.

Model FDT421 provides seven (7) field-selectable, pre-programmed temperature settings:

- Fixed 135°F (57°C)
- Fixed 145°F (63°C)
- Fixed 155°F (68°C)
- Fixed 165°F (74°C)
- Fixed 174°F (79°C)
- Rate-of-Rise: 15°F / min. (8.3°C) at fixed 135°F (57°C)
- Rate-of-Rise: 15°F / min. (8.3°C) at fixed 174°F (79°C)

Additionally, the Model FDT421 detector has the following *optional* feature:

- Model FDT421 provides indication of potential freezing for sprinkler systems, via a configuration for reporting a low-temperature warning of 40°F (4.4°C).

  This feature is compatible with Models FC2025, FC2050 and FireFinder XLS.

Technical Data

Operating Temperature Range: +32°F (0°C) to 100°F (38°C) [with 135°F (57°C) alarm-threshold setting]

Relative Humidity: 0-95%; non-condensing

Air Pressure: No effect

Input Voltage Range: 16VDC – 30VDC

***Alarm* Current (max.):** 410µA

Standby Current (max.): 250µA, max. (Average)

Maximum Spacing: 50-foot centers (2,500 sq. ft.), per NFPA 72 and ULC-S524

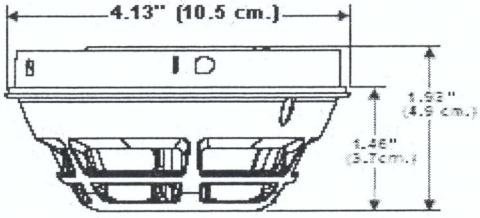
Thermal Rating:
Model FDT421 provides up to seven (7) field-selectable, pre-programmed temperature settings:

- Fixed 135°F (57°C)
- Fixed 145°F (63°C)
- Fixed 155°F (68°C)
- Fixed 165°F (74°C)
- Fixed 174°F (79°C)
- Rate-of-Rise: 15°F / min. (8.3°C / min) at fixed 135°F (57°C)
- Rate-of-Rise: 15°F / min. (8.3°C / min) at fixed 174°F (79°C)

Detector Weight:
0.32 Lbs.
(0.144 Kg.)

Mounting Diagram

Dimensions



Compatible FACPs

Model	Data Sheet Number	Description
—	6300	FireFinder XLS
FC2005	6813	50-point addressable FACP
FC2025	6815	252-point addressable FACP
FC2050	6815	504-point addressable FACP

Details for Ordering

Model	Part Number	Description
FDT421	S54320-F5-A1	Thermal (Heat) Detector
DB-11	500-094151	Detector Mounting Base
DB-11E	500-094151E	Detector Base {small}
DB2-HR	S54320-F12-A1	Relay Base
RL-HC	500-033230	Remote Alarm Indicator: 4" octagon-box mount, red
RL-HW	500-033310	Remote Alarm Indicator: Single-gang box mount, red
LK-11	500-695350	Base Locking Kit

STI-9604	—	STI Mechanical Protection Guard

See: www.STI-USA.com for further details on ordering Model STI-9604.

In Canada, order:

Model	Part Number	Description
DB-11C	500-095687	Detector Mounting Base for Series 11 Detectors (℔ULC Listed)

Notice: This marketing data sheet is not intended to be used for system design or installation purposes. For the most up-to-date information, refer to each product's installation instructions.

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Building Technologies Division

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URL: www.Siemens.CA

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Supersedes sheet dated 11/13
(Rev. 4)

S

Data Sheet
Fire Safety Products

Specialized Devices

Air-Duct Housings —> FDBZ Series

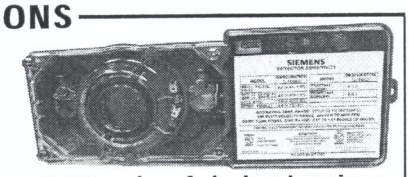
Models FDBZ492, FDBZ492-HR, FDBZ492-R and FDBZ492-RP (with FDBZ-WT and FDBZ492-RTL)

ARCHITECT AND ENGINEER SPECIFICATIONS

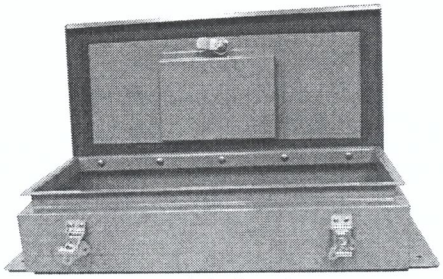
- Four (4) models available
  - Addressable and conventional (with and without relays)
- Compatible with Siemens – Fire Safety conventional and addressable fire-alarm control panels (FACPs)
- Magnet test feature with the Model OP121 conventional detector
- Design for air-velocity range of 100 to 4,000 feet-per-minute (fpm)
- Robust, compatible conventional remote indicator test switch that incorporates tri-color light-emitting diode (LED)
- Clear housing cover with smoke test port on cover for quick identification of detector type
  - Removable with four (4) captive-thumb screws (no tools required)
  - Includes a smoke / aerosol detector test port
- Optional NEMA 4X-reinforced, stainless-steel and watertight enclosure available, Model FDBZ-WT
- No tools required for cover removal, sampling and exhaust-tube installations
- *Trouble*-event activation upon front-cover removal
- *Alarm* LED visible from front



Remote alarm indicator
(Model FDBZ492-RTL)



FDBZ-series of air-duct housings
(FDBZ492, FDBZ492-HR, FDBZ492-R and FDBZ492-RP)



Watertight housing
(Model FDBZ-WT)

- Self-contained model available with 'on-board' power supply for conventional detectors
- Expanded temperature range
- Relay models available
- ®UL268A Listed, ®ULC-S529 Listed; FM (#3010), CSFM (#3240-0067:0265) Approved

Product Overview

The Siemens — Fire Safety Model 'FDBZ'-series of air-duct-detector housings are designed to be used with the Siemens Model 'H'-series, 'FD'-series and the Model OP121 detectors. Designed for installation directly to heating, ventilating and air-conditioning (HVAC) duct systems, the Model 'FDBZ'-series complies with National Fire Protection Association Standard (NFPA) No.'s 72 and 90A, and is Underwriters' Laboratories Listed.

When equipped, the air-duct detector housing will signal the presence of smoke being carried through the duct system. Air-duct detectors are not intended to be substituted for open-area detection.

Notes: Most conventional time-control equipment guarantee only one (1) detector per zone when the detector's operated relay function is critical. The connection of a remote lamp and a remote relay – per detector – is allowed. Refer to the installation manual for the respective conventional fire system.

Notes – (cont.'d): With either the Desigo® series or FireFinder® XLS series of FACPs, up to 252-addressable detectors with relays per circuit may be used. The connection of an intelligent remote lamp (ILED) and a remote relay is allowed for each detector simultaneously.

Specifications

The Model 'FDBZ'-series of air-duct housings are uniquely designed to use with the photoelectric detector. Sensitivity of Models PE-11, PE-11C and OP121 detectors can be verified for calibration via LED visual status or a Model RSAW-11, Model RSAC-11 or Model FDBZ492-RTL multi-color remote lamp. A green flash indicates the detector has passed its self test. Amber indicates a *Trouble* condition, and red indicates an *Alarm* event.

Sensitivity range for Models HFP-11, FP-11, SFP-11, HFPO-11, SFPO-11, FDO421, FDOOT441 and FDOOTC441is verified from the multi-color LED of the respective detector, or its sensitivity reading may be printed by command from the corresponding FACP to an optional printer.

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Specifications — (continued)

The remote alarm indicator (Model FDBZ492-RTL) allows for manual testing via a key-switch for conventional and addressable detectors, as well as the conventional and addressable air-duct housing with relay. Model FDBZ492-RTL, which mounts remotely from the conventional and addressable air-duct housing, allows for manual relay-output control. The duct-detector remote indicator key-switch also indicates the current state of the detector.

The watertight housing (Model FDBZ-WT), which allows the air-duct detector housing to be installed inside the separate NEMA 4X enclosure, is for installations for either an outdoor area or in environments where excessive moisture is prevalent.

Each detector unit employs a cross-sectional sampling principle of operation. Inlet sampling tubes are available in four (4) lengths (see: **Sampling Tube Selection Table**). Outlet sampling tubes are one (1) common length and draw. A continuous, cross-sectional sample of air moves through the duct. Stratification or skin affect phenomenon that occurs in the duct can prevent smoke (especially in large ducts) from reaching a spot-type detector.

In addition, the unique design of the sampling chamber insures uniform sensitivity in air velocities, ranging from a low of 100 fpm to as high as 4,000 fpm. Each housing comes with three (3) wiring entry ports:

- Two (2) 3/4" conduit knockouts
- One (1) 1/2" conduit opening

The inlet sampling tube length is determined by the width of the air duct being protected. The inlet tube — greater than and nearest to the duct width — should be used (see: **Sampling Tube Selection Table**). The inlet tube can then be trimmed at the job site to the exact width of the duct. The outlet sampling tube for all ducts — irrespective of width — has a fixed length of approximately 5.5 inches (14cm.), and is supplied with the air-duct housing.

Note: When the use of a remote relay is required, order Model FDBZ492-R for conventional systems; Model FDBZ492-HR for addressable systems. When required, a separate watertight enclosure (Model FDBZ-WT), which is designed to contain the air-duct housings is available.

(For full details, refer to installation instructions for the respective air-duct housing.)

Note: When a self-contained duct detector with power supply is required, order Model FDBZ492-RP.

(For full details, refer to installation instructions part number A6V10330327.)

Sampling Tube Selection Table

Duct Width	Sampling Tube (Model No.)
For duct widths 6" to 1'	ST-10
For duct widths 1' to 3'	ST-25
For duct widths 3' to 5' (requires support)	ST-50
For duct widths 5' to 10' (requires support)	ST-100

Maintenance of the detector is easily accomplished via the removal of the duct-housing sampling chamber cover. The detector, which plugs into the housing, is easily removed for cleaning or replacing by a trained technician.

All that is necessary for installation of the air-duct detector is the cutting of three (3) small holes for the Sampling Tube installation (template included), and the drilling of two (2) holes for mounting the air-duct housing. The unit is then easily mounted in place, and connection made to the existing wires or terminals — if optional accessories are utilized. No mechanical tools are required for removing the cover or connecting the sampling and exhaust tubes to an air-duct housing.

Models ST-50 and ST-100 require support. However, Model ST-100 is shipped in two (2) 5-ft. (152 cm.) pieces with a coupling for field assembly.

Technical Data

Operating Temperature Ranges: +32°F (0°C) to 120°F (49°C)

Sampling Tube Pressure Range of Differences: > 0.01 inches; < 1.2 inches of water column

Relative Humidity: 0 – 95%; non-condensing

Air Pressure / Altitude Range: No effect / No limitations

Air-Duct Velocity: 100 – 4,000 ft. / min (0.51— 20m / sec)

Dimensions: {H-x-W-x-D}

- Rectangular: 14.38"-x-5"-x-2.5" (37 cm.-x-12.7 cm.-x-6.36 cm.)
- Square: 7.75"-x-9"-x-2.5" (19.7 cm.-x-22.9 cm.-x-6.36 cm.)

Detector Weight: 1.8 Lbs. (0.82 Kg.)

Notes to Architect: When building codes regulate the location of detectors within ventilating systems, make sure the number and locations of detectors are in accordance with the code regulations.

For additional electrical specifications, please see the installation instructions of the corresponding air-duct housing.

Operation

Based on the monitoring results, the LED indicator flashes the following colors based on the following conditions:

Flash Color	Condition	Flash Interval (in seconds)
Green*:	Normal supervisory operation. Smoke sensitivity is within rated limits.	10
Yellow:	Detector is in *Trouble* condition, and needs either repair or replacement.	4
Red:	*Alarm* condition.	1
No Flash:	Detector is not powered.	— —

* LED can be turned OFF.
Please follow the corresponding description of the panel used.

Products included with the air-duct housing:

- (1) short-return (outlet) tube
- (1) stopper
- (2) #12 + 3/4" sheet-metal screws
- (1) mounting template

Note: Detector and sampling tube to be purchased separately. Minimum hardware required is: one (1) air-duct housing assembly; one (1) sampling tube and one (1) detector.

Details for Ordering

Model	Part Number	Description
FDBZ492	S54319-B22-A1	A two-wire addressable or conventional duct detector (without relays) designed for direct use on heating, ventilating and air-conditioning (HVAC) air-duct systems. When equipped, the air-duct detector housing will signal the presence of smoke being carried through the duct system. For use with the following Models: – HFP-11 – FDO421 – OP121 – SFP-11 – FDOOT441 – PE-11 – HFPO-11 – FDOOTC441 – PE-11C – SFPO-11 – FP-11
FDBZ492-HR	S54319-B23-A1	A two-wire addressable duct detector (with relays) designed for direct use to HVAC air-duct systems and works with the Remote Test Switch (FDBZ492-RTL). This part has a programmable relay base, and when equipped, the addressable air-duct detector housing will signal the presence of smoke being carried through the duct system. For use with the following Models: – FDO421 – FP-11 – SFP-11 – FDOOT441 – HFP-11 – SFPO-11 – FDOOTC441 – HFPO-11

Details for Ordering – (continued)

Model	Part Number	Description
FDBZ492-R	S54319-B24-A1	A two-wire conventional duct detector with relays designed for direct use on HVAC air-duct systems. This detector has a relay base, and when equipped with conventional air-duct housing, will signal the presence of smoke being carried through the duct system. For use with the following Models: – OP121 – PE-11 – PE-11C
FDBZ492-RP	S54319-B25-A1	A four-wire conventional duct detector with relays and a built-in power supply. Housing is designed for direct use to HVAC air-duct systems. It has a relay base with a built-in power source. When equipped with conventional air-duct housing, this duct detector will signal the presence of smoke being carried through the duct system. For use with the following Models: – OP121 – PE-11 – PE-11C
FDBZ492-RTL	S54319-S27-A1	Device is used for manual testing via a key-switch for duct-housing Models FDBZ492-R, FDBZ492-RP and FDBZ492-HR. Device mounts remotely from the conventional and addressable air-duct housing, allowing for manual relay-output control. The duct-detector remote key-switch also indicates the current state of the detector. For use with the following Models: – FDBZ492-R – FDBZ492-RP – FDBZ492-HR
FDBZ-WT	S54319-B26-A1	An optional, separate watertight NEMA 4X enclosure (Model FDBZ-WT) that provides added watertight protection for any of the Model FDBZ492-series duct housings. The duct housing fits into the separate 4X enclosure. This part allows the air-duct detector housing to be installed in the separate enclosure, and can be used in either an outdoor area or in environments where excessive moisture is prevalent. For use with the following Models: – FDBZ492 – FDBZ492-R – FDBZ492-HR – FDBZ492-RP
ST-10	500-649710	Sampling tube for Ducts 6" to 1'
ST-25	500-649711	Sampling tube for Ducts over 1' to 3'
ST-50	500-649712	Sampling tube for Ducts 3" to 5'
ST-100	500-649713	Sampling tube for Ducts 5' to 10'

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Notice: This marketing data sheet is not intended to be used for system design or installation purposes. For the most up-to-date information, refer to each product's installation instructions.

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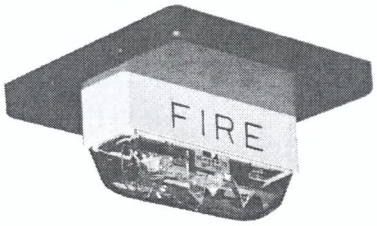
Fire Safety
8 Fernwood Road
Florham Park, NJ 07932
Tel: (973) 593-2600
FAX: (908) 547-6877
URL: www.usa.Siemens.com/Fire

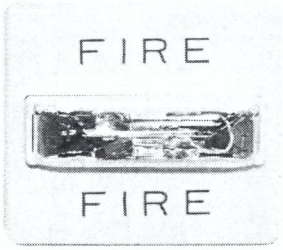
Fire Safety
1577 North Service Road
East Oakville, Ontario
L6H 0H6 / Canada
Tel: [905] 465-8000
URL: www.Siemens.CA

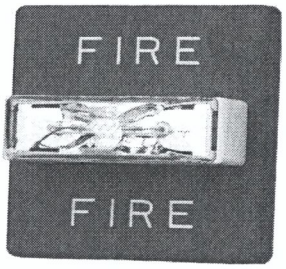
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Wheelock RSS and RSSP Strobes and Strobe Plates







Description

The Wheelock patented RSS Strobe appliances and RSSP Strobe Plates by Eaton have lower current draw while maintaining outstanding performance, reliability and cost effectiveness. These versatile appliances will satisfy virtually all requirements for indoor, wall or ceiling mount applications.

Strobe options include the Wheelock Patented MCW multi-candela strobe with field selectable candela settings of 15/30/75/110cd or the high intensity MCWH strobe with field selectable 135/185cd. Ceiling mount models include the patented MCC multi-candela ceiling strobe with field selectable intensities of 15/30/75/95cd or the high intensity MCCH strobe with field selectable 115/177cd.

All models may be synchronized using the Wheelock DSM Sync Modules, Wheelock Power Supplies or other manufacturers panels incorporating the Wheelock Patented Sync Protocol. Synchronized strobes can eliminate possible restrictions on the number of strobes in the field of view. Wheelock's synchronized strobes offer an easy way to comply with ADA recommendations concerning photosensitive epilepsy as well as meeting the requirements of NFPA 72.

The Wheelock Series RSS Strobes employ a Patented Integral Strobe Mounting Plate that can be mounted to a single gang, double gang, 4" square, 100mm European backboxes or the SHBB surface backbox. If the flush backbox has side or top space between it and the finished wall, the NATP (Notification Appliance Trimplate) may be used. It provides an additional .65" of trim for the Appliance. An attractive cover plate is provided for a clean, finished appearance on all models.

The RSSP Multi-Candela Strobe Plates are a cost effective way to retrofit required wall strobe appliances to bells, horns, chimes, multitones or speakers and easily mounts to standard 4" backboxes or for surface mount use with the Wheelock SBL2 surface backbox.

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Features

- Approvals include: UL Standard 1971, New York City (MEA), California State Fire Marshal (CSFM), Factory Mutual (FM),and Chicago (BFP) See approvals by model in Specifications and Ordering information
- ADA/NFPA/UFC/ANSI compliant. Meets OSHA 29 Part 1910.16
- Wall mount Multi-Candela models are available with Field Selectable Candela Settings of 15/30/ 75/110cd or 135/185cd.
- Wall mount Multi-Candela models are available with Field Selectable Candela Settings of 15/30/75/110cd or 135/185cd.
- Strobes produce 1 flash per second over the regulated voltage range
- 12 and 24 VDC models with wide UL "Regulated Voltage" using filtered (DC) or unfiltered VRMS input voltage
- Synchronize using the Wheelock sync modules or panels with built-in Wheelock Patented Sync Protocol
- Fast installation with IN/OUT screw terminals using #12 to #18 AWG wire

Note: All CAUTIONS and WARNINGS are identified by the symbol ⚠. All warnings are printed in bold capital letters.

⚠ WARNING

PLEASE READ THESE SPECIFICATIONS AND ASSOCIATED INSTALLATION INSTRUCTIONS CAREFULLY BEFORE USING, SPECIFYING OR APPLYING THIS PRODUCT. VISIT WWW.EATON.COM/MASSNOTIFICATION OR CONTACT EATON FOR THE CURRENT INSTALLATION INSTRUCTIONS. FAILURE TO COMPLY WITH ANY OF THESE INSTRUCTIONS, CAUTIONS OR WARNINGS COULD RESULT IN IMPROPER APPLICATION, INSTALLATION AND/OR OPERATION OF THESE PRODUCTS IN AN EMERGENCY SITUATION, WHICH COULD RESULT IN PROPERTY DAMAGE, AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.

Audibles/Speakers for RSSP

Product	Series
Multitone Appliances	AMT, MT
Horns	AH, NH, HS
Motor Bells	MB-G6/G10
Speakers	ET-1010/1080, E70, ET70
Chimes	CH70

Drawings

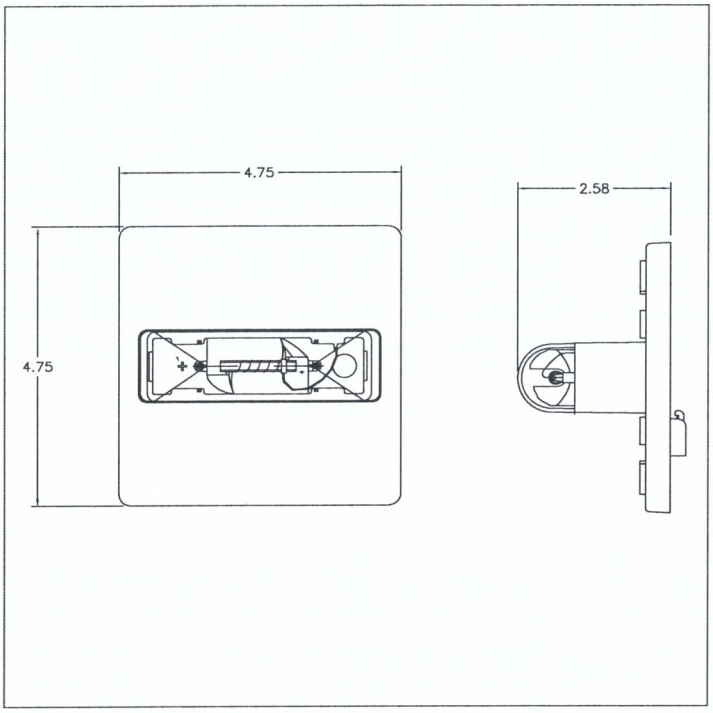


Figure 1. RSS wall strobe - Front & Side Views

General Notes

- Strobes are designed to flash at 1 flash per second minimum over their "Regulated Voltage Range." Note that NFPA-72 specifies a flash rate of 1 to 2 flashes per second and ADA Guidelines specify a flash rate of 1 to 3 flashes per second.
- All candela ratings represent minimum effective Strobe intensity based on UL 1971.

Table 1. Maximum RMS Current

		UL/ULC MAX CURRENT [a]									
RSS/RSSP Strobes		24VDC									
Model	Regulated Voltage Range VDC	1575	15cd	30cd	75cd	95cd	110cd	115cd	135cd	177cd	185cd
121575W	16.0-33.0	0.255									
24MCW	16.0-33.0		0.060	0.092	0.165		0.220				
24MCWH	16.0-33.0								0.300		0.420
24MCC	16.0-33.0		0.065	0.105	0.189	0.249					
24MCCH	16.0-33.0							0.300		0.420	

Table 2. Specification & Ordering Information

										Agency Approvals				
Model	Order #	Strobe Candela	Red	White	Wall	Ceiling	Non-Sync	Mounting Options [b]	Square or Round	UL	MEA	CSFM	FM	BFP
RSS-24MCW-FR	9400	15/30/75/110	X		X		X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	X
RSS-24MCW-FW	9401	15/30/75/110		X	X		X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	X
RSS-24MCW-AR	9773	15/30/75/110		X	X		X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	X
RSS-121575W-FR	7476	15 (75 on Axis)	X		X		X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	X
RSS-121575W-FW	7468	15 (75 on Axis)		X	X		X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	X
RSS-24MCC-FW	3158	15/30/75/95		X		X	X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	
RSS-24MCC-FR	3157	15/30/75/95	X			X	X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	
RSS-24MCCH-FW	3461	115/177		X		X	X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	
RSS-24MCWH-FR	3465	135/185	X		X		X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	
RSS-24MCWH-FW	3464	135/185		X	X		X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	
RSSWP-2475W-FR	9013	180@ 77F 75@-31F	X		X		X	B,D,E,F,G,H,J,NO,R,X	square	X	X	X	X	
RSSWP-2475W-FW	3034	180@ 77 F 75@-31 F		X	X		X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X	X	
RSSP-121575W-FR	7798	15 (75 on Axis)	X		X		X	D,E,Z	square	X		X	X	X
RSSP-24MCW-FR	9402	15/30/75/110	X		X		X	D,E,Z	square	X	X	X	X	X
RSSP-24MCWH-FR	9482	135/185	X		X		X	B,D,E,F,G,H,J,N,O,R,X	square	X	X	X		

Table 3. Specifications

Physical	
Material	Red or white textured UV stabilized, colored impregnated engineered plastic. Exceeds 94V-0 UL flammability rating.
Weight	RSS Strobe: 0.40 lbs (0.181 kg)
Lens	GE Lexan 943A
Dimensions	RSS Strobe: 4.75" W x 4.75" H x 2.58"D
Operating Temperature	Indoor: 33.8°F to 120.2°F (0°C to 49°C) and maximum humidity of 93%
Wire Connections	#12 through #18 AWG
Power & General	
Operating voltage	25/70 VRMS
Strobe Output Rating	UL 1971
Strobe Flash Rate	Strobes are designed to flash at 1 flash per second
Synchronization Models	Strobes can be synchronized with Wheelock's DSM Sync Modules, Power Supplies or SAFEPATH products, using Wheelock patented sync protocol

[a] RMS current ratings are per UL maximum RMS method. UL max current rating is the maximum RMS current within the listed voltage range (16-33v for 24v units). For strobes the UL max current is usually at the minimum listed voltage (16v for 24v units). For audibles the max current is usually at the maximum listed voltage (33v for 24v units). For unfiltered FWR ratings, see installation instructions.

[b] For information on mounting options, refer to specification sheet TD450028EN.

Architects and Engineers Specifications

The visual notification appliances shall be Wheelock RSS Strobe appliances or approved equals. The Series RSS shall meet and be listed for UL Standard 1971 (Emergency Devices for the Hearing-Impaired) for Indoor Fire Protection Service. The strobe shall be listed for indoor use and shall meet the requirements of FCC Part 15 Class B. The strobe appliances shall produce a flash rate of one (1) flash per second over the Regulated Voltage Range and shall incorporate a Xenon flashtube enclosed in a rugged Lexan® lens. All inputs shall be compatible with standard reverse polarity supervision of circuit wiring by a Fire Alarm Control Panel (FACP). When Strobe Plates are to be installed, they shall be the Wheelock Series RSSP Strobe Plate and shall have the same electronic circuitry as the Wheelock Series RSS.

The RSS Strobe shall be of low current design. Where Multi-Candela appliances are specified, the strobe intensity shall have field selectable settings and shall be rated per UL Standard 1971 at 15/30/75/110cd or 135/185cd for wall mount and 15/30/75/95cd or 115/177cd for ceiling mount. The selector switch for selecting the candela shall be tamper resistant.

When synchronization is required, the appliance shall be compatible with Wheelock's DSM Sync Modules, Wheelock Power Supplies or other manufacturers panels with built-in Wheelock Patented Sync Protocol. The strobes shall not drift out of synchronization at any-time during operation. If the sync module or Power Supply fails to operate, (i.e., contacts remain closed), the strobe shall revert to a non-synchronized flash rate. The strobes shall be designed for indoor surface of flush mounting.

The RSS Strobe appliances shall incorporate a Patented, Integral Strobe Mounting Plate that shall allow mounting to single gang, double-gang, 4-inch square, 100mm European type backboxes, or the SHBB Surface Backbox. If required, an NATP (Notification Appliance Trimplate) shall be provided. An attaching cover plate shall be provided to give the Appliance and attractive appearance. The Appliance shall not have any mounting holes or screw heads visible when the installation is completed.

The RSSP Multi-Candela or single candela Strobe Plate shall mount to either a standard 4 inch square backbox for flush mounting, or the Wheelock SBL2 backbox for surface mounting.

All notification appliances shall be backward compatible.

UL, MEA, CSFM, BFP, FM

Note: Due to continuous development of our products, specifications and offerings are subject to change without notice in accordance with Wheelock Inc., dba Eaton standard terms and conditions.

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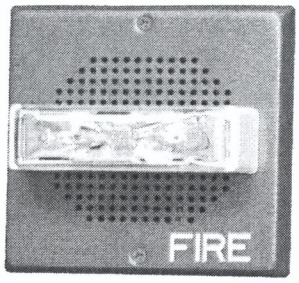
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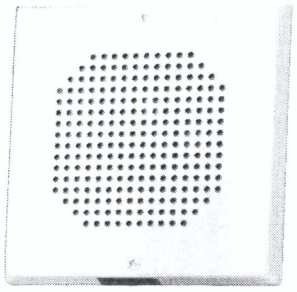
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Wheelock ET speakers and speaker strobes







Description

The Wheelock high performance ET Speakers and Speaker Strobes provide high audio output, clear audibility, dual voltage (25/70 VRMS) capability and field selectable taps from 1/8 to 8 watts. They are designed to meet the critical needs of the life safety industry for effective emergency voice communications, tone signaling and visible signaling to alert the hearing impaired.

The low profile design incorporates a speaker mounting plate for faster and easier installation. Each model has a built-in level adjustment feature and an aesthetic two (2) screw grille cover.

The ET Speaker Strobe models incorporate Low Current draw Series RSS Strobes.

Strobe options for wall mount models include 1575 cd or Wheelock's patented MCW multi-candela strobe with field selectable candela settings of 15/30/75/110cd or the high intensity MCWH strobe with field selectable 135/185cd.

Ceiling mount models are available in Wheelock's patented MCC multi-candela ceiling strobe with field selectable intensities of 15/30/75/95cd or the high intensity MCCH strobe with field selectable 115/177cd.

The strobe portion of all ET Strobes may be synchronized when using the Wheelock DSM Sync Modules, Wheelock Power Supplies or other manufacturers panels incorporating the Wheelock Patented Sync Protocol. Wheelock synchronized strobes offer an easy way to comply with ADA recommendations concerning photosensitive epilepsy.

ET70 and ET90 Speaker Strobes are UL Listed for indoor use under Standard 1971 (Signaling Devices for the Hearing Impaired) and Standard 1480 (Speaker Appliances), and use a Xenon flashtube with solid state circuitry enclosed in a rugged Lexan® lens to provide maximum reliability for effective visual signaling. All inputs are supervised and employ IN/OUT wiring terminals for fast installation using #12 to #18 AWG wiring.

Color options for Series ET speakers and speaker strobes are red or white.

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Features

- Approvals include: UL Standard 1971, UL Standard 1480, New York City (MEA), California State Fire Marshall (CSFM), Factory Mutual (FM), and Chicago (BFP) See approvals by model in Specifications and Ordering Information
- ADA/NFPA/UFC/ANSI compliant
- Meets OSHA 29 Part 1910.165
- Wall mount models are available with Field Selectable Candela Settings of 15/30/75/110cd or 135/185cd (Multi-Candela models) or 1575cd (Single Candela model)
- Ceiling mount models are available with field selectable candela settings of 15/30/75/95cd or 115/177cd (multi-candela models)
- Strobes produce 1 flash per second over the regulated voltage range
- 24 VDC with wide UL "Regulated Voltage" using filtered DC or unfiltered VRMS input voltage
- Synchronize with sync modules or panels with built-in Wheelock Patented Sync Protocol
- Field selectable taps for 25 or 70 VRMS operation from 1/8 watt to 8 watts
- High efficiency design for maximum output at minimum wattage across a frequency range of 400 to 4000 HZ
- Fast installation with IN/OUT screw terminals using #12 to #18 AWG wires

Note: All CAUTIONS and WARNINGS are identified by the symbol ⚠. All warnings are printed in bold capital letters.

⚠ WARNING

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Drawings

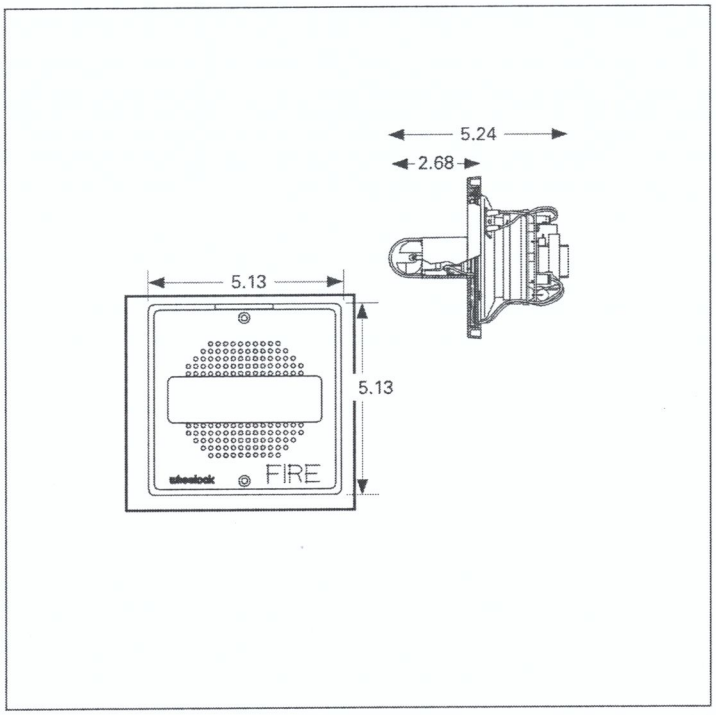


Figure 1. ET80 Speaker - Front & Side Views

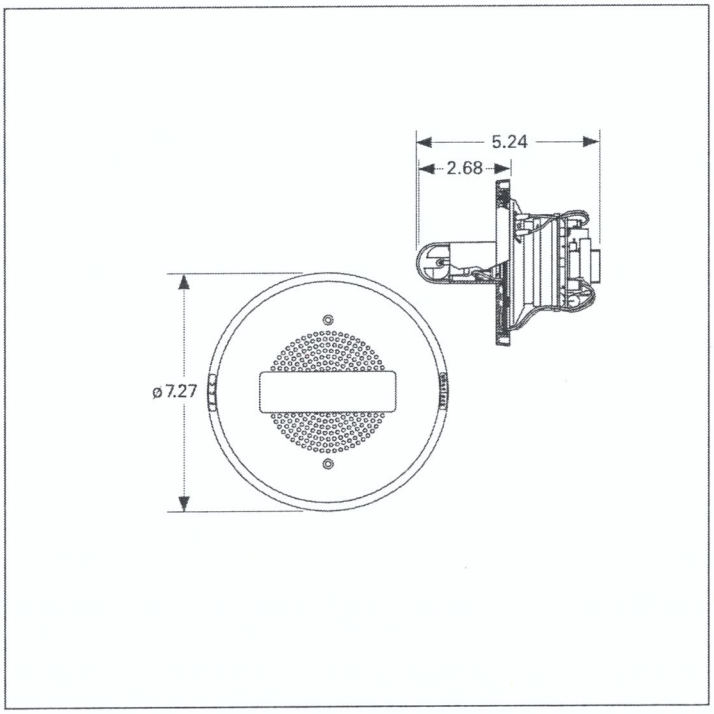


Figure 2. ET-1010 Speaker Strobe - Front & Side Views

General Notes

- Strobes are designed to flash at 1 flash per second minimum over their "Regulated Voltage Range." Note that NFPA-72 specifies a flash rate of 1 to 2 flashes per second and ADA Guidelines specify a flash rate of 1 to 3 flashes per second.
- All candela ratings represent minimum effective Strobe intensity based on UL 1971.

Table 1. UL max current [a]

ET70/ET90 Speaker strobes	ET70 Strobe current - wall mount							ET90 Strobe current - ceiling mount					
	241575W	24MCW				24MCWH		24MCC				24MCCH	
	1575cd	15cd	30cd	75cd	110cd	135cd	185cd	15cd	30cd	75cd	95cd	115cd	177cd
16-33 VDC	0.090	0.060	0.092	0.165	0.220	0.300	0.420	0.065	0.105	0.189	0.249	0.300	0.420

[a] UL max current rating is the maximum RMS current within the listed voltage range (16-33v for 24v units). For strobes the UL max current is usually at the minimum listed voltage (16v for 24v units). For audibles the max current is usually at the maximum listed voltage (33v for 24v units). For unfiltered FWR ratings, see installation instructions.

Table 2. ET70/ET90 UL Reverberant dBA @ 10 Feet[b]

watts	1/8	1/4	1/2	1	2	4	8
ET Speaker	75.0	78.0	81.0	84.0	87.0	90.0	93.0
ET Speaker strobe	75.0	78.0	81.0	84.0	87.0	90.0	93.0

[b] dBA ratings are based on UL testing under UL Standard 1480

Specifications and ordering information

Model	Order code	Wall mount	Ceiling mount	Non-Sync	Strobe sync w/DSM or wheelock power supplies	Strobe candela	# Model color red	# Model color white	# Model color nickel	Mounting options[c]	Agency approvals				
											UL	MEA	CSFM	FM	BFP
ET70-24MCW-FR	9020	X	-	X	X	15/30/75/110	X	-		L,O,P,Q,U,Y	X	X	X	X	X
ET70-24MCW-FW	9021	X	-	X	X	15/30/75/110	-	X		L,O,P,Q,U,Y	X	X	X	X	X
ET70-24MCWH-FR	3472	X	-	X	X	135/185	X	-	-	L,O,P,Q,U,Y	X	X	X	X	-
ET70-24MCWH-FW	3475	X	-	X	X	135/185	-	X	-	L,O,P,Q,U,Y	X	X	X	X	-
ET70WP-2475-FR	9077	X	-	X	X	180	X	-	-	M (Outdoor)	X	-	X	X	-
ET90-24MCC-FW	3164	-	X	X	X	15/30/75/95	-	X	-	L,Q,U,V,Y	X	X	X	X	-
ET90-24MCC-FR	3163	-	X	X	X	15/30/75/95	X	-	-	L,Q,U,V,Y	X	X	X	X	-
ET90-24MCCH-FW	3473	-	X	X	X	115/177	-	X	-	L,Q,U,V,Y	X	X	X	X	-
ET90-24MCCH-FR	0139	-	X	X	X	115/177	X	-	-	L,Q,U,V,Y	X	X	X	X	-
ET70-R	7840	X	X	-	-	-	X	-	-	L,O,P,Q,U,Y	X	X	X	X	X
ET70-W	7844	X	X	-	-	-	-	X	-	L,O,P,Q,U,Y	X	X	X	X	X
ET70-N	3097	X	X	-	-	-	-	-	X	L,O,P,Q,U,Y	X	X	X	X	X
ET90-R	7842	X	X	-	-	-	X	-	-	L,Q,U,V,Y	X	X	X	X	X
ET90-W	7846	X	X	-	-	-	-	X	-	L,Q,U,V,Y	X	X	X	X	X
ET90-N	3098	X	X	-	-	-	-	-	X	L,Q,U,V,Y	X	X	X	X	X

[c] Refer to data sheet TD450028EN for mounting options.

Note: Due to continuous development of our products, specifications and offerings are subject to change without notice in accordance with Cooper Wheelock Inc. dba Eaton standard terms and conditions.

Architects and engineers specifications

The speaker appliances shall be Wheelock ET Speakers and speaker strobe appliances shall be Wheelock ET Speaker Strobes or approved equals. The speakers shall be UL Listed under Standard 1480 for Fire Protective Service and speakers equipped with strobes shall be listed under UL Standard 1971 for Signaling Devices for the Hearing-Impaired. In addition, the strobes shall be certified to meet the requirements of FCC Part 15, Class B.

All speakers shall be designed for a field selectable input of either 25 or 70 VRMS, with selectable power taps from 1/8 watt to 8 watts. All models shall have listed sound output of up to 93 dB at 10 feet and a listed frequency response of 400 to 4000 Hz. The speaker shall also incorporate a sealed back construction. All inputs shall employ terminals that accept #12 to #18 AWG wire sizes.

The strobe portion of the appliance shall produce a flash rate of one (1) flash per second over the Regulated Voltage Range and shall incorporate a Xenon flashtube enclosed in a rugged Lexan® lens. The strobe shall be of low current design. Where, Multi-Candela Speaker Strobes are specified, the strobe intensity shall have field selectable settings and shall be rated per UL Standard 1971 at 15/30/75/110cd or 135/185cd for wall mount and 15/30/75/95 cd or 115/177cd for ceiling mount. The selector switch for selecting the candela shall be tamper resistant. The 1575 strobe shall be specified when 15 candela UL Standard 1971 listing with 75 candela on-axis is required (e.g. ADA compliance).

When synchronization is required, the strobe portion of the appliance shall be compatible with Wheelock's DSM Sync Modules, Wheelock Power Supplies or other manufacturers panels with built-in Wheelock Patented Sync Protocol. The strobes shall not drift out of synchronization at any time during operation. If the sync module or Power Supply fails to operate, (i.e., contacts remain closed), the strobe shall revert to a non-synchronized flash rate.

The speaker and speaker strobe appliances shall be designed for indoor surface or flush mounting. The speaker and speaker strobe shall incorporate a speaker mounting plate with a grille cover which is secured with two screws for a level, aesthetic finish and shall mount to standard electrical hardware requiring no additional trim-plate or adapter.

The finish of the ET speakers and speaker strobes shall be white, red or nickel plate.

All speakers and speaker strobes shall be backward compatible.

We encourage and support nicet certification 3 year warranty.

Note: Due to continuous development of our products, specifications and offerings are subject to change without notice in accordance with Cooper Wheelock Inc., dba Eaton standard terms and conditions.

NEMA Member

WE ENCOURAGE AND SUPPORT NICET CERTIFICATION
3 YEAR WARRANTY

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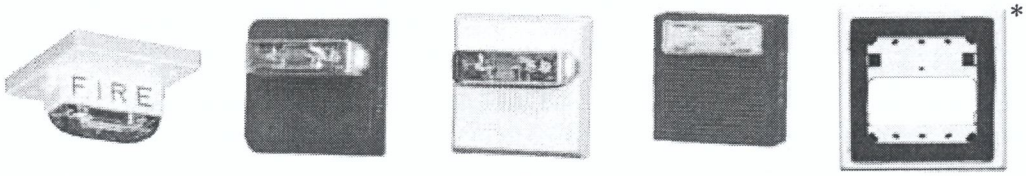
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Powering Business Worldwide

COOPER Notification

Weatherproof Appliances - Series AH Audibles, AS Audible Strobes, MT Multitone Strobes, RSS Strobes and ET70 Speaker Strobes and Weatherproof Mounting Accessories



*

Description:

Designed for life safety, performance and reliability, Cooper Notification's Wheelock cost effective weatherpoof notification appliances include:

Weatherproof Appliances	Series
Strobes	RSSWP
Horn Strobes	ASWP
Horns	AH-24WP, AH-12WP
Multitone Horn Strobes	MTWP
Multitone Horns	MT
Speaker Strobes	ET70WP
Speakers	ET-1010

All strobe models are UL dual listed - meeting both UL1638 and UL1971 requirements. As dual listed appliances, these weatherproof strobes, horn strobes and speaker strobes are listed for outdoor applications under UL 1638 as well as under UL 1971, the Standard for Safety Signaling Devices for Hearing Impaired. With an extended temperature range of –31°F to 150°F (-35°C to 66°C), Wheelock weatherproof appliances meet or exceed UL outdoor test requirements for rain, humidity and corrosion resistance while providing multiple strobe intensity options, including the highest strobe ratings available for area coverage per NFPA 72 strobe spacing tables (up to 185 candela for wall mounting and 177 candela for ceiling mounting).

To enable weatherproof mounting, Cooper Notification provides the industry's widest choice of mounting options for surface or unique semi-flush installation. Models are available for surface mounting to Wheelock weatherproof backboxes on walls or ceilings. The optional WP-KIT allows the weatherproof backboxes (IOB, WPBB or WPSBB) to be mounted to a recessed electrical box for concealed conduit installation. For semi-flush installation, the WPA* and WFPA* kits allow a customer to mount the weatherproof appliances to a recessed electrical box without the need for an external weatherproof backbox. See the Backboxes, Plates and Gaskets Table on page three of this document for a summarization of these mounting options and the required accessories.

All models may be synchronized using the Wheelock DSM Sync Modules, Wheelock Power Supplies or other manufacturers panels incorporating the Wheelock Patented Sync Protocol. The horn output of horn strobes can be independently controlled on 2-wire circuits using the Wheelock patented sync protocol. MTWP horn strobe models are 4-wire appliances; the strobes can be synchronized while the audible can be connected to a coded fire alarm system or can be set to produce any of eight selectable tones.

Features:

- Approvals include: UL Standards 1971, 1638, 464 and 1480 California State Fire Marshal (CSFM), New York City (MEA), Factory Mutual (FM), Chicago (BFP) and ULC . See agency approvals by model number on page two of this document
- Compliance with the following requirements: NFPA, UFC, ANSI 117.1, OSHA Part 29, 1910.165, ADA
- Weatherproof with extended temperature range of –40°F to 150°F (-40°C to 66°C)*
- Dual Listed strobe models (UL 1638 and UL 1971)
- Industry's highest strobe candela options
- Synchronize using the Wheelock Sync Modules or panels with built-in Wheelock Patented Sync Protocol
- Models with field selectable tone, dBA and candela settings
- Wall or ceiling mounting options
- Surface of semi-flush mounting
- IN/OUT wiring termination accepting two #12-18 AWG wires at each terminal

The series RSSWP, ASWP, AH-24WP, MTWP-2475W, and MT-12/24 have UL / ULC approval down to -40°F. The ET-1010 and ET70WP have UL approval down to -40°F. The AH-12WP has UL approval down to -31°F.

UL® E5946 S5391 S2652

THE CITY OF NEW YORK DEPARTMENT OF BUILDINGS MEA 151-92-E

7125-0785:131 (ASWP)
7125-0785:146 (ET70WP)
7125-0785:156 (MTWP)

FM APPROVED

NOTE: All CAUTIONS and WARNINGS are identified by the symbol ⚠. All warnings are printed in bold capital letters.

⚠ WARNING: PLEASE READ THESE SPECIFICATIONS AND ASSOCIATED INSTALLATION INSTRUCTIONS CAREFULLY BEFORE USING, SPECIFYING OR APPLYING THIS PRODUCT. VISIT WWW.COOPERNOTIFICATION.COM OR CONTACT COOPER WHEELOCK FOR THE CURRENT INSTALLATION INSTRUCTIONS. FAILURE TO COMPLY WITH ANY OF THESE INSTRUCTIONS, CAUTIONS OR WARNINGS COULD RESULT IN IMPROPER APPLICATION, INSTALLATION AND/OR OPERATION OF THESE PRODUCTS IN AN EMERGENCY SITUATION, WHICH COULD RESULT IN PROPERTY DAMAGE, AND SERIOUS INJURY OR DEATH TO YOU AND/OR OTHERS.

General Notes:

- Strobes are designed to flash at 1 flash per second minimum over their UL Listed Regulated Voltage Range.
- All candela ratings represent minimum effective Strobe intensity based on UL Standards 1971 and 1638 as indicated in candela ratings table.

Wall Mount



RSSWP


MTWP


ASWP

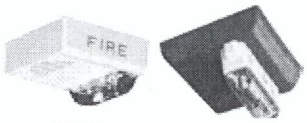

ET70WP

Strobe		Order Code
RSSWP-2475W-FR	Red	9013
RSSWP-2475W-FW	White	3034
RSSWP-24MCWH-FR	Red	5161
RSSWP-24MCWH-FW	White	5165
Audible Strobe		
ASWP-2475W-FR	Red	9012
ASWP-24MCWH-FR	Red	5137
ASWP-24MCWH-FW	White	5140
Multi-tone Strobe		
MTWP-2475W-FR	Red	8420
MTWP-2475W-FW	White	3112
MTWP-24MCWH-FR	Red	5132
MTWP-24MCWH-FW	White	5134
Speaker Strobe		
ET70WP-2475W-FR	Red	9077
ET70WP-2475W-FW	White	3179
ET70WP-24185W-FR	Red	4885
ET70WP-24185W-FW	White	4891
ET70WP-24135W-FR	Red	4872
ET70WP-24135W-FW	White	4875

Ceiling Mount



RSSWP MTWP



ASWP ET70WP

Strobe		Order Code
RSSWP-2475C-FR	Red	4338
RSSWP-2475C-FW	White	4446
RSSWP-24MCCH-FR	Red	5167
RSSWP-24MCCH-FW	White	5187
Audible Strobe		
ASWP-2475C-FR	Red	4251
ASWP-2475C-FW	White	4502
ASWP-24MCCH-FR	Red	5149
ASWP-24MCCH-FW	White	5157
Multi-tone Strobe		
MTWP-2475C-FR	Red	4457
MTWP-2475C-FW	White	4478
MTWP-24MCCH-FR	Red	5102
MTWP-24MCCH-FW	White	5122
Speaker Strobe		
ET70WP-2475C-FR	Red	4452
ET70WP-2475C-FW	White	4454
ET70WP-24177C-FR	Red	4845
ET70WP-24177C-FW	White	4859
ET70WP-24115C-FR	Red	4550
ET70WP-24115C-FW	White	4732

Wall or Ceiling Mount


MT


AH


ET-1010

Audible		Order Code
AH-24WP-R	Red	7416
AH-12WP-R	Red	7415
Horn		
MT-12/24-R	Red	5023
Speaker		
ET-1010-R	Red	3135
ET-1010-W	White	3137

UL Max. Current	AH	
	24 VDC	12 VDC
High (99) dBA	0.080	0.192
Med (95) dBA	0.043	0.108
Low (90) dBA	0.021	0.058

UL Reverberant dBA @ 10 Feet							
Watts	1/8	1/4	1/2	1	2	4	8
ET-1010	77	80	83	86	87	92	94
ET70WP	78	81	84	87	90	93	95

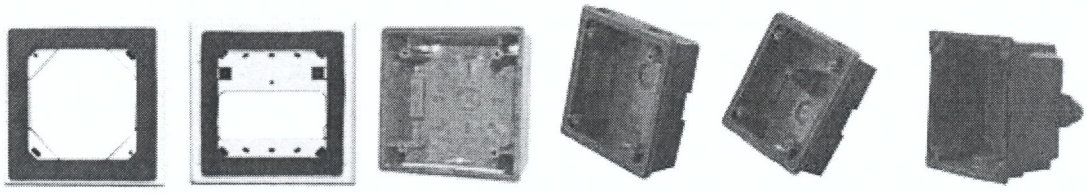
Series	Candela Ratings						
	UL 1971	UL 1638 @ 77°F	UL 1638 @ -40°F	RSS, ET70WP and MTWP UL Max Current (Strobe Only)	ASWP		
					High	Med	Low
2475W	30**	180	115	0.138	0.168	0.155	0.150
2475C	15	180	115	0.138	0.168	0.155	0.150
MCWH	135	135	56	0.300	0.355	0.340	0.335
	185	185	77	0.420	0.480	0.465	0.460
MCCH	115	115	47	0.300	0.355	0.340	0.335
	177	177	73	0.420	0.480	0.465	0.460
24185	185	185	77	0.420			
24177	177	177	73	0.420			

**Wall mount rating only

UL Max. Current (Audible)	MTWP/MT 24 VDC		MT 12 VDC	
dBA	HI	STD	HI	STD
Horn	0.108	0.044	0.177	0.034
Bell	0.053	0.024	0.095	0.020
March Time	0.104	0.038	0.142	0.034
Code 3 Horn	0.091	0.035	0.142	0.034
Code 3 Tone	0.075	0.035	0.105	0.021
Slow Whoop	0.098	0.037	0.142	0.035
Siren	0.104	0.036	0.152	0.030
Hi/Lo	0.057	0.025	0.114	0.026

Model Number	Agency Approvals				
Strobe	**UL**	**MEA**	**CSFM**	**FM**	**BFP**
RSSWP-2475	X	X	X	X	-
RSSWP-24MCWH	X	-	X	-	-
RSSWP-24MCCH	X	-	X	-	-
Audible Strobe					
ASWP-2475	X	X	X	X	X
ASWP-MCWH	X	-	X	-	-
ASWP-MCCH	X	-	X	-	-
Multitone Strobe					
MTWP-2475	X	X	X	X	-
MTWP-MCWH	X	-	X	-	-
MTWP-MCCH	X	-	X	-	-
Horns/Audibles					
AH-24WP	X	X	X	X	X
AH-12WP	X	X	X	X	X
MT-12/24	X	X	X	X	X
Speaker Strobe					
ET70WP-2475	X	-	X	X	-
ET70WP-185	X	-	X	X	-
ET70WP-177	X	-	X	X	-
ET70WP-115	X	-	X	X	-
ET70WP-135	X	-	X	X	-

Mounting Accessories



WFP WFPA IOB WPSBB WPBB WBB

Gasket Kit		Order Code
WP-KIT		4486
Flush Plates		
WFPA-R	Red	4698
WFPA-W	White	4701
WFP-R	Red	4696
WFP-W	White	4697
Backboxes		
IOB-R*	Red	5046
IOB-W*	White	5047
WPSBB-R*	Red	9751
WPSBB-W*	White	3033
WPBB-R*	Red	9014
WPBB-W*	White	4692
WBB-R	Red	2959
WBB-W	White	2960

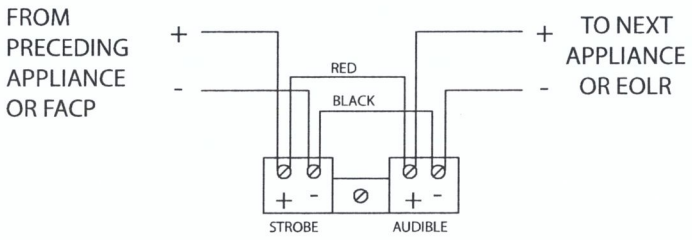
Mounting Options:

	Backboxes, Plates, Gasket Kits		
	Surface Mount		Flush Mount
	Exposed Conduit	Concealed Conduit	
RSSWP Strobes	WPSBB	WPSBB + WP-KIT	WFP
ET70WP Speaker Strobes	IOB	IOB + WP-KIT	WFP
ASWP Horn Strobes	WPBB	WPBB + WP-KIT	WFPA
AHWP Horns	WBB	-	WFP
ET-1010 Speakers	WBB	-	WFP
MTWP Multitone Horn Strobes	IOB	IOB + WP-KIT	WFP
Multitone Horn	IOB	IOB + WP-KIT	WFP

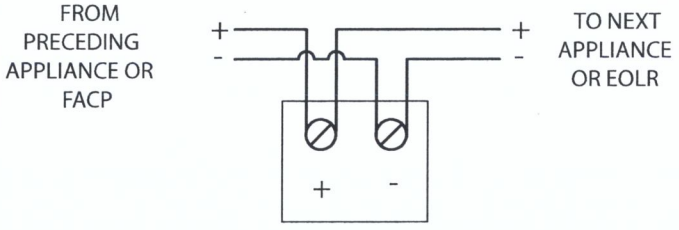
*IOB, WPSBB and WPBB models include weep holes and plug in the event that moisture may have entered the appliance

Wiring Diagrams

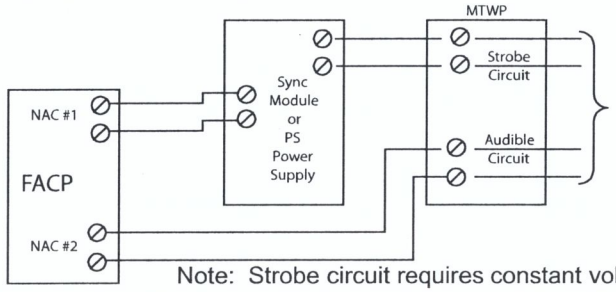
SERIES MTWP AUDIBLE APPLIANCE AND STROBE OPERATE IN UNISON. RED AND BLACK SHUNT-WIRES ARE SUPPLIED.



SERIES RSSWP, ASWP, AHWP, MTWP AND MT-12/24 APPLIANCES

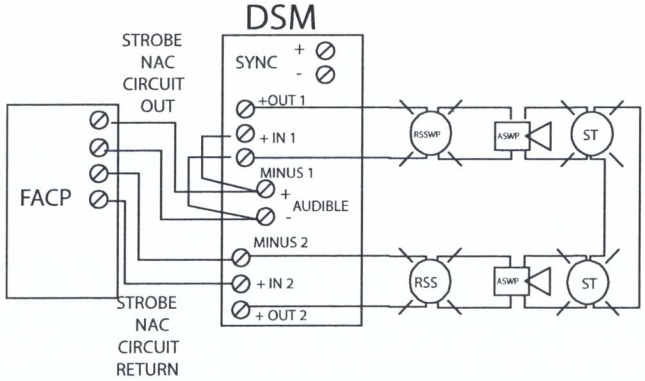


SERIES MTWP APPLIANCES SYNCHRONIZED STROBE OPERATION WITH CODED FACP



Note: Strobe circuit requires constant voltage.

SERIES RSSWP/ASWP APPLIANCES SYNCHRONIZED W/ DSM MODULE SINGLE CLASS "A" NAC CIRCUIT



Note: Models are available in Red or White. Contact Customer Service for Order Code and Delivery.
#Refer to Data Sheet S7000 for Mounting Options

NOTE: Due to continuous development of our products, specifications and offerings are subject to change without notice in accordance with Cooper Wheelock Inc. dba Cooper Notification standard terms and conditions.

ARCHITECTS AND ENGINEERS SPECIFICATIONS

General
Weatherproof notification appliances shall be UL listed for outdoor use. Weatherproof Strobe appliances shall be listed under UL Standard 1638 (Standard for Visual Signaling Appliances) for Indoor/Outdoor use and UL Standard 1971 (Standard for Safety Signaling Devices for Hearing Impaired). The appliances shall be available for optional wall mounting or ceiling mounting to weatherproof backboxes using either exposed conduit or concealed conduit, or semi-flush mounting to a recessed electrical box in walls or ceilings using Wheelock mounting accessories.

Weatherproof Strobes
Weatherproof Strobe appliances shall produce a minimum flash rate of 60 flashes per minute over the UL Regulated Voltage Range of 16 to 33 VDC and shall incorporate a Xenon flashtube. The weatherproof strobes shall be available with UL 1971 candela ratings up to 185 cd for wall mounting and 177 cd for ceiling mounting. UL 1638 candela ratings up to 180 cd at 77°F shall be available. The strobes shall operate over an extended temperature range of –40°F to 150°F (-40°C to 66°C) and be listed for maximum humidity of 95% RH. Strobe inputs shall be polarized for compatibility with standard reverse polarity supervision of circuit wiring by a Fire Alarm Control Panel (FACP).

Weatherproof Audibles and Audible/Strobe Combinations Weatherproof horns and multitone audibles shall be listed for Indoor/Outdoor use under UL Standard 464. The horns shall be able to produce a continuous output or a temporal code-3 output that can be synchronized. The horns shall have at least 3 sound level settings. Horn/Strobe combinations shall be able to be synchronized on a single NAC.

Multitone audibles shall be able to produce 8 distinct tones selectable by dip switch and shall have at least 2 sound level settings. Multitone Audible/Strobe combinations shall have independent inputs for the audible and strobe. The strobes shall be able to be synchronized. The audibles shall be able to be coded when operated on a separate NAC.

Weatherproof Speakers and Speaker/Strobes
Weatherproof speakers and speaker/strobes shall be listed for Indoor/Outdoor use under UL Standard 1480. All speakers shall provide field selectable taps for 1/8W to 8W operation for either 25 VRMS or 70 VRMS audio systems and shall incorporate a sealed back construction for extra protection and improved audibility. Speakers without strobes shall be Wheelock Series ET-1010. They shall be listed to produce up to 94 dBA and shall incorporate a vandal resistant grille design. Speaker with strobes shall be Wheelock Series ET70WP. They shall be available for surface or semi-flush mounting to walls or ceilings and shall be listed to produce up to 93 dBA.

Synchronization Modules
When synchronization of strobes or temporal code-3 audibles is required, the appliances shall be compatible with the Wheelock Series DSM Sync Modules, Wheelock Power Supplies or other manufacturers panels with built-in Wheelock Patented Sync Protocol. The strobes and audibles shall not drift out of synchronization at any time during operation.

Series ASWP audibles and strobes shall be able to be synchronized on a 2-wire circuit with the ability to silence the audible if required. The strobes on Series MT multitone audible/strobe appliances shall be able to be synchronized and shall be able to be operated on a separate circuit from the audibles while the audible circuit is connected to a coded or continuous NAC.

Weatherproof Mounting Accessories
Weatherproof mounting options shall include surface mounting or semi-flush mounting to walls or ceilings. Surface mounted appliances shall mount to Wheelock IOB, WBB, WPBB or WPSBB weatherproof backboxes using either exposed conduit or concealed conduit. For concealed conduit the weatherproof backbox shall be mounted to a recessed electrical box with Wheelock's WP-KIT to provide a weatherproof seal for the electrical box. Semi-flush mounted appliances shall mount to a recessed electrical box using Wheelock WFP or WFPA flush plates to provide a weatherproof seal between the electrical box and the appliance.

NEMA Member

WE ENCOURAGE AND SUPPORT NICET CERTIFICATION
3 YEAR WARRANTY

S9004 WP 11/12

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Long Branch, NJ 07740
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F: 732-222-8707
www.coopernotification.com

Cooper Notification is Wheelock® MEDC SAFEPATH WAVES

COOPER Notification

Accessories

System Battery Sets

Models BP-61; BT-series and BTX-series

ARCHITECT AND ENGINEER SPECIFICATIONS

- 24 VDC, nominal for ancillary power of fire alarm control panels (FACPs)
- 7AH, 10AH, 15AH, 31AH, 55AH & 100AH (Amp-hour) battery sets
- Sealed, lead-acid and rechargeable types
- Mounts in a system enclosure, or in Models BB-55, BB-55R battery boxes
- Detector-component compatibility



Model
BT-33

Product Overview

Siemens – Fire Safety battery sets are manufactured by major suppliers of batteries, such as: Werker, Johnson Controls, Yuasa Batteries, Inc. and EaglePicher Technologies, LLC.

As the manufacturers improve the design of their batteries, the amp-hour rating will increase. However, the dimensions of the batteries will remain the same to ensure proper fit in the system enclosures, as specified.

If the system enclosure does not house the required battery set, use the Model BB-55 battery box: [**data-sheet number, 3326.**]

Model BB-55 can house any of the available battery sets.

Details for Ordering

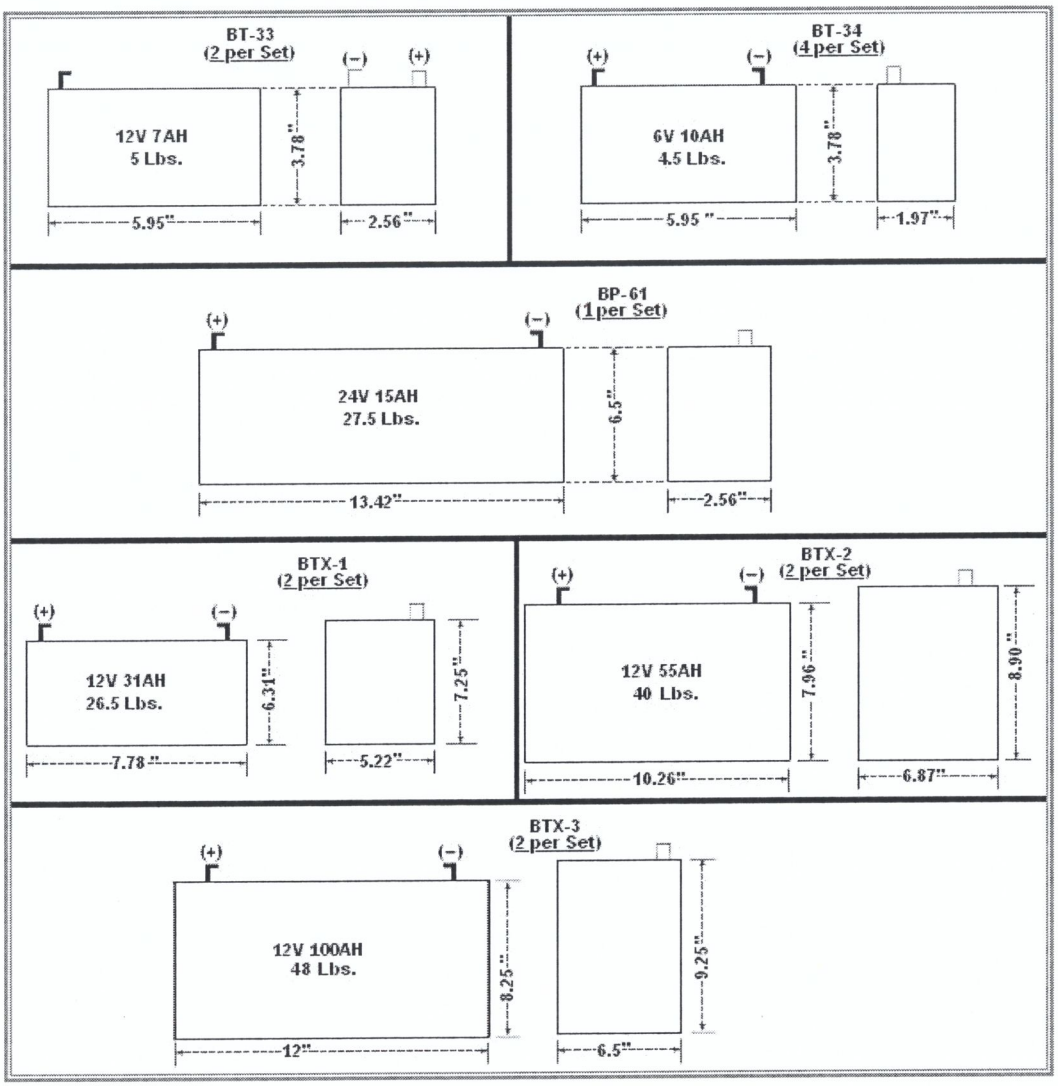
Model	Part Number	Description
BT-33	175-387141	7-Amp-Hour Battery Set
BT-34	175-387140	10-Amp-Hour Battery Set
BP-61	175-387194	15-Amp-Hour Battery Set
BTX-1	175-083897	31-Amp-Hour Battery Set
BTX-2	175-083898	55-Amp-Hour Battery Set
BTX-3	599-034220	100-Amp-Hour Battery Set

Notes:

- The amp-hours stated above are minimum ratings.
- The actual batteries installed may exceed the indicated rating.
- SXL® is listed with BT-33, BT-34 and BP-61 only.

S Industry, Inc.
Building Technologies Division

Dimensions



Notice: This marketing data sheet is not intended to be used for system design or installation purposes. For the most up-to-date information, refer to each product's installation instructions.

s Industry, Inc.
Building Technologies Division

Fire Safety
8 Fernwood Road
Florham Park, NJ 07932
Tel: (973) 593-2600
FAX: (908) 547-6877
URL: www.usa.Siemens.com/Fire

(SII-FS)
Printed in U.S.A.

November 2014
Supersedes sheet dated 6/2012
(Rev. 3)

Technical Data Sheet
Aquaseal® Fire-Alarm Cables



WEST PENN WIRE

2833 West Chestnut Street
Washington, PA 15301
Toll Free: (800) 245-4964
Fax: (724) 222-6420
www.westpenn-wpw.com

PART NUMBER:	**AQ294**
DESCRIPTION:	16/2 Stranded bare copper conductors, overall shield with Aquaseal tape and overall jacket.
NEC RATING:	FPL – PLTC, CL3 NEC Article 760 And 725
APPROVALS:	(UL) Listed – Direct Burial
APPLICATION:	Materials suitable for outdoor use, and indoor trays, allows a variety of uses for (Low voltage industrial process control circuits, Power-Limited circuits, Power-Limited fire alarm circuits, Power-Limited tray cable PLTC)

Construction Parameters:

Conductor	16 AWG Bare Copper
Stranding	7x24
Insulation Material	PVC with Nylon
Insulation Thickness	PVC 0.015" Nom. Nylon .005" Nom.
Number of Conductors	2 (1 Pair)
Shield	100% Aluminum Polyester Foil
Drain	Stranded Tinned Copper
Water-Blocking Tape	2 Ply water swellable tape
Jacket Material	Sunlight/ Moisture Resistant PVC
Jacket Thickness	0.040" Nom.
Overall Cable Diameter	0.328" Nom.
Approximate Cable Weight	58 Lbs/1M' Nom.
Flame Rating	UL 1685 Vertical Tray

Electrical & Environmental Properties:

Temperature Rating	-20deg C to 90deg C
Operating Voltage	300 V RMS
Max.Capacitance Between Conductors @ 1 KHz	37 pf/ft Nom.
Capacitance Between Conductors to Shield @ 1 KHz	67 pf/ft Nom.
DC Resistance per Conductor @ 20deg C	6.2 Ohms/1M' Nom.
Insulation Colors	Black, Red
Jacket Color	Black
RoHS Compliant	--
TIA455-82B Water Infiltration Test Compliant	Yes
UL 444 & 13 Compliant	Yes

Mechanical Properties:

Max. Recommended Pull Tension	69 lbs.
Min. Bend Radius (Install)	3.2"

Specification Issue Date: 7/06

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SECTION 31 10 00

SITE PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Locate and mark existing utilities within the limits of work.

B. Remove all existing structures, surface and subsurface improvements within the area of work, except for existing underground site utilities designated to remain as indicated on plan.

C. Properly dispose of all excess and unsuitable material.

D. Strip all areas within the limits of work.

E. Deploy and subsequently remove temporary construction area fencing at completion of construction.

F. Install and maintain tree protective fencing around trees to be saved, and remove all existing trees within the limits of work except those designated to remain.

G. Install and maintain erosion control measures and siltation control devices.

H. Contractor shall Implement the requirements of the Storm Water Pollution Prevention Plan (SWPPP) and comply with all the State of California Construction General Permit requirements for a Risk Level Two Project.

I. The Contractor shall provide the information to the Owner for preparing a Notice of Intent (NOI) as needed. The Owner will submit the NOI to the State Department of Water Resources and prepare the Storm Water Pollution Prevention Plan (SWPPP). This project is a Risk Level 2 Project, the contactor shall follow allow Risk Level 2 SWPPP requirements. The Contractor shall assign a QSP to the project; this person shall meet all QSP requirements as stated in the State's General Stormwater Permit. The Contractor shall be responsible for implementing and maintaining the SWPPP and all risk level requirements, including all sampling and record keeping..

J. Demolition to be phased to meet the needs of the owner. Contractor to provide a phased demolition plan to the architect as a first order of work via the RFI process, for review and approval by the design team and owner.

1.02 RELATED SECTIONS

A. Earthwork - Section 31 20 00

B. Trenching, Backfilling and Compaction - Section 31 23 16

1.03 REFERENCES

A. Reference Data:

1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the work is given.

B. City of South San Francisco Standard Plans and Specifications.

C. Caltrans Standard Plans and Specifications, where applicable.

D. South San Francisco Unified School District Standard Design and Construction Standards.

E. State of California Construction General Permit Order No. 2009-0009-DWQ

PART 2 PRODUCTS

2.01 CLEARED MATERIAL

A. The objectionable cleared material including buildings, structures, fences, site furniture, etc., shall be properly removed from the project site and disposed of properly.

B. The location, extent of all background data, existing line work and existing utility facilities shown on these plans are approximate and are based on site observations, aerial photos, as-builts and topographic and field survey data. The contractor shall independently review ground, topography, and current site conditions throughout the site, and assume wholly and unconditionally the risk of completing the proposed work shown on these plans, regardless of rock, water table, or other conditions which contractor may encounter in the course of the work.

C. The contractor shall properly remove and recycle all concrete, metal and all other debris and rubble from the project site per the contract documents. In the event that the presence of hazardous materials is suspected or discovered on the site, the contractor shall inform the owner. In response, the owner shall retain an independent testing laboratory to determine the nature of the material encountered and whether corrective measures or remedial action is requited.

2.02 STRIPPED MATERIAL

A. Excess and objectionable stripped material including asphalt and concrete pavements shall be properly removed from the project site and disposed of properly by the contractor.

B. The demolished existing asphaltic concrete and aggregate base shall be removed from the project site and disposed of properly by the contractor.

2.03 EROSION CONTROL

A. Materials shall be as shown on the plans, or as required to meet the State Construction General Permit requirements during all stages of construction and all weather conditions.

B. See Section 32 92 13 for information on hydroseeding material.

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

A. Install tree protective fencing around trees designated to be saved prior to the start of demolition work. See Civil and Landscape Plans and Specifications. Install fencing as far from the trunk as possible to allow for construction of proposed improvements. Maintain fencing throughout duration of construction.

B. The area above the natural ground surface shall be cleared of all vegetable growth such as trees not designated to be saved, roots, brush, grass and weeds and all other objectionable material including buildings, concrete, masonry, footings, sheet metal, lumber, retaining walls, utility enclosures, guardrails and similar materials within the limits of construction.

C. The natural ground surface within the entire site, except within the tree protection zones, shall be grubbed to a depth necessary to remove all stumps, buried logs, roots over 2-inches in diameter and all other unsuitable material. Stumps shall be removed to a depth of at least 24" below original grade.

D. Existing utilities to be abandoned that are located within the limit of work line shall be slurried and capped, or completely removed and excavations backfilled and compacted with native material. Any portions of these utilities that conflict with the new improvements shall be removed.

E. All unsuitable material shall be removed from the construction area and disposed of properly. Comply with hazardous materials abatement regulations that may apply.

3.02 STRIPPING

A. The upper soils containing grass, small roots and other vegetation to a depth of 2-3 inches shall be stripped from the site, and shall be removed from the site, is the property of the contractor and disposed of properly. Strippings may be reused as backfill for landscape and/or planter areas if material is approved by the School District and project Landscape Architect. Deeper stripping may be required in localized areas to remove roots or other concentrations of organic material.

B. Dust control shall be performed by the contractor during all phases of the construction. Payment for the dust control work involved shall be considered included in the various other items of work and no additional allowance will be made therefor.

C. The Geotechnical Engineer will observe the clearing and stripping operations and recommend the maximum depth of stripping required and any additional excavation necessary due to contamination of materials or concentrations of vegetation.

3.03 EROSION CONTROL AND STORM WATER POLLUTION PREVENTION PLAN

A. Install and maintain filter fabric wrapped grates, sediment rolls, both silt fence wrapped and plain, around inlet structures until such time as all vegetative and hard surface improvements within their individual tributary areas are completed. Provide periodic maintenance of all such devices, and following completion of said improvements, remove and dispose of erosion control devices and repair surfaces to match final specified surface finishes.

B. Any areas where ground has been disturbed, and where final landscaping has not been installed by October 15 will require the installation and maintenance of erosion control devices by the Contractor, as generally shown on the plans.

C. Install and maintain "True Dam" silt barriers at curb inlets as required. Remove following completion of hard surface and vegetative improvements with individual tributary areas.

D. All disturbed areas shall be hydroseeded per Section 32 92 13.

E. The Contractor shall provide the information to the Owner for preparing a Notice of Intent (NOI) as needed. The Owner will submit the NOI to the State Department of Water Resources and prepare the

Storm Water Pollution Prevention Plan (SWPPP). This project is a Risk Level 2 Project, the contactor shall follow allow Risk Level 2 SWPPP requirements. The Contractor shall assign a QSP to the project; this person shall meet all QSP requirements as stated in the State's General Stormwater Permit. The Contractor shall be responsible for implementing and maintaining the SWPPP and all risk level requirements, including all sampling and record keeping. The Contractor shall keep a copy of the SWPPP at the jobsite at all times and make the plan available to the Owner, Engineer and State of California Representatives for their use. The Contractor shall comply with all terms of the SWPPP and the State Water Resources Control Board (SWRCB) Order No. 2009-009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit no. CAS000002 in a timely fashion and with no additional compensation therefore.

The SWPPP shall include as a standard compliance reference the latest edition of the California Stormwater Quality Associates Stormwater Best Management Practices Handbook. The SWPPP shall include but not be limited to specific references to management practices required to operate the erosion control plan included in the project drawings, dewatering , construction near water courses, material used and storage, excavation, sediment control, trenching, use and stockpiling of cold patch asphalt, temporary stockpiling of trench spoils and earthen materials and pile drawings..

3.04 SURFACE IMPROVEMENT AND UTILITY REMOVAL AND RELOCATION

A. The Contractor shall have Underground Service Alert mark all existing public utilities as a first order of work.

B. The Contractor shall pothole each existing utility that will be extended or reused at its point of cut and removal to confirm the actual locations and depths. Notify engineer of results via the RFI process.

C. Existing water, sewer, storm drain, gas, electrical, communication (data) services and mains to be abandoned and removed or abandoned in place as indicated on the plans.

D. All concrete and asphalt pavements and other existing improvements within the areas to be developed should be removed during site demolition. Existing building foundations should be entirely removed below final subgrade in the new building areas, and to a depth of at least three feet in areas outside the new building footprints. Any excess demolished asphalt and aggregate base shall be off hauled from the site and the property of the contractor.

E. See Mechanical, Electrical, and Civil plans for detailed demolition/removal/replacements requirements.

3.05 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 31 20 00

EARTHWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of suitable materials for on-site earthwork operations.

B. Definitions of terms.

C. Description of the duties and responsibilities of the Geotechnical Engineer.

D. Requirements for dust and erosion control.

E. Requirements for excavation, import of select fill, placement of fill, and disposal of surplus material off the project site.

F. Dewatering of excavations.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this Section.

B. Related Sections include the following:

1. Site Preparation – Section 31 10 00

2. Trenching, Backfilling and Compaction - Section 31 23 16

1.03 REFERENCES

A. Reference Data:

1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.

2. South San Francisco Unified School District Standard Design and Construction Standards.

1.04 EXISTING CONDITIONS

A. Geotechnical Report -- For supplementary information, the Contractor shall review the Geotechnical Engineering and Geologic Hazard Study for Parkway Heights Middle School by Geosphere Consultants INC. dated January 30, 2013 and Addendum #1 to the Geotechnical Engineering and Geologic Hazards Study by Geosphere Consultants INC. dated December 6, 2013. Where these specifications and the Geotechnical Report do not agree, the Contractor shall obtain clarification from the Geotechnical Engineer. The subsurface conditions of the project site predominantly consists of medium stiff silty to sandy clay overlying medium dense to very dense silty/clayey sands to poorly graded sands extending to a depth of 50 feet, the maximum depth of exploration below ground level. If loose or soft soils are encountered these soils should be replaced with suitable engineered/import fills.

B. The contractor shall perform earthwork calculations which account for his proposed methods of grading and trenching of all materials regardless of character as he deems necessary for bidding and construction purposes. It shall be the sole responsibility of the contractor to account for the cost of any necessary import of select material or removal from the site of unsuitable or excess fill material in his bid in order to achieve the grades shown on the plan. Any excess dirt shall be the property of the contractor and shall be properly disposed of offsite by the contractor. No additional compensation shall be allowed for this item of work unless the owner requests additional work be performed.

1.05 SUBMITTALS

A. Submit test reports and compaction curve analysis for select import select fill required in accordance with Section
01 33 00.

B. It is the Contractor's responsibility to achieve the finished grades shown on the plan, to perform their own earthwork calculations and to determine the quantity of and provide for soil import or export required to achieve plan grades.

1.06 DEFINITIONS

A. Standard Specifications -- Where referred to in these specifications, "Standard Specifications" shall mean the State of California Standard Specifications; and City of South San Francisco Standard Plans and Specifications current editions. All work shall be carried out in conformance with the Standard Specification unless otherwise specified herein.

B. Percent Compaction -- As referred to in these specifications, percent compaction is the required in-place dry density of the material, expressed as a percentage of the maximum dry density of the same material determined by the ASTM D 1557 test procedure.

C. Optimum Moisture Content -- As referred to in these specifications, optimum moisture content is the moisture content, percent (by dry weight), corresponding to the maximum dry density of the same material as determined by the ASTM D 1557 test procedure.

PART 2 PRODUCTS

2.01 GENERAL FILL

A. General fill shall be clean, free of organic material, lumps, and rocks greater than three inches in diameter. In addition, general fill material should be non-expansive, having a Plasticity Index of 15 or less, an R-Value greater than 40, and contain at least 10 percent fines. In general, the onsite soils to the extent that they may be available, will be suitable for reuse as fill, provided any organics, lumps, concentrations of roots, debris are removed and materials are approved for reuse as fill by the geotechnical engineer.

2.02 IMPORTED SELECT FILL

A. Imported fill material shall be fee of organic content, a plasticity index no greater than 15 percent, an R-Valve greater than 40, contain at least 10 percent fines and shall not contain environmental contaminants or rocks or lumps larger than six (3) inches in greatest dimension. Proposed fill materials must be approved by the Geotechnical Engineer prior to their use. Imported fill materials will need to be approved by Geotechnical Engineer prior to their importation to the site. The District may also

require that certain fill materials be pre-approved by the project Environmental Consultant.

PART 3 EXECUTION

3.01 GEOTECHNICAL ENGINEER

A. The work covered by these specifications shall be performed under the observation of the Geotechnical Engineer, who shall be retained and paid by the Owner. The Geotechnical Engineer will be present at the site intermittently during the conduct of work to observe the work, and to perform field and laboratory tests to evaluate material quality and compaction. The Contractor shall cooperate with the Geotechnical Engineer in performing the observations and tests. The Geotechnical Engineer shall notify the Contractor of failing test results. The Contractor shall rework these areas until the specified degree of compaction is obtained. At the completion of his work, the Geotechnical Engineer shall submit a report to the Owner, including a tabulation of all tests performed. The Geotechnical Engineer's costs for observing and testing the repair of unsatisfactory work performed by the Contractor shall be billed to the Owner. The Owner shall pay them and then shall deduct the amount from monies due to the Contractor.

3.02 SPILLAGE, DUST AND EROSION CONTROL

A. The Contractor shall prevent spillage when hauling on or adjacent to any public street or highway. In the event that such occurs, the Contractor shall remove all spillage and sweep, wash or otherwise clean such streets or highways as required by local City and County authorities and/or the State of California.

B. The Contractor shall take all precautions needed to prevent a dust nuisance to adjacent public or private properties and to prevent erosion and transportation of soil to downstream, adjacent properties, due to his work under this contract. Any damage so caused shall be corrected or repaired by the Contractor at no cost to the Owner.

3.03 SUBGRADE PREPARATION

A. Under exterior concrete flatwork areas: Following demolition and general grading of the entire area within the proposed hardscape areas the exposed underlying soils shall be scarified to a minimum depth of 8 inches, moistened to near optimum moisture content and re-compacted to at least 90% relative compaction. If loose of soft soil is encounter, these should be removed to expose firm soil and backfilled with select fill moistened to near optimum moisture content and re-compacted to at least 90% relative compaction. The unsuitable material should be excavated and disposed of by the contractor. Refer to the Geotechnical Investigation Report for further requirements.

B. Under concrete and paved asphalt areas: Following demolition and general grading of the entire area within the proposed paved traffic areas and 1' beyond the limits of the paved areas, the exposed underlying soils shall be scarified to a minimum depth of 8 inches, moistened to near optimum moisture content and re-compacted to at least 95% relative compaction. If loose of soft soil is encounter, these should be removed to expose firm soil and backfilled with select fill moistened to near optimum moisture content and re-compacted to at least 95% relative compaction. The unsuitable material should be excavated and disposed of by the contractor. Proof roll (with heavy rubber tired equipment, such as a full water truck) exposed subgrade to a firm and unyielding surface under the observation of the project geotechnical engineer or his designated reprehensive. If the subgrade soils cannot be proof rolled to a firm surface, placement of a suitable geotextile for stabilization may be

required. Soft spots or areas of pumping may require overexcavation and replacement with suitable material. Refer to the Geotechnical Investigation Report for further requirements. Once the compacted subgrade has been reached, it is recommended that baserock in paved and on-grade concrete slab areas be placed immediately to protect the subgrade. Alternatively, the subgrade should be kept moist by watering until baserock is placed.

C. If grading occurs in the winter rainy season, unstable and unworkable subgrade conditions may be present and compaction on on-site soils may not be feasible. These conditions may be remedied using appropriate soil admixtures, such as cement/lime or other admixtures. More detailed recommendations can be provided during construction. Stabilizing subgrade in small, isolated areas can be accomplished with the approval if the Geotechnical Engineer by over-excavation one foot, placing Tensar BX1100 geogrid or equivalent geogrid on the soil, and then placing 12 inches of class 2 baserock on the geogrid. The upper six inches of the baserock should be compacted to at least 95% relative compaction. Refer to the Geotechnical Investigation Report for further requirements.

3.04 EXCAVATION

A. Final surfaces exposed by the completed excavations (cutting) shall be finished true to line and grade, and present a smooth, firm surface. Depressions shall be filled and compacted, and loose material shall be removed.

B. Temporary construction slopes shall not exceed requirements set forth in Cal-OSHA Industrial Safety Orders, or ratio suggested in the field by the Geotechnical Engineer.

C. All site preparation and fill placement should be observed by a representative of the Geotechnical Engineer.

D. Where field density tests indicate that required compaction and/or moisture content has not been attained, the fill shall be reconditioned as necessary and recompacted to the required density and/or moisture content prior to placing additional material. The Contractor shall be responsible for placing, moisture conditioning and compacting approved material in accordance with these specifications.

E. Sufficient testing and inspection should be performed to assure compliance with the recommended compaction standards. Samples of proposed native or imported fill should be submitted to the Geotechnical Engineer material testing laboratory for assessment at least 48 hours prior to placement or importing to the site (whichever is soonest).

F. All excess excavated material should be disposed of by the contractor or stockpiled on the site by the contractor for later use as landscaping material.

G. The contractor shall perform earthwork calculations which account for his proposed methods of grading and trenching of all materials regardless of character as he deems necessary for bidding and construction purposes. It shall be the sole responsibility of the contractor to account for the cost of any necessary import of select material or removal from the site of unsuitable or excess fill material in his bid in order to achieve the grades shown on the plan. Any excess dirt shall be the property of the contractor and shall be properly disposed of offsite by the contractor. No additional compensation shall be allowed for this item of work unless the owner requests additional work be performed.

3.05 FIELD QUALITY CONTROL

A. The Geotechnical Engineer will observe the excavation, soil removal, moisture conditioning and

recompaction operations. After the completion of these operations and before placement of fill, the Contractor shall obtain the Geotechnical Engineer's approval of the site preparation in each area.

3.06 DEWATERING

A. During excavation activities, groundwater may be encountered. The contractor is responsible for accounting in their bid the necessary equipment required to remove groundwater from excavations to allow for the proper placement of fill per the Geotechnical Report.

B. All dewatering activities must comply with local and State water quality standards.

C. Dewatering shall be performed under a contractor obtained permit from either the Sanitary District (if discharge is to the sewer system) or the Regional Water Quality Control Board (if discharge is to the storm drain system). The Contractor is advised that both of these agencies may require testing of the proposed dewatering discharge for contaminants. It shall be the sole responsibility of the Contractor to apply for and obtain the necessary permits, obtain and pay for any required water quality tests, design shoring and dewatering systems, and pay any fees associated with discharging the water to the sanitary sewer system if that option is selected. Permits must be obtained prior to any discharge occurring.

3.07 PLACEMENT, MOISTURE CONDITIONING AND COMPACTION

A. All fill shall be placed as engineered fill, moisture conditioned and compacted as described on the following page.

AREA	COMPACTION RECOMMENDATIONS
General Engineered Fill	In lifts, a maximum of 8 inches loose thickness, mechanically compacted to a minimum of 90 percent relative compaction, near optimum uniform moisture content (±3%).
Paved areas (asphalt/concrete)	In lifts, a maximum of 8 inches loose thickness, mechanically compacted to a minimum of 95 percent relative compaction near optimum uniform moisture content (±2%).
Exterior Concrete Slab Areas	In lifts, a maximum of 8 inches loose thickness, mechanically compacted to a minimum of 90 percent relative compaction, near optimum uniform moisture content (±3%).
Select Fill	In lifts, a maximum of 8 inches loose thickness, mechanically compacted to a minimum of 90 percent relative compaction in Building/Exterior Concrete Areas and 95% relative compaction in Paved Traffic Areas, near optimum uniform moisture content (±3% in Building Areas/Exterior Concrete Slab Areas and ±2% in Paved Traffic Areas).

*All compaction requirements stated herein refer to dry density and moisture content relationships obtained through the laboratory standard described by ASTM D-1557.

B. All site preparation and fill placement should be observed by a representative of the Geotechnical Engineer.

C. Where field density tests indicate that required compaction and/or moisture content has not been attained, the fill shall be reconditioned as necessary and recompacted to the required density and/or moisture content prior to placing additional material. The Contractor shall be responsible for placing, moisture conditioning and compacting approved material in accordance with these specifications.

D. Sufficient testing and inspection should be performed to assure compliance with the recommended compaction standards. Samples of proposed native or imported fill should be submitted to the Geotechnical Engineers material testing laboratory for assessment at least 48 hours prior to placement or importing to the site (whichever is soonest).

3.08 FINISH

A. Fill slopes shall be compacted by slope rolling and trimming or shall be overfilled and trimmed back to planned grade. The completed fill shall be finished true to line and grade. Depressions shall be filled and compacted and all loose material shall be removed.

B. After completion of compaction and finish grading operations, fill slopes, horizontal surfaces disturbed by construction operations, and cut slopes shall be moisture conditioned and "trackwalked" to provide a firm and uniformly roughened surface free of loose material.

C. See also requirements in landscape specifications for slope and landscaped area requirements.

3.09 CLEAN UP

A. Remove all debris and stains resulting from the work of this section, including any and all excess material, which shall be removed from the project site.

END OF SECTION

SECTION 31 23 16

TRENCHING, BACKFILLING AND COMPACTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Trenching and other excavation needed for the installation of pipe and appurtenances up to within 5 feet of buildings or structures.

B. Provide and install bedding material as specified.

C. Backfill and compact trenches and excavations with suitable material and as specified.

D. Patch trenches in existing surfaced areas to match surrounding surfacing.

E. Provide and install subbedding material as required.

F. Seal utility trenches where utilities enter the building under the perimeter foundation with concrete, clayey soil, sand-cement slurry, or controlled density fill (CDF) as approved by the geotechnical engineer.

G. Provide seat wall backfill material as required.

H. Install Controlled Density Backfill as shown on the approved drawings.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications apply to this Section.

B. Related Sections include the following:

1. Earthwork – Section 31 20 00

2. Site Drainage – Section 33 41 00

1.03 SUBMITTALS

A. In accordance with Section 01 33 00, Submittal Procedures:

1. Sand equivalent and gradation analysis of bedding and backfill materials.

2. Submit gradation and sand equivalent analysis for seat wall backfill material.

3. Submit Controlled Density Fill mix design.

1.04 REFERENCES

A. Standard Specifications

1. Where referred to in these specifications, "Standard Specifications" shall mean the State of California Department of Transportation Standard Specifications. All work shall be carried out in conformance with the Standard Specifications unless otherwise specified herein.

2. Where referred to in these specifications, "City Standards" shall mean the latest edition of the City of South San Francisco or California Water Company Bayshore District Design and Construction Standards. All applicable work shall be carried out in conformance with the referenced standard.

B. South San Francisco Unified School District Standard Design and Construction Standards.

1.05 EXISTING SITE CONDITIONS

A. The Contractor shall acquaint himself with all site conditions. If unshown active utilities are encountered during the work that are not shown on the topographic map, the Engineer shall be promptly notified for instruction. Failure to notify will make the Contractor liable for damage to these utilities arising from Contractor's operations subsequent to his discovery of such unshown utilities.

B. The Contractor shall review the Soils Report and plan their work accordingly.

1.06 QUALITY ASSURANCE

A. Testing Agency: The project Geotechnical Engineer (Inspector) shall verify the adequacy of sub-bedding conditions and monitor bedding, backfilling and compaction.

B. Unsatisfactory Conditions: The Inspector will advise the Contractor immediately if unsatisfactory conditions or test results are observed. The area where compaction is unsatisfactory shall be reworked until the required density has been attained. The Inspector shall have the authority to reject structural bedding or backfill until corrective measures to measure unsuitable material or rework as needed have taken place. It shall be the sole responsibility of the Contractor to achieve the specified degree of compaction.

1.07 PROTECTION FROM CAVING

A. Construction Safety Orders

1. Nothing in this section shall be deemed to allow the use of a shoring, sloping, or protective system less effective than that required by the Construction Safety Orders. The Contractor shall take all necessary measures to protect the workmen and adjacent areas and structures from the hazards of the trenching or excavation operations. Sheet piling and other sheeting shall be withdrawn in such a manner as to prevent caving at the walls of excavation or damage to piping or other structures. Except as may be hereinafter modified, no sheeting shall be left in the trench and no backfill shall be made against the sheeting before it is removed. Any sheeting extending below the invert of the pipe shall be left in place by cutting off in a manner satisfactory to the Inspector.

B. Liability

1. Nothing in this section shall be construed to impose tort liability on the Architect, or the Design Engineer.

PART 2 PRODUCTS

2.01 TRENCH STABILIZATION SUBBEDDING

A. Drain rock for trench stabilization subbedding shall be of the nominal sizes designated as 3/4" x 1/4".

2.02 BEDDING MATERIAL

A. Bedding material shall be well graded sand material free from vegetable matter and refuse.

B. The minimum sand equivalent value shall be 30.

C. The grading shall conform to the following:

Sieve	Percentage Passing	
	Minimum	**Maximum**
1"	100	--
3/4"	90	100
3/8"	65	100
#4	30	100
No. 200	0	15

D. Bedding for public water improvements shall comply with the California Water Company Bayshore District Standards.

2.03 BACKFILL

A. Trench backfill material within landscape areas may be native excavated material free of vegetable matter, refuse and other unsatisfactory material. Native trench backfill is not allowed in proposed concrete or asphalt paved areas. Expansive onsite soils as identified by the Geotechnical Engineer should not be used.

B. The backfill material shall be free of stone and lumps exceeding 3 inches in greatest dimension.

C. Backfill material shall have Plastic Index (PI) value of 15 or less. Liquid limit (LL) value shall be no more than 40. The R-Value should be greater than 40, and contain at least 10 percent fines. The backfill shall be free of organic materials and debris and should be pre-approved by the geotechnical engineer prior to installation.

2.04 GRANULAR BACKFILL MATERIAL

A. Granular backfill material shall be gravel, sand or rock material free from deleterious materials.

B. Minimum sand equivalent value shall be 30.

C. Granular backfill material other than shall conform to the following:

Sieve Size	Percentage Passing
3"	100
3/4"	-
3/8"	-
No. 4	40 to 100
No. 30	10-100

D. Backfill for public water improvements shall comply with California Water Company Bayshore District Standards.

E. Class 2 Aggregate base can be used as granular backfill material. Aggregate base shall be Class 2, and the combined aggregate shall conform to the 3/4-inch maximum grading specified in Section 26-1.02A "Class 2 Aggregate Base" of the 2006 Caltrans Specifications.

2.05 SEAT WALL BACKFILL

A. Caltrans Class 2 permeable material shall be used for filling behind seat walls and shall consist of clean, coarse sand and gravel or crushed stone, conforming to Caltrans Class 2 Permeable Material Specifications (latest edition.

B. In lieu of using Class 2 Permeable material for seat wall backfill, the seat wall backfill may be backfilled with locally available, clean, ½" to ¾" maximum size crushed rock or gravel could be used, provided it is encapsulated in non woven geotextile filter fabric, such as Mirafi 140 N or an approved alternative (as defined in Section 2.5).Clean ½" to ¾" maximum size crushed rock or gravel grading shall meet the following.

Sieve Size	Percentage Passing
1"	88 to 100
3/4"	70 to 100
1/2"	-
3/8"	5 to 35
No. 4	0-16

2.06 FILTER FABRIC

A. All filter fabric shall be Mirafi 140N or approved equal and meet the following Minimum Average Roll Values unless otherwise specified by the geotechnical engineer.

1. Grab Strength (ASTM D-4632) 180lbs
2. Mass Per unit Area (ASTM D-4751) 6 oz/yd^2

3.	Apparent Opening Size (ASTM D-4751)	70-100 U.S. Std. Sieve
4.	Flow Rate (ASTM D-4491)	80 gal/min/ft^2
5.	Puncture Strength (ASTM D-4833)	80 lbs

2.07 CONTROLLED DENSITY FILL

A. Controlled Density Fill shall be Class B, 200 psi maximum compressive strength, normal flowability, 8 to 10 inches slump with a permeability of less than 10^{-6} cm/sec.

B. Controlled Density Fill shall be a mixture of Portland cement, fly ash, aggregates, water, and admixtures which has been batched and mixed in accordance with ASTM C94. Portland cement shall conform to ASTM C150 or AASHTO M85. Fly ash shall be Class F or Class C. Aggregates shall conform to ASTM C33. Admixtures shall conform to ASTM C260, ASTM C494, or AASHTO M194.

PART 3 EXECUTION

3.01 EXCAVATION

A. The Contractor shall make all necessary excavations to construct the work shown on the Drawings and in accordance with trench detail appropriate to the utility being installed and the City Standards.

B. The Contractor shall perform all excavations of every description and all substances encountered to the depth indicated on the drawings. During excavation, that material suitable for backfilling shall be deposited in an orderly manner a sufficient distance from the banks for the trench to avoid overloading and to prevent slides or cave-ins. All excavated material no require or suitable for backfill shall be removed and properly disposed of offsite.

C. Excavation shall include the removal of all materials or surface obstructions of any nature that would interfere with the execution of the work, and their replacement to equivalent preconstruction condition after installation of utilities.

D. All trench excavation work shall conform to the Division of Industrial Safety Construction Safety Orders, which are currently in use.

3.02 TRENCH WIDTH AND DEPTH

A. The maximum allowable width of trench measured at the top of the pipe shall be the outside diameter of the pipe exclusive of bells and collars, plus twenty-four (24) inches, and such maximum width shall be inclusive of all trench sheeting. Minimum width of trench for pipes 18" diameter and less shall be pipe diameter plus 6". Maximum width of trench for pipes 18" diameter and less shall be pipe diameter plus 9". Minimum width of trench for pipes 18" diameter and less shall be pipe diameter plus 9". Maximum width of trench for pipes 18" diameter and greater shall be pipe diameter plus 12". Whenever the maximum allowable trench width is exceeded for any reason, the Contractor shall, at his expense, embed or cradle the pipe in concrete in a manner satisfactory to the Engineer.

B. The trench shall be excavated to the dimensions and depth shown on the Drawings and in a manner, which will produce a firm foundation for supporting the entire length of each section of pipe. Bell holes shall be provided so that the load is carried on the pipe barrel.

3.03 CONTROL OF WATER

A. The Contractor, at his own expense, shall provide sufficient pumping equipment and the operation thereof to remove ground water from the excavation.

B. Water shall be disposed of in such a manner as to cause no injury to public or private property, nor be a menace to the public health. Discharges directly to storm drainage systems, ditches, and creeks shall not be allowed.

C. Dewatering shall be performed under a contractor obtained permit from either the City of South San Francisco (if discharge is to the sewer system) or the Regional Water Quality Control Board (if discharge is to the storm drain system). The Contractor is advised that both of these agencies may require testing of the proposed dewatering discharge for contaminants. It shall be the sole responsibility of the Contractor to apply for and obtain the necessary permits, obtain and pay for any required water quality tests, design shoring and dewatering systems, and pay any fees associated with discharging the water to the sanitary sewer system if that option is selected. Permits must be obtained prior to any discharge occurring.

3.04 UNSUITABLE SUB-BEDDING

A. Where soft, wet, spongy, or unsuitable trench foundation is encountered, sub-bedding material shall be placed under the pipe to facilitate construction. The cost of furnishing and placing sub-bedding material shall be included in the price bid for the job.

3.05 BRACING EXCAVATIONS

A. Excavations shall be so braced and supported that they will be safe, and the ground alongside the excavation will not slide or settle, and all existing improvements of any kind, either on public or private property will be fully protected from damage.

B. If any damage does result to such improvements, the Contractor shall make the necessary repairs or reconstruction at his own expense.

3.06 PIPE BEDDING

A. Bedding material shall be placed under the pipe before the pipe joints have been completed and inspected.

B. Bedding material shall be placed carefully around and under the pipe in horizontal layers 4 inches thick after compaction.

C. The bedding material shall be brought up uniformly on each side of the pipe.

D. Bedding material shall have the proper moisture content to assure maximum compaction by using hand or pneumatic tampers.

E. Bedding shall be accomplished in a manner which will not disturb the pipe but will secure a relative compaction of 90 percent.

F. Bedding shall be installed up to 12 inches below and over the bottom/top of the pipe.

G. Utility trenches shall be sealed with concrete, clayey soil, sand-cement slurry, or controlled density fill (CDF) where the utility enters the building under the perimeter foundation to prevent migration of water beneath the building.

3.07 TRENCH BACKFILL

A. Backfill material shall be placed after the pipe and bedding have been inspected by the Inspector. Native backfill may be used, at the contractor's option, outside of exterior slab and pavement areas. All trenches shall be backfilled to pavement or exterior slab structural section subgrade, or to finished grade in unpaved areas.

B. Backfill and compaction of utility trenches in and immediately adjacent to building pads, driveways, parking, and other flatwork areas should be such that no settlement will occur.

C. Where trenches closely parallel a footing and the trench bottom is within a 2 horizontal to 1 (one) vertical plane, projected outward and downward from any structural element, grout slurry should be utilized to backfill that portion of the trench below this plane. The use of slurry backfill is not required where a narrow trench crosses a footing at or near a right angle.

D. Granular Backfill (Non-native)

1. The backfill material shall be placed in layers not exceeding 6" in uncompacted thickness.
2. Compaction may be accomplished by adding sufficient water to the material as it is placed in the trench to achieve 95 percent relative compaction.
3. Supplemental compactive effort using vibratory means shall be employed if necessary to obtain specified degree of compaction.
4. Ponding or the use of excessive amounts of water will not be allowed.
5. Vibratory or other compaction equipment shall be used whenever necessary to obtain the required compaction, and must be used within 12 inches of pavement subgrade in paved areas, where compaction is required to be 95% R.C.
6. Utility trenches shall be sealed with concrete, clayey soil, sand-cement slurry, or controlled density fill (CDF) where the utility enters the building under the perimeter foundation to prevent migration of water beneath the building.

E. Native Backfill

1. The backfill material shall be placed in layers not exceeding 6" in uncompacted thickness.
2. Compaction may be accomplished by adding sufficient water to the material as it is placed in the trench to achieve 90 percent relative compaction.
3. Supplemental compactive effort using vibratory means shall be employed if necessary to obtain specified degree of compaction.
4. Ponding or the use of excessive amounts of water will not be allowed.
5. Vibratory or other compaction equipment shall be used whenever necessary to obtain the required compaction.

6. Utility trenches shall be sealed with concrete, clayey soil, sand-cement slurry, or controlled density fill (CDF) where the utility enters the building under the perimeter foundation to prevent migration of water beneath the building.

F. Controlled Density Fill

1. Controlled Density Fill shall be provided where shown on the drawings and shall provide a non-segregating, self-consolidating, free-flowing, and excavatable material which will result in a hardened, dense, non-settling fill.

2. Measuring, mixing, delivery, and placement of controlled density fill shall be in accordance with ASTM C94.

3. Controlled Density Fill shall be flowable, and shall be installed so as to flow under and provide full support for the entire length of the pipe.

4. Controlled Density Fill shall be brought up uniformly to the elevation shown on the drawings, and shall completely fill the area designated without voids.

5. Each filling stage shall be as continuous an operation as practicable.

6. Trench sections to be filled shall be contained at either end by bulkheads or earth fill.

7. Controlled Density Fill shall have a temperature of at least 40 degrees F at the time of placement, and shall not be placed when either ground or ambient air temperatures are less than 38 degrees F.

8. Native backfill shall not be placed over Controlled Density Fill for at least 12 hours after placement.

9. Traffic shall not be allowed over Controlled Density Fill for at least 24 hours after placement or until Controlled Density Fill is compacted or hardened to prevent rutting by construction equipment or traffic, whichever is later.

3.08 SEAT WALL BACKFILL

A. Trenches for seat wall backfill shall be as indicated on the drawings. Compact entire layer using a vibrating base plate compactor weighting no less than 200 lbs. Compactor should have a vibrating frequency no less than 1,600 cycles per minute. At least 3 passes should be made across the material. The geotechnical engineer should be on site full time to observe the placement and compaction of the material.

B. The seat wall backfill material shall be placed in layers not exceeding 8" in uncompacted thickness.

C. Compaction may be accomplished by adding sufficient water to the material as it is placed in the trench to achieve 90 percent relative compaction.

D. Vibratory or other compaction equipment shall be used whenever necessary to obtain the required compaction.

E. The space below the pipe invert shall be filled with a layer of Class 2 permeable material, upon which the pipe shall be laid with perforations down. Sections shall be joined as recommended by the pipe manufacture.

F. Rocks, bricks, broken concrete, or other hard material shall not be used to give intermediate support to pipes. Large stones or other hard objects shall not be left in contact with the pipes.

G. Alternatively, excavations for seat wall backfill may be filled with Class 2 permeable material (as defined in section 2.4). Alternatively, locally available, clean, ½" to ¾" maximum size crushed rock or grave could be used, provided it is encapsulated in non-woven geotextile filter fabric, such as Mirifi 140 N or an approved alternative (as defined in Section 2.5). The upper 2 feet of retaining wall backfill (above back drainage) should be comprised of low permeability soil to limit surface water infiltration into the retaining wall back drainage system.

3.09 RESURFACING

A. Onsite: Where trenches occur in existing surfaced areas, the existing surfacing shall be sawcut six inches wider than the trench along both sides. Trench patch shall be a minimum of 2.5" or match the existing asphalt thickness.

3.10 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 11 00

SUBGRADE PREPARATION & BASE MATERIAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide subgrade preparation and the base material installation complete, including clearing, grading, excavation, and filling and dewatering.

1.02 QUALITY ASSURANCE

A. Reference Standards

(1) Perform all work in accordance with all applicable laws, codes and regulations required by the City of South San Francisco.

(2) Reference to "Standard Specifications" shall mean the Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS.

B. Related work specified elsewhere includes:

(1) Section 31 20 00, Earthwork.

(2) Section 31 10 00, Site Clearing.

(3) Section 32 13 13, Landscape Concrete.

(4) Section 32 80 00, Irrigation.

(5) Section 32 90 00, Planting.

C. Stipulations

(1) The finished surface of the subgrade, at any point, shall not vary more than 0.05' above or below the elevation indicated on the drawings.

D. ASTM Standards.

1.03 SOILS REPORT

A. A soil investigation report has been prepared for the project.

B. The report is available in the office of the Architect and the Construction Manager for inspection by the Contractor. Unless otherwise specified, it is intended that all work be performed in accordance with the provisions of the report.

C. Drilled piers may encounter ground water. Excavations for drilled piers may require casings and installation of concrete by means of pumping under the direction of the Geotechnical Engineer.

1.04 SOILS BORINGS

A. Subsurface soils investigations have been made at the site and logs of the test holes are available with the Soils Report. Such investigations have been made for the purposes of design only neither the Landscape Architect, Owner, nor the Soils Engineers guarantee adequacy or accuracy of the data, or that data are representative of all conditions to be encountered. Such information is made available for general information only and shall not relieve the Contractor of the responsibility for making his own investigations.

PART 2 - MATERIALS

2.01 AGGREGATE BASE - CLASS 2

A. Aggregate base shall be Class 2, and free from vegetable matter or other deleterious substances. The percentage composition by weight of aggregate base shall conform to Section 26 of the Standard Specifications.

2.02 RECYCLED AGGREGATE BASE - CLASS 2

A. Subject to the approval of the Geotechnical Engineer, recycled aggregate base shall be Class 2, and free from vegetable matter or other deleterious substances. The percentage composition by weight of aggregate base shall conform to Section 26 of the Standard Specifications. Existing material may be reused if it meets the specifications for Aggregate Base - Class 2 and the required compaction and the approval of the Geotechnical Engineer.

PART 3 - EXECUTION

3.01 SUBGRADE PREPARATION

A. Verify that subgrade is free or organic matter and meet the requirements of the referenced geotechnical report.

B. Subgrade is that area on which pavement, surfacing, base, sub-base or layer of any other material which may be specified is to be placed.

C. Scarify subgrade to a depth of at least 12" below the final subgrade elevation, harrow, dry roll and break clods to achieve a finely divided condition. Remove all boulders, hardened material or rock encountered. The earth shall be uniform for the full depth and width of the subgrade.

D. Water the loose earth in a uniform manner and quantity so that the penetration will be at least 4".

E. Harrow the earth to mix the wet earth with the dry beneath, until the whole mass of loose material is at the proper state of moisture for compaction.

F. The finished subgrade, immediately prior to placing subsequent material thereon, shall be in accordance with the Standard Specifications for Class 2 Aggregate Base and the requirements of the referenced geotechnical report.

G. Within areas proposed to receive pavements or concrete slabs, the upper 12 inches of native soil should be uniformly moisture conditioned to above optimum moisture content and compacted to a minimum of 95 percent of maximum dry density as determined by ASTM Test Method D1557.

H. Fill material placed more than 12 inches below the final pad subgrade should be placed in 8" thick lifts and uniformly moisture conditioned to slightly above optimum moisture content and compacted to a minimum of 95 percent relative compaction.

3.02 AGGREGATE BASE

A. Deliver to site as a uniform mixture and spread each layer in one operation without segregation.

B. Class 2 Aggregate Base shall be readily compacted and spread with equipment that will provide a uniform layer conforming to the planned section, and as specified in Section 26 of the Standard Specifications Base and the requirements of the referenced geotechnical report.

C. Compact Aggregate Base to a minimum of 95 percent of maximum dry density as determined by ASTM Test Method D1557.

3.03 CLEANUP per Section 01 77 00

END OF SECTION

SECTION 32 12 16

ASPHALT CONCRETE PAVING AND BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide, spread and compact aggregate base as shown on the Contract Documents and as specified herein.

B. Provide, spread and compact asphaltic concrete pavement.

C. Adjusting to finish grade any and all new or existing, cleanouts, drainage structures, trench drains, etc., which are included in the limits of work.

D. Provide and place header boards at unconfined edges of asphalt paved areas.

E. Provide and place seal coat on all asphalt surfaces (two coats emulsified asphalt with sand and two coats without sand) per Section 32 12 17 - Asphalt Pavement Coating Application.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this Section.

B. Related Sections includes, but are not limited to the following:

1. Earthwork - Section 31 20 00
2. Trenching, Backfilling and Compaction - Section 31 23 16
3. Asphalt Pavement Coating Application - Section 32 12 17
4. Concrete Curb, Gutter, and Sidewalk/Walkway - Section 32 16 13

1.03 REFERENCES

A. Reference Data:

1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.

B. City of South San Francisco Standard Plans and Specifications.

C. Caltrans Standard Specifications.

D. South San Francisco Unified School District Standard Design and Construction Standards

1.04 QUALITY ASSURANCE

A. Testing and inspection of the aggregate base, aggregate subbase and asphaltic concrete shall be done by a testing laboratory retained and paid for by the District. Any areas receiving failing tests shall be

reworked by the Contractor to achieve the minimum specified degree of compaction. It shall be the sole responsibility of the Contractor to achieve satisfactory results.

B. Test Methods: Unless otherwise indicated, tests shall be made in conformance with the following standard methods:

1. Relative compaction shall be determined by Test Method No. California 216 and 231.
2. Design and Construction Standards of the City of South San Francisco latest edition.
3. Caltrans Standards and Specifications, July 2006 Edition.

1.05 SUBMITTALS

A. Submit asphalt mix design parameters and certificates of compliance.

B. Submit certificate of compliance for aggregate base and aggregate subbase.

C. Submit gradation and strength analysis of any recycled Class 2 aggregate base.

D. Submittals shall conform to the requirements of Section 01 33 00.

PART 2 PRODUCTS

2.01 AGGREGATE BASE

A. Aggregate for aggregate bases shall be clean and free of vegetable matter and other deleterious substances.

B. Aggregate base shall be of such a nature that it can be compacted readily under watering and rolling to form a firm, stable base.

C. Aggregate base shall be Class 2, and the combined aggregate shall conform to the 3/4-inch maximum grading specified in Section 26-1.02A "Class 2 Aggregate Base" of the 1992 Caltrans Specifications.

D. Recycled CL2 Aggregate base materials meeting the gradation and strength requirements of virgin material is acceptable. Aggregate for recycled aggregate bases shall be clean and free of vegetable matter and other deleterious substances. Recycled aggregate base shall be of such a nature that it can be compacted readily under watering and rolling to form a firm, stable base.

E. Site recycled CL2 Aggregate base may be used for a portion of the CL2 aggregate base as described on the plans. See Section 31 10 00.10, Site Preparation for more information on reuse of the existing asphaltic concrete and aggregate base as recycled CL2 Aggregate base.

2.02 ASPHALT CONCRETE

A. The asphalt concrete shall be Type A, 1/2 inch maximum shall conform to the applicable portions of Section 39 of the Caltrans Standard Specifications.

2.03 HEADER BOARDS

A. Header boards shall be constructed of nominal 2"x 6" redwood, meeting the requirements of Section 20-2.12, "Lumber", of the Caltrans specifications.

2.04 SEAL COAT

A. See Section 32 12 17 - Asphalt Pavement Coating Application for seal coat specifications.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION FOR BASE MATERIAL

A. Subgrade preparation shall conform with the requirements in Section 31 20 00 - Earthwork, and shall not vary more than 0.05 foot above, or 0.05 foot below the grade established by the plans.

B. Prepared subgrade shall be inspected by the independent testing laboratory retained by the District prior to the placement of any aggregate base.

C. As per Section 31 20 00 - Earthwork.

3.02 SPREADING

A. Aggregate base shall be delivered to the roadbed as uniform mixtures and shall be graded in layers or windrows. Segregation shall be avoided and the base shall be free from pockets of coarse or fine material.

B. The aggregate base, after spreading as above specified, shall be shaped to such thickness that after watering and compacting the completed base will conform to the required grade and cross section, within the tolerances specified in Section 26-1.05 "Compacting" of the Caltrans Specifications.

C. The base shall be spread, watered and compacted in layers not to exceed 6 inches in compacted thickness to achieve the specified thickness.

3.03 COMPACTION AND TOLERANCE

A. The relative compaction of the base shall not be less than 95 percent.

B. The finished surface of the aggregate base shall not vary more than 0.05 foot from the design grades.

C. Aggregate base which fails to meet the specified tolerances shall be reshaped, dewatered and recompacted at the Contractor's expense.

3.04 SUBGRADE PREPARATION FOR ASPHALT CONCRETE

A. All construction beneath the subgrade shall be completed, including pipeline testing, prior to asphalt concrete placement.

B. Subgrade shall not vary more than 0.05 foot above or below design grade.

C. Any soft spots in the subgrade shall be repaired by the Contractor, regardless of cause, prior to paving.

3.05 TACK COAT

A. Apply tack coat of RS-1 or CRS1 Emulsion to vertical surfaces of existing surfacing that will come into contact with asphalt concrete.

3.06 SPREADING AND COMPACTING ASPHALT CONCRETE

A. Shall be in accordance with Section 39 of the Caltrans Standard Specifications.

3.07 ASPHALT REFINEMENT COURSES

A. Surface preparation and application of seal coat shall be per the manufacturer's recommendations.

B. Asphalt refinement courses are required to seal the asphalt areas and to provide a less coarse surface for children.

C. Asphalt refinement courses shall consist of two coats of emulsified asphalt with sand followed by two coats of emulsified asphalt without sand. See Section 32 12 17 - Asphalt Pavement Coating Application.

3.08 STRUCTURE ADJUSTMENT

A. The Contractor shall mark the location of all structures to be adjusted to grade and shall be responsible for their location after paving operations are completed.

B. After surfacing or resurfacing is completed, the Contractor shall construct or reconstruct the structures to grade as shown on the plans.

3.09 FLOW TEST

A. Finished pavement areas shall be flow tested in the presence of the Inspector of record to confirm that positive gradients that facilitate proper and complete surface drainage, have been achieved in all paved areas.

B. Any areas that fail the flow test, defined as any area where depth of ponding water exceeds 1/4 inch or where the surface of a ponding area exceeds 10 square feet, shall be repaved to achieve positive drainage.

3.10 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 12 17
ASPHALT PAVEMENT COATING APPLICATION

GENERAL

1.01 SUMMARY

A. Related Sections:
   1. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specifications, apply to this Section.

1.02 DESCRIPTION

A. Clean surface of asphalt prior to crack sealing/filling or application of sealcoat.

B. Perform crack sealing/filling prior to application of sealcoat.

C. First apply two coats of emulsified asphalt pavement sealcoat with sand to all new and existing asphalt pavement areas as shown on the approved drawings.

D. Second apply two coats of emulsified asphalt pavement sealcoat without sand over the areas previously coated with emulsified asphalt pavement sealcoat with sand as shown on the approved drawings

1.03 REFERENCES

A. ASTM D-4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Tester.

B. ASTM D-4060 Test Method for Abrasion Resistance of Organic Coatings by the Taber Abrasion.

C. ASTM D522-93A Standard Test Method for Mandrel Bend Test of Attached Organic Coatings.

D. ASTM G-155 QUV Accelerated Weathering Environment. Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.

E. ASTM D-2486 MEK rub test for chemical resistance.

F. ASTM D-570 Standard Test Method for water absorption of plastics.

G. ASTM E-303 British Pendulum test for friction.

H. EPA 24 ASTM D3960-05 Volatile Organic Compounds.

I. ASTM D2047-04 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

J. ASTM C1028-07 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.

K. Americans with Disabilities Act Accessibility Guidelines (ADAAG) Bulletin #4: Ground and Floor Surfaces, static coefficient of friction for wet surfaces along an accessible route, when measured by the NBS-Brungraber machine using a silastic sensor shoe to not exceed 0.6 for a level surface and 0.8 for ramps. These values are included in the advisory material in the Appendix to ADAAG.

L. South San Francisco Unified School District Standard Design and Construction Standards.

1.04 DEFINITIONS

A. "Accredited Applicator" is an applicator who is accredited by the coating supplier to apply the asphalt pavement coating.

B. "The Work" is the application of the coating to the surface.

C. "Owner" means the Owner and refers to the representative person who has decision-making authority for the Work.

1.05 REQUIRED SUBMITTALS

A. The following documents are required for submittal review:
   1. A copy of the current year accreditation certificate available from the Accredited Applicator or written verification from the coating supplier that the contractor is qualified to perform this Work.
   2. Written and published specification for the application of the selected asphalt pavement coating.
   3. Confirmation of coating color (black).
   4. Proof of coating performance through a Certificate of Analysis or equal document as provided by the Accredited Applicator or the coating supplier.
   5. Asphalt crack sealer/filler.

PART 2 PRODUCTS

2.01 SEALCOAT WITHOUT SAND

A. The materials for Asphalt Sealcoat immediately prior to mixing shall conform to the following requirements:
   1. Asphaltic Emulsion shall be SS1h or CSS1h. Table 1 or 2, with the exception of the penetration on residue from distillation which will conform to a value of 20 to 60, Clay stabilized emulsion, with a ph not greater than 7.0, and a solids content not less than 45% may be used.
   2. The properties of the SS1h shall be determined in accordance with AASHTO designation T59 "testing emulsified asphalt."
   3. Water shall be potable and of such quality that the water will not separate from the emulsion before the sealcoat is applied.
   4. Mineral Aggregate components shall be 100% passing the #16 mesh sieve. These components shall be a natural or manufactured consisting of clean, hard, durable, uncoated particles that are clean and free from decomposed materials, organic materials and other deleterious substances. The sieve analysis of the Mineral Aggregate components shall be determined in accordance with the A.S.T.M. test methods C136 or Cal Test 202.
   5. The Asphalt Sealcoat materials, as manufactured, undiluted, except as noted, shall conform to the following requirements:

Table 1 Asphalt Sealcoat RequirementS

	MIN	MAX	METHOD
Weight (per gallon)	9.0 lbs		A.S.T.M. D244
Cone Penetration	340m.m.	700	A.S.T.M. D217
% Non-Volatile	50		ASMA A-1*
% Non-Volatile Soluble in Tri-Clorethylene	10	35	A.S.T.M. D2042
Wet Track Abrasion		35 gram loss	A.S.T.M. D3910
Mineral Aggregate Components	#16 Sieve 100% passing		A.S.T.M. C136
Dried Film Color Viscosity	Black 75 KREB		A.S.T.M. D562
Accelerate Weathering	No Deterioration		Fed Spec TI-C-555B
*Weigh 10 grams of homogenous product into a previously tarred ointment can. Place in a constant temperature oven at 325 degrees F for 90 minutes. Cool, reweigh and calculate non-volatile components.			

2.02 SEALCOAT WITH SAND

A. The materials for Asphalt Sealcoat with Sand shall be the same material s as listed above for the Sealcoat Without Sand except as noted below.

B. Mix #30 mesh sand and additional binder of 1/10 gallon SS1h asphalt emulsion per gallon of undiluted asphalt Sealcoat. The addition of the sand shall not exceed 3 pounds per gallon of undiluted asphalt sealcoat.

2.03 SEALCOAT SAND

A. Asphalt Sealcoat sand shall be #30 mesh sand.

2.04 TACK COAT

A. Slow setting asphalt emulsion SS1h.

2.05 HERBICIDE

A. Provide approved herbicide, tinted for visual identification, non-oil based, non-flammable formulation, and complying with all current California and EPA environmental regulations.

2.06 EQUIPMENT

A. The Accredited Applicator is required to use the proper equipment in the application of the asphalt pavement coating as per the recommendation of the coating supplier.

2.07 CRACK SEALER

A. Cracks less than 1/2 inch in width: Guard Top Crack Filler or approved equal.

B. Cracks greater than 1/2 inch in width: #4 sheet mix asphalt.

PART 3 EXECUTION

3.01 PRE-CONDITIONS

A. Pavement:
   1. Asphalt pavement must be stable, well compacted and generally in excellent condition for the application of the asphalt pavement coating to be successful.

B. Asphalt Pavement Marking Removal:
   1. Pavement markings may be removed by sandblasting, water-blasting, grinding, or other approved mechanical methods. The removal methods should, to the fullest extent possible, cause no significant damage to the pavement surface.
   2. The Inspector shall determine if the removal of the markings is satisfactory for the application of the asphalt pavement coating. Work shall not proceed until this approval is granted.

3.02 SURFACE PREPARATION FOR SEALCOAT

A. The surface to receive Asphalt Sealcoat must be free of all foreign material and dry immediately prior to sealcoat application. Cleaning may be by air blowing, vacuum, mechanical sweeper, washing, or other techniques as approved by the Engineer. If washing the existing surface is used, the surface shall not have any standing water prior to application of the sealcoat. Salt, cleaning agents, fertilizers, hard water deposits and other such chemicals will promote lack of bonding of the sealcoat to the existing surface any may require extraordinary cleaning measures.

B. Perform crack sealing/filling, prior to the application by Contractor of the Sealcoat. Cracks shall be cleaned of dirt and organic matter by pressure washing. After drying, fill cracks with asphalt emulsion. All cracks must be sealed/filled prior to application of the sealcoat. Cracks that contain weed and other

live vegetable matter must be treated with a locally approved non-oil based sterilent prior to filling the cracks.

C. Prior to application of sealcoat, deposits of grease or oil shall be cleaned by scraping, burning, and/or or the use of approved detergents in order to promote adhesion of the sealcoat. After cleaning the areas above, the areas shall be sealed with an oilseal. Oilseal shall be a quick drying latex emulsion with suitable admixtures manufactures specifically for the purpose of isolating the Asphalt Sealcoat from any residual oils, petroleum grease, and gasoline stained pavement. The properties of the Oilseal shall be such as to be compatible with the Asphalt Sealcoat.

D. In areas where the foreign oil or grease has penetrated the asphalt concrete such that cleaning as described above is not effective, the affected areas shall be removed to the depth necessary but not less than ¾ inch. The removed asphalt concrete shall be replaced with new asphalt concrete.

E. On excessively weathered surfaces or areas such that cleaning operation leave a film of dust, a tack coat of SS1h shall be applied. The tack coat shall consist of one (1) part SS1h with four (4) parts water or two (2) parts Asphalt Sealcoat with one (1) part water applied at a rate of 0.05 to 0.10 gal/sq. yd. The tack coat must be dry prior to application of the Asphalt Sealcoat. Application of the sealant shall be by distributor spray bar, with hand spraying kept to a minimum. Temperature of the asphalt sealant shall be sufficiently high to permit uniform spray pattern. For asphalt cements the minimum temperature shall be 150°C (300°F). A spray pattern for asphalt emulsion is improved by heating. Temperatures in the 55°C (130°F) to 70°C (160°F) range are desirable. A temperature of 70°C (160°F) shall not be exceeded since higher temperatures may break emulsion.

3.03 APPLICATION OF SEALCOAT WITHOUT SAND

A. Application of the Asphalt Sealcoat shall be by mechanical means using rubber faced squeegees, brooms, distributor bar/wand, or combinations of these or other techniques approved by the Manufacturer and by the Engineer.

B. The Asphalt Sealcoat being applied shall be uniform and freeflowing, free of lumps and other inconsistencies. Potable water may be added as necessary as per manufacturer's recommendation, for consistency and spreadability but shall not exceed 15% by volume or as directed by Engineer. If, after the addition of the maximum allowable water volume the sealcoat is unsuitable, the materials shall be rejected and removed from the site.

C. The Asphalt Sealcoat shall not be placed on new asphalt concrete until after a 30 day minimum cure period or as directed by the engineer. .

D. **Asphalt Sealcoat without sand shall consist of two application coats of material.** The sealcoat must be thoroughly dry prior to application of the second or subsequent coats.

E. Application of Asphalt Sealcoat in ambient temperatures in excess of 80 degrees Fahrenheit shall require pretreatment of the asphalt concrete surface with a water mist. The water must not be standing but the surface should be damp prior to sealcoat application. This treatment is also recommended for application on porous surfaces where the water within the sealcoat may be absorbed too quickly by the existing pavement surface.

F. Asphalt Sealcoat shall be applied uniformly over the prescribed area in continuous parallel lines in a manner so that no ridges or uncoated areas shall exist. Application rates will vary depending on the texture of the existing asphalt surfaces requiring more sealcoat than smooth surfaces. Follow manufacturer's recommendations. The following application rate is a guideline only:

Smooth Dense Surface
20-30 gallons/1000 sf

G. Asphalt Sealcoat shall not be applied when the ambient temperature is less than 55 degrees and the surface temperature is less than 60 degrees F. Sealcoat shall not be applied within 24 hours prior to forecasted rain, freezing temperatures, during rain, or when the surface contains standing water.

H. Minimum coefficient of friction requirements for both paving and markings:
   1. Wet Skid Resistance at pavement <6% slope: (when measured by the NBS-Brungraber machine): 0.60.
   2. Wet Skid Resistance at slopes >6%: (when measured by the NBS-Brungraber machine): 0.80.

3.04 APPLICATION OF SEALCOAT WITH SAND

A. Application of the Asphalt Sealcoat with sand shall be by mechanical means using rubber faced squeegees, brooms, distributor bar/wand, or combinations of these or other techniques approved by the Manufacturer and by the Engineer.

B. The Asphalt Sealcoat with sand shall not be placed on new asphalt concrete until after a 30 day minimum cure period or as directed by the engineer. .

C. The Asphalt Sealcoat with sand being applied shall be uniform and freeflowing, free of lumps and other inconsistencies. Potable water may be added as necessary as per manufacturer's recommendation, for consistency and spreadability but shall not exceed 15% by volume or as directed by Engineer. If, after the addition of the maximum allowable water volume the sealcoat is unsuitable, the materials shall be rejected and removed from the site.

D. **Asphalt Sealcoat with sand shall consist of two application coats of material.** The sealcoat must be thoroughly dry prior to application of the second or subsequent coats.

E. Application of Asphalt Sealcoat with sand in ambient temperatures in excess of 80 degrees Fahrenheit shall require pretreatment of the asphalt concrete surface with a water mist. The water must not be standing but the surface should be damp prior to sealcoat application. This treatment is also recommended for application on porous surfaces where the water within the sealcoat may be absorbed too quickly by the existing pavement surface.

F. Asphalt Sealcoat with sand shall be applied uniformly over the prescribed area in continuous parallel lines in a manner so that no ridges or uncoated areas shall exist. Application rates will vary depending on the texture of the existing asphalt surfaces requiring more sealcoat than smooth surfaces. Follow manufacturer's recommendations. The following application rate is a guideline only:

Rough Aged Surface
40-50 gallons/1000 sf

G. Asphalt Sealcoat shall not be applied when the ambient temperature is less than 55 degrees and the surface temperature is less than 60 degrees F. Sealcoat shall not be applied within 24 hours prior to forecasted rain, freezing temperatures, during rain, or when the surface contains standing water.

H. Minimum coefficient of friction requirements for both paving and markings:
   1. Wet Skid Resistance at pavement <6% slope: (when measured by the NBS-Brungraber machine): 0.60.
   2. Wet Skid Resistance at slopes >6%: (when measured by the NBS-Brungraber machine): 0.80.

3.05 OPENING TO TRAFFIC

A. Traffic shall not be allowed on the Asphalt Sealcoat until the sealcoat is thoroughly cured, which in warm weather conditions is approximately 24 hours. Minor scuffing or power steering marks may occur on a newly applied surface in warm weather.

B. Irrigation watering shall be kept off for at least 24 hours prior to and after the application of Asphalt Sealcoat.

C. Striping for parking and traffic flow should be done only after the sealcoat has thoroughly dried. For best results, a high quality Traffic Line paint is recommended.

3.06 WARRANTY

A. Provide 2 year manufacturer's warrant from date of acceptance by owner for durability of surfacing.

END OF SECTION

SECTION 32 12 23.10

PAVEMENT MARKINGS AND SIGNS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish materials and install painted traffic striping and markings.

B. Furnish materials and install traffic signs and posts.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications apply to this Section.

B. Related Sections include the following:

1. Bases and Paving - Section 32 10 00.10

2. Concrete Curb, Gutter and Sidewalk/Walkway – Section 32 16 00.10

1.03 SUBMITTALS

A. In accordance with Section 01 33 00, Submittal Procedures:

1. Paint product data.

2. Sign and sign post product data.

3. Fixed pipe bollard product data.

1.04 REFERENCES

A. California Manual of Uniform Traffic Control Devices (MUTCD), latest edition.

B. California Code of Regulations, Title 24, Part 2 – California Building Code (CBC), latest edition.

C. American with Disabilities Act (ADA), latest edition.

D. South San Francisco Unified School District Standard Design and Construction Standards California Title 24 Regulations

PART 2 PRODUCTS

2.01 STRIPING PAINT

A. The paint to be used on striping shall be commercial quality paint and be applied in two coats to achieve the designed coverage. Thinner shall not be mixed with paint.

B. White paint shall be used on new stall stripes and crosswalks. Blue paint shall be used on all accessible stall markings as required by ADA. Yellow paint shall be used on new loading/unloading zone stripes. Red paint shall be used on all curbs designated for no parking zones and/or firelanes.

C. Handicapped Symbol Background Paint shall be blue color Glidden Co. "Glid-Guard Lifemaster Finish No. 5200/series, Color 1/M 79", or approved equal.

D. Traffic Marking and symbol paint shall be Water-Born, Fast-Dry, Traffic Paint distributed by Fuller-O'Brien Corp, D.J. Simpson (#108-273, White); (#108-280, Blue); or approved equal.

E. Thermoplastic stripes and markings shall be hot applied conforming to CSS Section 84 and shall be Cataphote-Catatherm brand, Pavemark thermoplastic brand or approved equal. Thermoplastic stripes and markings shall have a minimum skid friction value of BPN 35.

F. Red fire lane curb paint shall be Water-Born, Fast-Dry, Traffic Paint distributed by Fuller-O'Brien Corp, D.J. Simpson color "fire red" or approved equal.

2.02 SIGNS

A. Traffic and regulatory signs shall conform to the requirements of the Caltrans Traffic Manual for the type of sign indicated on the plans. Accessible parking signs shall also comply with the applicable sections of California Title 24 regulations and the ADA.

B. Signs shall be mounted at standard heights on 2-inch square unistrut posts set in concrete.

2.03 PAVEMENT MARKERS AND ADHESIVES:

A. Fire hydrant pavement markers shall be two-way retroflective "Blue" markers and shall conform to the applicable requirements of CSS section 85.

B. Adhesive for pavement markers shall be standard set epoxy adhesive conforming to the requirements of CSS Section 95-2-05.

PART 3 EXECUTION

3.01 STRIPING

A. No striping shall be started until all paving work on the entire job has been completed, and the various finished surfaces are sufficiently cured to prevent undue tracking onto new striping.

B. All stripes for parking spaces shall have a width of four inches. Play area striping shall be the width and color shown on the plans. All widths shall be within 1/4-inch of the specified widths.

C. All lines and other shapes shall be clean and sharp as to dimensions and shall be painted or painted out in the locations shows on the plans. Ragged ends of segments, fogginess along the sides, or objectionable dribbling along the unpainted portions of the stripe shall not be permitted.

D. The finished product shall have an opaque, well painted appearance with no black or other discolorations showing through. Any smears shall be painted out with black paint to the satisfaction of the Owner's Representative.

E. The Contractor shall take all reasonable precautions to protect the paint during drying time and may be required to paint out all objectionable tracking. Appropriate traffic control necessary to insure non-tracking as well as reasonable traffic flows shall be the Contractor's responsibility.

F. Painted stripes shall receive two coats of paint to achieve the desired coverage.

G. No work shall be done when the pavement is appreciably damp.

H. Paint shall dry "track free" in not less than thirty (30) minutes and not more than ninety (90) minutes.

3.02 SIGNS

A. Signs shall be installed in the locations shown on the plans and in accordance with the referenced standards for height, setback from the curb, and embedment.

B. Signs for Disabled accessibility shall be installed in accordance with the requirements of the California Building Code.

3.03 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 12 23
PAVEMENT MARKINGS AND SIGNS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish materials and install painted traffic striping and markings.

B. Furnish materials and install traffic signs and posts.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications apply to this Section.

B. Related Sections include the following:
   1. Bases and Paving - Section 32 12 16
   2. Concrete Curb, Gutter and Sidewalk/Walkway – Section 32 16 13

1.03 SUBMITTALS

A. In accordance with Section 01 33 00, Submittal Procedures:
   1. Paint product data.
   2. Sign and sign post product data.
   3. Fixed pipe bollard product data.

1.04 REFERENCES

A. California Manual of Uniform Traffic Control Devices (MUTCD), latest edition.

B. California Code of Regulations, Title 24, Part 2 – California Building Code (CBC), latest edition.

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C. Handicapped Symbol Background Paint shall be blue color Glidden Co. "Glid-Guard Lifemaster Finish No. 5200/series, Color 1/M 79", or approved equal.

D. Traffic Marking and symbol paint shall be Water-Born, Fast-Dry, Traffic Paint distributed by Fuller-O'Brien Corp, D.J. Simpson (#108-273, White); (#108-280, Blue); or approved equal.

E. Thermoplastic stripes and markings shall be hot applied conforming to CSS Section 84 and shall be Cataphote-Catatherm brand, Pavemark thermoplastic brand or approved equal. Thermoplastic stripes and markings shall have a minimum skid friction value of BPN 35.

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A. Traffic and regulatory signs shall conform to the requirements of the Caltrans Traffic Manual for the type of sign indicated on the plans. Accessible parking signs shall also comply with the applicable sections of California Title 24 regulations and the ADA.

B. Signs shall be mounted at standard heights on 2-inch square unistrut posts set in concrete.

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B. All stripes for parking spaces shall have a width of four inches. Play area striping shall be the width and color shown on the plans. All widths shall be within 1/4-inch of the specified widths.

C. All lines and other shapes shall be clean and sharp as to dimensions and shall be painted or painted out in the locations shows on the plans. Ragged ends of segments, fogginess along the sides, or objectionable dribbling along the unpainted portions of the stripe shall not be permitted.

D. The finished product shall have an opaque, well painted appearance with no black or other discolorations showing through. Any smears shall be painted out with black paint to the satisfaction of the Owner's Representative.

E. The Contractor shall take all reasonable precautions to protect the paint during drying time and may be required to paint out all objectionable tracking. Appropriate traffic control necessary to insure non-tracking as well as reasonable traffic flows shall be the Contractor's responsibility.

F. Painted stripes shall receive two coats of paint to achieve the desired coverage.

G. No work shall be done when the pavement is appreciably damp.

H. Paint shall dry "track free" in not less than thirty (30) minutes and not more than ninety (90) minutes.

3.02 SIGNS

A. Signs shall be installed in the locations shown on the plans and in accordance with the referenced standards for height, setback from the curb, and embedment.

B. Signs for Disabled accessibility shall be installed in accordance with the requirements of the California Building Code.

3.03 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

13SECTION 32 13 13

LANDSCAPE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Provide Portland cement concrete site work complete, including the following principal items:

(1) Footings for site furnishings.

(2) Pavements, including aggregate bases.

(3) Footings for site work, pads, seat walls, planter walls, curbs ramps, ramps, steps, bands, and utility collars.

B. Related Sections include:

(1) Section 12 93 00 – Site Furnishings

(2) Section 31 20 00 – Earthwork.

(3) Section 32 31 13 – Chain Link Fencing.

(4) Section 32 80 00 - Irrigation.

(5) Section 32 90 00 - Planting.

1.02 SUBMITTALS

A. Section 01 33 00 – Submittals: Submittal procedures.

B. The Contractor's Testing Laboratory's certificate of compliance.

C. The Contractor shall submit:

(1) Certified copies of mix designs for each concrete class specified including compressive strength test reports.

(2) Certification that materials meet requirements specified.

(3) Certification from vendor that samples originate from and are representative of each lot proposed for use.

(4) Weight master Certificates for concrete delivered to the site and used for improvements.

(5) Mill certifications for reinforcing steel.

(6) Product literature and samples of truncated dome pavers.

(7) Items required under Waiver of Batch Plant Inspection specified herein.

(8) Items required by Form DSA-103 Testing & Inspection Sheet.

D. The Owner's Testing Agency will submit reports on tests and inspections performed to the Owner, the Landscape Architect, the Contractor, and the Division of the State Architect.

E. Schedule of placing for the Construction Manager's review before starting Work.

F. Mock-ups of all materials under this Division shall be supplied for testing as requested by the Project Inspector.

G. Provide mock up of all concrete finishes, color and joints (with curing compound if any to be used) indicated on the drawings. Accepted mock-ups shall be kept at the job site to serve as a prerequisite for all finishes.

1.03 QUALITY ASSURANCE

A. Reference and Standards:

(1) Requirements of GENERAL CONDITIONS and DIVISION NO. 1 applies to all Work in this Section.

(2) Perform work in accordance with all applicable laws, codes and regulations required by City of South San Francisco and the State of California.

(3) Reference to "Standard Specifications" shall mean the current Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS.

(4) The American Concrete Institute (ACI): "Manual of Concrete Practice," Parts 1, 2 and 3.

(5) California Code of Regulations. Title 24, 2016 edition, also known as California Building Code (CBC).

(6) American Society for Testing and Materials (ASTM).

B. Stipulations:

(1) Finish Surface Tolerance: 1/4-inch maximum variation in 10 feet.

(2) At no point shall paving surface fail to drain.

(3) The finish surface of concrete paving along accessible routes of travel shall be at least as slip resistant as medium broom finish perpendicular to the path of travel for slopes under 6%, and slip resistant heavy broom finish perpendicular to the path of travel at slopes 6% or greater. See the landscape drawings for specified finishes.

(4) The Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete meets minimum requirements. Use the same mix design for all exposed concrete.

(5) Placing of concrete by means of pumping will be an acceptable method of placement providing that the Contractor can demonstrate that:

a. Specified concrete strengths will be met.

b. Equipment has a record of satisfactory performance under similar conditions and using a similar mix.

c. Trial batches have been made.

1.04 TESTS

A. The Project Inspector will select a qualified testing laboratory to take samples for testing during the course of the work as considered necessary. The Owner will pay costs for such tests. Contractor shall cooperate in making tests and shall be responsible for notifying the designated laboratory in sufficient time to allow taking of samples at time of pour.

B. Should tests show that concrete is below specified strength, Contractor shall remove all such concrete, as directed by the Project Inspector. Full cost of removal of low strength concrete, its replacement with concrete of proper specified strength and testing, shall be borne by Contractor.

C. The Contractor's Testing Laboratory Qualifications: The Contractor's Testing Laboratory shall be under direction of a Civil Engineer registered in the State of California, shall have operated successfully for four years prior to this work, and shall conform to requirements of ASTM E329.

1.05 COORDINATION

A. Coordinate items of other trades. Contractor shall be responsible for the proper installation of all accessories embedded in the concrete and for the provision of holes, openings, etc., necessary to the execution of the work of the trades.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Supply ready mixed concrete throughout. Batch, mix and transport in accordance with ASTM C-94, "Specifications for Ready Mixed Concrete."

B. Mix and deliver concrete in quantities that will permit immediate use only.

C. Indiscriminate addition of water for any reason will be cause for rejection of the load.

D. Ensure storage facilities are weather tight and dry.

E. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

F. Store bulk cement in bins capable of preventing exposure to moisture.

G. Use sacked cement in chronological order of delivery. Store each shipment so that it may be readily distinguishable from other shipments.

1.07 SOILS REPORT

A. A soil investigation report has been prepared for the project.

B. The report is available in the office of the Architect and the Construction Manager for inspection by the Contractor. Unless otherwise specified, it is intended that all work be performed in accordance with the provisions of the report.

C. Drilled piers may encounter ground water. Excavations for drilled piers may require casings and installation of concrete by means of pumping under the direction of the Geotechnical Engineer.

1.08 SOILS BORINGS

A. Subsurface soils investigations have been made at the site and logs of the test holes are available with the Soils Report. Such investigations have been made for the purposes of design only, and neither the Landscape Architect, the Owner, nor the Soils Engineers guarantee adequacy or accuracy of the data, or that data are representative of all conditions to be encountered. Such information is made available for general information only and shall not relieve the Contractor of the responsibility for making his own investigations.

PART 2 - PRODUCTS

2.01 FORMWORK MATERIALS

A. Forms shall be wood, except curbs may be formed with accepted metal form systems.

(1) Plywood: 5/8-inch thickness minimum. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form", Class 1. Panels to receive specified form sealer to ensure uniform finish of exposed surfaces.

(2) Lumber: Douglas fir, "Standard" grade or better (grade marks not required).

B. Form Coatings: Knox-Crete, or equal.

C. Form Ties: Burke "Penta-Tie," or equal, cone and rod type with 1-inch break-back or product similar to appropriately sized Simpson Strong Tie WT, or equal. Do not use form ties in forms for concrete seat wall and sculpture table.

2.02 REINFORCING MATERIALS

A. Bar Reinforcement ASTM A615.

(1) #3 and smaller: Grade 40.

(2) #4 and larger: Grade 60.

B. Smooth Dowels: Aztec Concrete Accessories "Speed Dowels," or equal product 800-531-3355.

2.03 CONCRETE CLASSES

CLASS	STRENGTH	AGGREGATE	WEIGHT	SLUMP
A	3000	3/4	145	4

A. Class: Identifies all concrete as specified.

B. Strength: Compressive strength in psi after 28-days when tested in accordance with ASTM C39. All concrete shall develop compression strength specified in 28-days. To meet above requirements, mix shall be designed such that average compressive strength will exceed specified 28-day strength by an amount as specified by ACI 318.

C. Aggregate: Maximum size in inches.

D. Weight: Pounds per cubic foot, air dry.

E. Slump: In inches when tested in accordance with ASTM C143.

2.04 CONCRETE MATERIALS

A. General Requirements:

(1) Cement and aggregates shall have proven history of successful use with one another. Sources of cement and aggregate shall remain unchanged throughout work unless the Landscape Architect approves request for change made at least 10-days prior to anticipated date of casting.

(2) Ready-mixed concrete shall meet requirements of ASTM C94.

(3) Deviations in properties of materials tested by the Owner's Testing Agency shall be cause for their rejection pending additional test results and redesign of mix by the Contractor's Testing Laboratory.

(4) No frozen aggregates will be permitted.

B. Cements:

(1) ASTM C150, Type II. Use one brand of cement throughout project unless otherwise acceptable to Landscape Architect.

C. Fly Ash: ASTM C618, Type F. Fly ash as a replacement for Portland cement use no less than 15% if used, and no more than 25%.

D. Aggregates:

(1) Coarse: ASTM C33. Coarse aggregate shall consist of a clean, hard, fine grained, sound crushed rock, or washed gravel or a combination of both. It shall be free from oil, organic matter or other deleterious substances and shall not contain more than two percent by weight of shale or cherty material. "Cleanness value shall not be less than 75 when tested per MM Test Method, 227 and conforming to CBC.

(2) Fines: ASTM C33. Sand equivalent shall be not less than 75 when tested as per ASTM D2419.

(3) Provide aggregates from a single source for exposed concrete.

E. Water: Clean and potable, free from impurities detrimental to concrete.

F. Water-Reducing Admixture: Must be compatible with color pigments where required. ASTM C494, Type A, that do not contain non-lignini sulfonate. Same as Grace Construction Materials' "WRDA" with hycol; Master Builders "Pozzolith" 322N; or equal product substituted per Section 01 65 00.

G. Air Entraining Admixture: Must be compatible with color pigments where required. ASTM C260, certified by manufacturer to be compatible with other products. Same as W.R. Grace's "Daravair", Master Builders' "Micro-Air", Sika Corp.'s "Sika Aer", or equal product substituted per 01 65 00.

H. Other Admixtures: Only as approved by the Landscape Architect.

I. Non-Shrink Grout: Premixed high strength grout requiring only addition of water at the site. Same as Master Builder's "Masterflow 928 Grout"; Burke's "Non-Ferrous, Non-Shrink Grout", or equal product substituted per Section 0163001 65 00.

J. Curing Materials:

(1) Curing Compound: ASTM C309. Water loss – not more than 0.55 kg/m^2 in 72 hours; Light Reflectance – not less than 60%. Same as Grace Construction Materials' "Horn Clear Seal"; Grimes Co.'s "Sealcrete"; Master Builders' "Masterseal W", or equal product substituted per Section 0163001 65 00.

(2) Apply to slabs-on-grade at 150 percent of manufacturer's recommended coverage rate.

K. Epoxy Adhesive: Two component material suitable for anchoring rebar into dry or damp concrete. Same as Burke's "Burk Epoxy MV", Covert's "CIA-Gel 7000", Hilti's "HIT C-100" or equal product substituted per Section 0163001 65 00.

L. Lamp Black: As supplied by batch plant.

2.05 CONCRETE MIXES

A. Concrete mixes shall be accepted and shall be in accordance with CalTrans Standard Specifications Section 90. Unless otherwise noted, mix shall be Class "A," 3,000 psi, Type II Portland cement and 3/4-inch maximum aggregate.

B. Lamp Black: Concrete for paving shall be darkened by the addition of accepted agents at the mixer. The proportion of lampblack or other accepted colorant, to a great extent dependent on the color of the cement used in the mix, shall be that required to properly darken the concrete to reduce glare, and shall be subject to the approval of the Project Inspector or as required by Landscape Architect. Provide mock-ups with a ratio of one pound of lamp black for each cubic yard of concrete or as otherwise approved. Use Davis Colors or equal pigment as required to meet lamp black requirement.

2.06 ANCILLARY MATERIALS

A. Aggregate Base:

(1) Class 2 aggregate base conforming to Section 26 of the Standard Specifications.

(2) Recycled Aggregate Base - Class 2: Aggregate base shall be Class 2, and free from organic matter, rebar, fiberglass or other deleterious substances. The percentage composition by weight of aggregate base shall conform to Section 26 of the Standard Specifications. Existing material may be reused if it meets the specifications for Aggregate Base - Class 2 and the required compaction and the approval of the Geotechnical Engineer.

B. Expansion Joint Material:

(1) Fiber Expansion Joint: A non-extruding resilient filler, saturated with high quality bituminous materials having preserving characteristics. W. R. Meadows or accepted equal. Conform to ASTM-D1751-83. Include Joint Sealant.

C. Concrete Sealer: Use sealer compatible with pigments in concrete. Scofield Selectseal-W as manufactured by L. M. Scofield Co. or silicone-based, non-staining product such as Consolideck® SingleStep™ acrylic-siloxane blend that meets Type I, Class A requirements of ASTM C 1315 and as accepted by Landscape Architect.

D. Joint Sealant: Use joint sealant compatible with pigments in concrete "Sonolastic Sealant Two-Part" as manufactured by Sonneborn-Contech, Building Products Division, Contech, Inc.; or Sikaflex-1a elastomeric joint sealant available from Sika Corporation, Hayward (510) 487-2294. or approved equal. Joint caps or bond breaker tape to be as recommended by sealant manufacturer. Color shall be as selected by Architect.

E. Curing Compound: ASTM C309, Water-base type, free of permanent color, oil or wax, or accepted equal. Curing compound shall be compatible with color pigments

F. Combination Curing Compound Concrete Sealer: Scofield Cureseal-W as manufactured by L. M. Scofield Co. or W. R. Meadows Vocomp-20, (800-342-5976) or accepted equal. Combination Curing Compound. Combination Curing Compound Concrete Sealer shall be compatible with color pigments.

G. Color of Concrete: Pigments for integral colored concrete as manufactured by Davis Colors, 800-356-4848, applied at manufacturer's specified rates of application, or accepted equal.

H. Color of Concrete: Pigments for stained concrete as manufactured by L. M. Scofield, 800-800-9900, applied at manufacturer's specified rates of application, or accepted equal.

2.07 MIXES

A. General Requirements:

(1) The Contractor shall perform tests or assemble the necessary data indicating conformance with specifications.

(2) For each mix submit data showing that proposed mix will attain the required strength in accordance with requirements of CBC.

(3) The Contractor shall instruct Laboratory to base mix design on use of materials tested and approved by the Owner's Testing Agency.

(4) Mix design shall include compression strength test reports per CBC chapter 19A.

(5) Mix shall be designed, tested, and adjusted if necessary in ample time before first concrete is scheduled to be placed. Laboratory data and strength test results for revised mix design shall be submitted to Landscape Architect prior to using in project.

(6) Insure mix designs will produce concrete to strengths specified and of uniform density without segregation.

(7) If mix yield exceeds 1-cubic yard, modify mix design to no more than one cubic yard without changing cement content.

(8) The Contractor's mix designs shall be subject to review by the Landscape Architect and by the Owner's Testing Agency.

(9) Introduction of calcium chloride will not be permitted.

(10) Unspecified admixtures will not be permitted unless the Landscape Architect reviews, the Contractor modifies mix designs as necessary, and modifications are accepted by the Owner's Testing Agency.

B. Slab-on-Grade Mix requirements:

(1) Maximum water/cement ratio: 0.45.

(2) Use of Water-Reducing admixture is required. Use High Range Water-Reducing admixture (super plasticizer) when required to maintain workability and pumpability.

C. Patching Mortar: Mix in proportions by volume of one part cement to two parts fine sand.

D. Concrete Fill: Mix in proportions by volume of one part cement, two parts fine aggregate, one part coarse aggregate (3/8- inch); with as little water as necessary to make stiff workable plastic mix.

E. Non-Shrink Grout: Follow approved manufacturer's printed instructions and recommendations.

2.08 MIXING

A. Batching Plant Conditions:

(1) Ensure equipment and plant will afford accurate weighing, minimize segregation and will efficiently handle all materials to satisfaction of the Landscape Architect and the Owner's Testing Agency.

(2) Replace at no additional expense equipment the Landscape Architect and the Owner's Testing Agency deem inadequate or unsuitable.

(3) Use approved moisture meter capable of determining moisture content of sand.

B. General Requirements:

(1) Thoroughly clean concrete equipment before use for Architectural concrete mixes to avoid contamination.

(2) Mix cement, fine and coarse aggregates, admixtures and water to exact proportions of mix designs. Method of mixing shall comply with CBC chapter 19A.

(3) Measure fine and coarse aggregates separately according to approved method which provides accurate control and easy checking.

(4) Adjust grading to improve workability; do not add water unless otherwise directed.

(5) Maintain proportions, values, or factors of approved mixes throughout work.

(6) Mix concrete in transit mixers five minutes immediately prior to discharge in addition to mixing as called for by ACI 304 and ASTM C94.

C. Admixtures: Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.

2.09 SOURCE QUALITY CONTROL

A. The Owner's Testing Agency will:

(1) Review mix designs, certificates of compliance, and samples of materials the Contractor proposes to use.

(2) Test and inspect materials, as necessary, in accordance with ACI 318 and CBC Chapter 19A for compliance with requirements.

(3) Take samples as required from the Contractor's designated sources.

(4) Take one grab sample for each 100 tons of Portland cement except that, when used in bulk loading ready-mix plants where separate bins for pre-tested cement are not available, take grab samples for each shipment of cement placed in bin with not less than one sample being taken for each day's pour and subsequently test such samples if required by the Landscape Architect who may be so advised by the Division of the State Architect (DSA).

(5) Test both coarse and fine aggregate by use of solution of sodium or magnesium sulfate, or both whenever in the judgment of the Landscape Architect such tests are necessary to determine quality of material. Perform such tests in accordance with ASTM C88. Loss shall not exceed 6-percent of either fine or coarse aggregate. Aggregate failing to comply with this requirement may be used in the Work provided it contains less than 2- percent of shale and other deleterious particles and shows a loss in soundness test of not more than 10-percent when tested in the sodium sulphate solution. Test aggregates as required by CBC chapter 19A.

(6) Test for sand equivalent of fine aggregate in accordance with California Test 217.

(7) Test for cleanness value of coarse aggregate in accordance with California Test 227.

(8) Inspect plant prior to any work to verify following:

a. Plant is equipped with approved metering devices for determining moisture content of fine aggregate.

b. Other plant quality controls are adequate.

(9) Continuously inspect quality and quantity of materials used in transit mixed concrete, in batched aggregates and ready-mixed concrete at mixing plant or other location per CBC Chapter 19A where other materials are measured.

B. Waiver of Batch Plant Inspection:

(1) Continuous batch plant inspection may be waived in accordance with CBC Chapter 19A if the plant complies with ASTM C94 and has been certified by an agency acceptable to DSA to comply with the requirements of the National Ready Mix Concrete Association.

(2) When batch plant inspection is waived, the following requirements shall apply:

a. Testing Agency shall check the first batching at the start of work and furnish mix proportions to the licensed Weighmaster.

b. Licensed Weighmaster shall identify material quantities and certify each load by a ticket.

c. Project Inspector shall collect truck mix tickets with load identification and maintain a daily record of placement. Trucks without a load ticket identifying the mix shall be rejected. Copies of daily placement record shall be submitted to DSA.

d. At the end of the project, the Weighmaster shall submit an affidavit to DSA certifying that all concrete supplied conforms to proportions established by mix designs.

2.10 GEOCOMPOSITE MATERIAL (Mirachain)

A. Enkadrain 3811R geocomposite drainage mat available from Colbond Inc., Enka, NC, www.colbond-usa.com, 800-365-7391.

B. Waterproofing System: MFM Subseal 60 Sheet Membrane Prime-A-Seal Primer and Mastic+Plus available from MFM Building Products, Coshocton, OH, (800) 882-7663, http://www.mfmbp.com/watermem.html, Local representative: Don Lambrecht & Associates, Inc., Rocklin, CA. 95677, 916-632-2059.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Install all concrete work true to line and grade as indicated on the drawings.

B. Correct irregularities to the satisfaction of the Landscape Architect.

3.02 PREPARATION

A. Take every precaution to obtain a subgrade of uniform bearing power by compaction to provide a firm base.

B. Subgrade shall be kept moist and shall not be allowed to dry out before placement of concrete. Place no material on muddy subgrade.

C. Aggregate base, where indicated, shall be placed and compacted in conformance with CalTrans Standard Specifications 26-1.04 and 26-1.05.

D. Obtain acceptance of subgrade from Project Inspector prior to placing steel and concrete.

3.03 FORMS

A. Forms shall be constructed in accordance with ACI 347 and shall be of sufficient strength and sufficiently tight to prevent visible distortion or leakage of mortar and fines.

B. Forms for exposed surfaces shall be designed to protect intended finish. Deflection of facing material between studs shall not exceed 0.0025 of the span. Facing material and pattern of joints shall be as accepted by the Project Inspector.

C. For vertical surface of wall footings below grade, clean-cut trench may be used in lieu of form if character of soil will permit installation without sluffing and width of concrete is increased at least 1 inch beyond indicated dimension of each face poured against earth.

D. Curb, mow band and pavement edge forms shall extend full depth of concrete. Curves shall be formed with flexible metal or wood made up of thin laminations. Curve forms shall extend one stake space straight beyond tangent point.

E. Maintain forms within the following tolerances.

(1) Top of Form: Plus or minus 1/8 inch in 10 feet and no abrupt variations; at required elevation to plus 3/8 inch.

(2) Face of Form: Plus or minus 1/4 inch in 10 feet longitudinal and no abrupt variations; perpendicular to surface plus or minus 1/8 inch.

F. Obtain approval of formwork from Project Inspector prior to placing concrete.

G. Forms may be reused upon cleaning and coating with parting compound to ensure separation from concrete without damage.

H. After concrete is placed, the following minimum times shall elapse before removal of forms.

(1) Footing sides: 24 hours.

(2) Walls and benches: 48 hours.

(3) Curbs: 1 hour.

3.04 REINFORCEMENT

A. All concrete shall be steel reinforced unless specifically noted to be "not reinforced." If no reinforcement is shown, reinforce in same manner as that shown in similar places.

B. Fabricate and place reinforcement as indicated on the Drawings and in accordance with ACI "Detailing Manual" SP-66. No reinforcement shall be placed prior to distribution of the accepted shop drawings.

C. Secure reinforcement in position by suitable supports and by wiring at intersections with tie wire. Supports shall be of sufficient number and strength to resist crushing or displacement under full load. Metal shall not extend to surface of concrete.

D. At time of placing concrete, reinforcing shall be free of excessive rust, mill scale, or other bond reducing matter. Immediately before placing concrete, check and adjust position, support and anchorage.

3.05 PLACING CONCRETE

A. The Inspector of Record, Architect, Structural Engineer, Testing Laboratory and DSA shall be notified at least 48 hours before placing concrete.

B. Place concrete in accordance with CBC chapter 19A.

C. Place concrete in cycles as a continuous operation to permit proper and thorough integration and to complete scheduled placement. Place no concrete where sun, wind, heat, or facilities prevent proper finishing and curing.

D. Convey concrete as rapidly and directly as practicable to preserve quality and to prevent separation from rehandling and flowing; do not deposit concrete initially set. Cast concrete within ninety (90) minutes after adding water unless otherwise noted. Retempering of concrete which has partially set will not be permitted.

E. Take precautions to avoid damage to under-slab moisture barrier and displacement of reinforcement and formwork.

F. Deposit concrete vertically in its final position. Avoid free falls in excess of six feet where reinforcement will cause segregation and in typical conditions unless the Architect approves otherwise.

G. Keep forms and reinforcement clean above pour line by removing clinging concrete with wire brush before casting next lift. Also remove leakage through forms.

H. Interruption in casting longer than 60-minutes shall be cause for discontinuing casting for remainder of day. In this event, cut back concrete and provide construction joints as the Architect directs; clean forms and reinforcement as necessary to receive concrete at a later time.

I. Hot Weather Concreting: Conform to ACI 305 and following requirements when mean daily temperature rises above 75 degrees Fahrenheit.

(1) An upper temperature limit of concrete mixes shall be established by the Contractor for each class of concrete. Concrete temperature during placing shall not be so high as to cause difficulty from loss of slump, flash set, or cold joints, and shall not exceed 90°F. Other project climatic conditions detrimental to concrete quality such as relative humidity, wind velocity, and solar radiation shall also be considered.

(2) Trial batches of concrete for each mix design shall be made at the limiting mix temperature selected. In lieu of trial batches, compression strength test reports (20 minimum) at the limiting temperature for each proposed mix shall be submitted to the Owner's testing laboratory for review.

(3) Practices to maintain concrete below maximum limiting temperature shall be in accordance with ACI 305. Concrete ingredients may be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for part of the mixing water.

(4) Practices to avoid the potential problems of hot weather concreting shall be employed by the Contractor in accordance with ACI 305.

(5) When the temperature of the reinforcing steel or steel deck forms is greater than 120°F, reinforcing and forms shall be sprayed with water just prior to placing the concrete.

J. Cold Weather Concreting:

(1) No placement of concrete will be allowed at temperatures below 20 degrees Fahrenheit or if mean daily temperature for curing period is anticipated to be below 20 degrees Fahrenheit.

(2) No concrete placement will be allowed on frozen subgrade.

(3) Conform to ACI 306 and following requirements when mean daily temperature falls below 40 degrees Fahrenheit.

a. Reinforcement, forms or ground to receive concrete shall be completely free from frost.

b. Concrete at time of placement for footings shall have temperature no lower than 50 degrees Fahrenheit, for all other concrete this minimum temperature at time of placement shall be 60 degrees Fahrenheit. Maximum temperature shall be 90 degrees Fahrenheit.

c. Concrete shall be maintained at temperature no lower than 50 degrees Fahrenheit for minimum 7-day period after placement by means of blanket insulation, heaters, or other methods as approved by the Landscape Architect.

d. Use of calcium chloride or admixtures containing calcium chloride as accelerators will not be permitted.

e. The Contractor shall keep a record of concrete surface temperature for first 7-days after each pour. This record shall be open to inspection by the Inspector.

K. Consolidating:

(1) Use vibrators for thorough consolidation of concrete.

(2) Provide vibrators for each location during simultaneous placing to ensure timely consolidation around reinforcement, embedded items and into corners of forms; ensure availability of spare vibrators in case of failures. Vibrate through full depth of freshly placed concrete.

(3) Do not place vibrators against reinforcement, attach to forms, or use to spread concrete.

(4) Exposed Concrete: Vibrate with rubber type heads and, in addition, spade along forms with flat strap or plate.

L. Construction Joints:

(1) Verify location and conformance with typical details; provide only where designated or approved by the Landscape Architect. Comply with CBC chapter 19A.

(2) All horizontal and vertical construction joints to be thoroughly sandblasted to clean and roughen entire surface to minimum 1/4-inch relief exposing clean coarse aggregate solidly embedded in mortar matrix.

(3) Just prior to depositing concrete, the surface of the construction joint shall be thoroughly wetted.

M. Walls and Other Formed Elements:

(1) Space points of deposit to eliminate need for lateral flow. Placing procedures of concrete in forms permitting escape of mortar, or flow of concrete itself, will not be permitted.

(2) Level top surface upon stopping work.

(3) Take special care to fill each part of the forms by depositing concrete directly as near final position as possible, and to force concrete under and around reinforcement, embedded items, without displacement.

(4) After concrete has taken its initial set, care shall be exercised to avoid jarring forms or placing any strain on ends of projecting reinforcement.

(5) Where backfill is placed against a wall, it shall be adequately shored until it has attained design strength.

3.06 JOINTS AND GROOVES

A. Plane of joints shall be perpendicular to surface. Where new pavements join existing, joints shall align.

B. Score Joints: Form in the fresh concrete using a jointer to cut the groove so that a smooth uniform impression is obtained to 1" depth unless shown otherwise. All joints shall be struck before and after brooming. Tool concrete both sides of joint.

C. Expansion Joints and Edging: Provided at the location and intervals as shown on the drawings, and at all locations where concrete paving abuts buildings, walls, pillars, curbs or other structures. Fiber joint material shall be placed with top edge 1/2" below the paved surface to allow space for sealant, and shall be securely held in place to prevent movement. Metal key joint material shall be placed flush with top edge of the paved surface, and shall be securely held in place to prevent movement. Joint and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression. All edges shall be struck before and after brooming.

D. Sealed Joints: After the curing period, fiber expansion joints shall be carefully cleaned and filled with accepted joint sealant to just below adjacent paved surface in such a manner as to avoid spilling on paved surfaces or overflowing from joint.

E. Construction Joints: Place construction joints at the end of pours and at locations where placement operations are stopped for a period of more than one half hour, except where such pours terminate at expansion joints.

(1) Construction joints shall be keyed with formed tongue and groove.

(2) Tool concrete edge both sides of construction joint.

3.07 FINISHING

A. Flatwork and Curbs:

(1) Surface Finishes:

a. Float Finish (typical preliminary finishing for slabs to receive other finishes): The surface of the slab shall be screeded and all surface water and laitance removed. Floating shall be started as soon as the screeded surface has stiffened sufficiently. Floating shall be performed by hand using a wood float and shall be the minimum necessary to produce a relatively smooth, level, even-textured surface.

b. Medium Broom Finish: After the slab has been float finished as described above, the surface shall be uniformly directional textured by coarse stable broom to match accepted mock up. Non-slip finish compliant with ADA requirements. Apply on concrete paving perpendicular to the path of travel.

c. Top Seeded Aggregate Finish:

1. Evenly distribute aggregate over 75% of the concrete surface.

2. Tamp aggregate solidly into concrete surface. Do not force coarse aggregates deeply into concrete; one troweling is usually sufficient.

3. Apply retarder to troweled-in aggregate surface in accordance with manufacturer's instructions as soon as possible. Apply uniform coat over entire surface without disturbing aggregate but prior to initial set of concrete.

4. Allow surface retarder to set prior to exposing aggregate. Do not expose aggregate while surface is muddy or sticky.

5. Evenly expose aggregate by water washing and brushing to an average depth of 1/8 inch. Use a controlled water spray to remove loose material and to clean stone. Avoid pocketing and kicking out aggregate.

6. Finish shall be uniform in color, texture and degree of exposure of aggregate.

7. Provide a non-slip finish in compliance with Title 24 requirements.

d. Provide finish in compliance with accepted field mock-up

e. Medium Brush Finish (typical for curbs): After the front form is removed, exposed surface shall be toweled smooth and then given a uniform light texture with fine brush parallel to line of curb, to match accepted mock up.

f. Sandblast Finish: Perform in as continuous an operation as possible, utilizing the same work crew to maintain continuity of finish to match accepted mock up.

Use abrasive grit of the proper type and gradation to expose the aggregate and surrounding matrix surfaces to match mock up panel, as follows:

1. Medium Cut: Approximately 1/8" to 3/16" depth.

2. Heavy Cut: Approximately 1/2" to 3/4" depth.

3. Blast corners and edge of patterns carefully, using backup boards in order to maintain a uniform corner of edge line.

4. Use same nozzle, nozzle pressure and blasting technique as used for mock up panel.

5. Maintain control of abrasive grit and concrete dust in each area of blasting. Clean up and remove all expended abrasive grit, concrete dust and debris at the end of each day of blasting operations.

3.08 CURING

A. General Requirements:

(1) Take curing measures immediately after casting and for measures other than application of curing compound, extend for seven days. The Architect may recommend longer periods based upon prevailing temperature, wind and relative humidity. Comply with CBC chapter 19A.

(2) Avoid alternate wetting and drying and fluctuations of concrete temperature.

(3) Protect fresh concrete from direct rays of sun, rain, freezing, drying winds, soiling, and damage.

(4) Do not permit curing method to affect adversely finishes or treatments applied to finish concrete.

B. Curing Method, Typical: Obtain the Landscape Architect's approval of alternate measures.

(1) Keep forms and concrete surfaces moist during period forms are required to remain in place.

(2) Apply curing compound per manufacturers' recommendations.

C. Cure exposed concrete in accordance with CalTrans Standard Specifications Section 90.

D. Only water or curing compounds that impart no permanent color or gloss shall be used for curing concrete.

3.09 CONCRETE SEALING

A. Seal all exposed surfaces according to manufacturer's specifications.

3.10 FIELD QUALITY CONTROL

A. The Owner's Testing Agency will:

(1) Perform testing in accordance with ACI 318 and CBC chapter 19A.

(2) Review concrete mix designs.

(3) Inspect concrete and grout placement continuously.

(4) Test concrete to control slumps according to ASTM C143.

(5) Continuously monitor concrete temperature as it arrives on the site.

(6) Test concrete for required compressive strength in accordance with CBC chapter 19A:

a. Make and cure three specimen cylinders according to ASTM C31 for each 50 cubic yards, or fraction thereof, of each class poured at site each day.

b. Retain one cylinder for 7-day test and two for the 28-day test.

c. Number each cylinder 1A, 1B, 1C, 2A, 2B, 2C, etc; date each set; and keep accurate record of pour each set represents.

d. Transport specimen cylinders from job to laboratory after cylinders have cured for 24-hours on site. Cylinders shall be covered and kept at air temperatures between 60 and 80 degrees Fahrenheit.

e. Test specimen cylinders at age 7-days and age 28-days for specified strength according to ASTM C39.

f. Base strength value on average of two cylinders taken for 28-day test.

(7) Test and inspect materials, as necessary, in accordance with ACI 318, MM Test Method 227 (Coarse Aggregates) and MM Test Method 217 (Fine Aggregates), for compliance with requirements specified in this section.

B. The Contractor shall:

(1) Submit ticket for each batch of concrete delivered to job site. Ticket shall bear the following information:

a. Design mix number.

b. Signature or initials of ready mix representative.

c. Time of batching.

d. Weight of cement, aggregates, water and admixtures in each batch with maximum aggregate size.

e. Total volume of concrete in each batch.

f. Notation to indicate equipment was checked for contaminants prior to batching.

(2) Pay the Owner's Testing Agency for taking core specimens of hardened structure and testing specimen according to ASTM C88 and C42 when laboratory tests of specimen cylinders show compressive strengths below specified minimum.

3.11 CLEANING, PATCHING AND DEFECTIVE WORK

A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing or is otherwise defective, and, in the Architect's judgment, these defects impair proper strength or appearance of the work, the Landscape Architect will require its removal and replacement at the Contractor's expense.

B. Immediately after stripping and before concrete is thoroughly dry, patch minor defects, form-tie holes, honeycombed areas, etc., with patching mortar. Patch shall match finish of adjacent surface unless otherwise noted. Remove ledges and bulges.

C. Compact mortar into place and neatly file defective surfaces to produce level, true planes. After initial set, dress surfaces of patches mechanically or manually to obtain same texture as surrounding surfaces.

D. Rock Pockets:

(1) Cut out to full solid surface and form key.

(2) Thoroughly wet before casting mortar.

(3) Where the Landscape Architect deems rock pocket too large for satisfactory mortar patching as described, cut out defective section to solid surface, key and pack solid with concrete to produce firm bond and match adjacent surface.

E. Cleaning:

(1) Insure removal of bituminous materials, form release agents, bond breakers, curing compounds if permitted and other materials employed in work of concreting which would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.

(2) Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.

3.12 PROTECTION

A. Protect concrete from injurious action of the elements and defacement of any nature during construction operations.

B. Protect exposed corners of concrete from traffic or use which will damage them in any way.

C. Make provisions to keep all exposed concrete free from latence caused by spillage or leaking forms or other contaminants. Do not allow laitances to penetrate, stain, or harden on surfaces which have been textured.

D. Remove and replace pavement that does not comply with requirements in this Section.

E. Protect pavement from damage. Do not permit construction traffic on concrete pavement. Exclude other traffic from pavement for at least 28 days after placement.

F. Maintain pavement free of stains, discoloration, dirt, and other foreign material. Sweep pavement not more than two days before date scheduled for Substantial Completion inspections.

3.13 PAVEMENT TOLERANCES

A. Comply with the following tolerances:

(1) Elevation: 1/4 inch.

(2) Thickness: Plus 3/8 inch minus 1/4 inch.

(3) Surface: Gap below 10-foot-long, unleveled straightedge not to exceed 1/4 inch.

(4) Lateral Alignment and Spacing of Dowels: 1 inch.

(5) Vertical Alignment of Dowels: 1/4 inch.

(6) Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.

(7) Joint Spacing: 3 inches.

(8) Contraction Joint Depth: Plus 1/4 inch, no minus.

(9) Joint Width: Plus 1/8 inch, no minus.

3.14 DEFECTIVE CONCRETE

A. If any concrete work is not formed as indicated, is under strength concrete, is concrete is out of line, level or plumb, or showing objectionable cracks, honeycomb, rock pockets, voids, spalling or exposed reinforcing, it shall be removed, repaired or replaced as directed by the Landscape Architect.

3.15 GEOCOMPOSITE MATERIAL

A. Apply waterproofing membrane and geo composite material conforming to the manufacturer's specifications to a minus 2 inches below finished soil grade on soil side of retaining walls and planters.

B. Waterproofing System: MFM Subseal 60 Sheet Membrane Prime-A-Seal Primer and Mastic+Plus available from MFM Building Products, Coshocton, OH, (800) 882-7663, http://www.mfmbp.com/watermem.html, Local representative: Don Lambrecht & Associates, Inc., Rocklin, CA. 95677, 916-632-2059.

3.16 CLEANING

A. Section 01 77 00 – Contract Closeout: Final cleaning.

B. During construction, wash off work as quickly as possible when stains or splotches are unavoidable.

C. Upon completion, clean exposed surfaces carefully. Brushing and cleaning solution, if used, must be preceded and followed with a through rinsing of clear water. No sandblasting will be allowed to clean surfaces.

D. Remove from premises; equipment, debris and surplus material needed for, or resulting from, this work. Remove all concrete waste from planting areas and legally dispose of it.

E. All work shall be left in a condition satisfactory to the Landscape Architect.

F. Perform Work under this Section to keep affected portions of building site neat, clean, and orderly. Remove, immediately upon completion of Work under this Section, surplus materials, rubbish, and equipment associated with or used in performance. Be aware that failure to perform clean-up operations within 24 hours of notice by Landscape Architect will be considered adequate grounds for having work done by others at no added expense to the Owner

END OF SECTION

SECTION 32 16 13
CONCRETE CURB, GUTTER AND SIDEWALK/WALKWAY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Place concrete curbs, gutters, valley gutters, and sidewalks/walkways.

B. Provide mock up of exterior concrete walk finish, including, but not limited to, texture, color, and score pattern.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this Section.

B. Related Sections include, but are not limited to, the following:
   1. Concrete Reinforcement - Section 03 20 00
   2. Cast-in-Place Concrete - Section 03 30 00
   3. Earthwork - Section 31 20 00
   4. Asphalt Concrete Paving and Base - Section 32 12 16

1.03 REFERENCES

A. Reference Data:
   1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.

B. City of South San Francisco Standard Plans and Specifications.

C. Caltrans Standard Specifications, Sections 73 (Concrete Curbs and Sidewalks) and 90 (Concrete).

D. South San Francisco Unified School District Standard Design and Construction Standards.

1.04 SUBMITTALS

A. Submit concrete mix design to Engineer for review at least 21 days prior to concrete. Submit product data for proprietary materials and items, admixtures, joint systems, curing compounds and dry-shake finish material. Submit laboratory test reports for evaluation of concrete material and mix design test.

B. Submit mock up of exterior concrete walk finish, including, but not limited to, texture, color, and score pattern to Architect for review prior to any concrete installation.

C. Submit shop drawing showing elevations, control joint layouts, finish and rebar schedule.

PART 2 PRODUCTS

2.01 CONCRETE

A. Concrete shall comply with the applicable provisions of Section 90 " Concrete" of the Caltrans Standard Specifications for Section 90-2 "Minor Concrete" and meet the following requirements listed below.
   1. Concrete shall have a minimum 28 day compressive strength of 2500 psi.
   2. Concrete shall have a maximum slump of 4 inches.
   3. Concrete must contain at least 505 pounds of cementitous material per cubic yard.
   4. Cementitious material must be Type II or V Portland cement or a combination of Type II or V Portland cement and other approved Supplementary Cementitious Materials (SCM's). Typical SCM's are ground granulated blast furnace slag, fly ash, silica flume, rice hull ash and natural

pozzolans such as calcined shale, calcined clay and metakaolin. The amount of SCM's in the concrete mix shall not exceed the requirements listed in section 90-1.02B of the Caltrans Standard Specifications.

5. The quantity of free water must not exceed 310 pounds per cubic yard of concrete plus 20 pounds of free water for each required 100 pounds of cementitious material in excess of 550 pounds of cementitious material per cubic yard of concrete.
6. The maximum course aggregate size must not be larger than 1-1/2" or smaller than ¾" and meet the gradation requirements in section 90-1.02C(4)(b).
7. Fine Aggregate grading shall meet the gradation requirements in section 90-1.02C(4)(c).
8. Acceptable admixtures shall conform to Section 90-1.02E. Chemical admixtures must comply with ASTM C 494, Air-entraining admixtures must comply with ASTM C 260.
9. For textured and colored concrete surfaces, aggregate must comply with the grading requirements for fine aggregate in section 90-1.02C(4)(c). Aggregate used in grout for textured and colored concrete surfaces must comply with the grading requirements listed in section 73-4.02. Color pigments for dry-shake method must comply with ASTM C 979.

B. Integral colored concrete admixtures shall be manufactured by L.M Scofield Company, Davis Colors Inc. or Solomon Colors.

C. Steel dowels and reinforcement steel must comply with Section 52 "Reinforcement" of the California Standard Specifications. Reinforcing steel shall be ASTM A-615 grade 60. Smooth dowel steel bars for expansion joints shall be ASTM A-29 grade 40.

D. Expansion joints shall contain 1/4-inch thick asphalt impregnated fiber strips to the full thickness of concrete. Preformed expansion joint filler must comply with ASTM D 1751. Joint primer shall be Sonneborn horizontal joint primer No. 733 or No 766. Expansion joint sealant shall be self-leveling sonolastic elastomeric polyurethane joint sealant in accordance with Federal Specifications TT-S-00227Em Type I, Class A-Sonneborn SL-2, or approved equal. Joint sealer color shall match concrete color.

E. Soil Sterilizer - Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting vegetation growth and approved for use on this work by governmental agencies which have jurisdiction.

PART 3 EXECUTION

3.01 GENERAL

A. Curbs, gutter, valley gutters, and sidewalks/walkways shall conform to the details shown on the plans and any applicable City of South San Francisco Standards for those improvements constructed within the public right of way.

B. Provide representative mock up of sidewalk including, but not limited to, texture, color, and score pattern for review and approval by Architect prior to construction.

C. Concrete finishes along accessible routes of travel shall be at least as slip-resistant as that described as a medium salted finish for slopes of less than 6%, and slip-resistant at slopes of 6% or greater.

D. Concrete finishes within the public right of way shall conform to the City of South San Francisco details and specifications.

E. Exterior concrete finishes in non accessible path of travel areas should be a light broom finish. Exterior concrete stairs shall have a non-slip finish.

3.02 SUBGRADE PREPARATION

A. As per Section 31 20 00.10, Earthwork.

B. Minimum Class 2 aggregate base material under sidewalks/walkways as shown on the Drawings shall be at least 4 inches in compacted thickness, or otherwise noted.

C. Material under public sidewalks/walkways/ driveway aprons shall conform to the City of South San Francisco details and specifications.

D. Subgrade and forms shall be wet immediately before concrete placement.

E. Reinforcement shall be carefully placed and supported as directed by ACI 318

F. Steel dowels and reinforcement steel must comply with Section 52 "Reinforcement" of the California Standard Specifications

G. Apply soil sterilizer 6" each side of the edges of sidewalks/walkways to prevent growth of vegetation under sidewalks/walkways.

H. Excavate for thickened edges where they occur.

3.03 EXISTING CURBS, GUTTERS AND SIDEWALKS

A. Expansion Joints shall be ¼' wide cut to a minimum depth of 1-1/4 inches with an abrasive type saw.

B. Joint shall be at first scoring line at or beyond the planned joint location.

3.04 FORMS

A. Smooth face against concrete, true smooth upper edge and rigid enough to withstand pressure of fresh concrete without distortion.

B. Clean and oil coated.

C. Carefully set to alignment, grade and required dimensions.

D. Adequately secured from movement by stakes, clamps, spreaders and braces.

3.05 CURB, GUTTER AND SIDEWALK/WALKWAY CONSTRUCTION

A. Dimensions as shown on Drawings.

B. Public sidewalks/walkways concrete thickness shall conform to City of South San Francisco specifications.

C. Weakened plane control joints shall be constructed at intervals not exceeding 5 feet. Joints shall be ¼" wide radius tooled joints to a 1" depth

D. Expansion joints shall be constructed at intervals not exceeding 15 feet.

E. Expansion joints, 1/4 inch wide and 1-1/4" deep, shall be installed where the new walkway joins existing curbs, drainage structures and other fixed objects.

F. Expansion joints shall contain 1/4-inch thick premolded joint fillers the full thickness of concrete. Preformed expansion joint filler must comply with ASTM D 1751.

G. The top and face of curbs, and non-decorative sidewalks/walkways shall be finished with a steel trowel and be given a final fine brush finish.

H. The top and face of curb shall be true and straight and not vary more than 0.01 foot above or below the staked grade.

I. Concrete curing shall be as provided in Section 90-1.03B of the California Standard Specifications.

J. Repairs shall be made by removing and replacing the entire unit between scoring lines or joints.

K. Curb and sidewalk construction in public right-of-way shall be performed under the term of an encroachment permit to be obtained and paid for by the Contractor from the City of South San Francisco.

L. Dowel sidewalks to building slabs at all doorways.

3.06 ADJUST UTILITY BOXES

A. The Contractor shall adjust all existing and new utility boxes, and any other service castings falling within the limits of work to exact grade at the same time the concrete improvements are being constructed and shall maintain these appurtenances to true and exact grade until concrete is thoroughly set.

3.07 CURING

A. Moist Curing: Cover with reinforced waterproof curing paper. Seal all joints and weights down edges. Maintain moist for 14 days.

B. Liquid Curing Compound: Locations as approved by Architect. Apply a uniform coating within two hours of final troweling.

3.08 REPAIRS AND PROTECTIONS

A. Repair or replace broken or defective concrete as directed by Architect.

B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

3.09 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 17 26
SURFACE APPLIED DETECTABLE/TACTILE WARNING SURFACES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish and install Surface Applied Detectable/Tactile Warning surfaces where indicated.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this Section.

B. South San Francisco Unified School District Standard Design and Construction Standards.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance.

B. Samples for Verification Purposes: Submit two (2) tile samples minimum 6"x6" of the kind proposed for use.

C. Shop drawings are required for products specified showing fabrication details, composite structural system, tile surface profile, fastener locations, sound on cane contact amplification feature, plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.

D. Material Test Reports: Submit complete test reports from qualified accredited independent testing laboratory's to qualify that materials proposed for use are in compliance with requirements and meet or exceed the properties indicated on the specifications. All tests shall be conducted on a Surface Applied Detectable/Tactile Warning Tile system as certified by a qualified independent testing laboratory and be current within a 60 month period.

E. Maintenance Instructions: Submit copies of manufacturer's specified installation and maintenance practices for each type of Detectable Warning Surface Tile and accessory as required.

1.04 QUALITY ASSURANCE

A. Provide Surface Applied Detectable/Tactile Warning Tiles and accessories as produced by a single manufacturer with a minimum of three (3) years experience in the manufacturing of Surface Applied Detectable/Tactile Warning Tiles.

B. Installer's Qualifications: Engage an experienced Installer certified in writing by Surface Applied Detectable/Tactile Warning Tile manufacturer as qualified for installation, who has successfully completed installations similar in material, design, and extent to that indicated for Project.

C. Americans with Disabilities Act (ADA): Provide Surface Applied Detectable/Tactile Warning Surface Tiles which comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act (Title III Regulations, 28 CFR Part 36 ADA STANDARDS FOR ACCESSIBLE DESIGN, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES).

D. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR) Title 24, Part 2, Section 205 definition of "Detectable Warning". Section 1117A.4 and 1127B.5 for "Curb Ramps" and Section 1133B.8.5 for "Detectable Warnings at Hazardous Vehicular Areas".

E. Engineered Polymer Composite Surface Applied Detectable/Tactile Warning Tiles shall be manufactured from an ultra violet stabilized polymer composition with fiberglass reinforcement, the tile shall incorporate an in-line pattern of truncated domes measuring nominal 0.2" height, 0.91" base diameter, and 0.45" top diameter, spaced center-to-center 2.35" as measured side by side. For wheelchair safety the field area shall consist of a high density, diamond grip™ pyramid micro texture of raised points 0.05" high; "Access Tile" as manufactured by Access Products, Inc., Tel: 888-679-4022, or approved equal.

1. Dimensions: Cast In Place Detectable/Tactile Warning Surface Tiles shall be held within the following dimensions and tolerances:

   Length and Width: [12x12] [24x36] [24x48] [24x60] [36x48] [36x60] [10' Radius Curve] (Varies, see Plans)
   Depth: 1.375 (1-3/8") (+/-) 5% max.
   Face Thickness: 0.1875 (3/16") (+/-) 5% max.
   Warpage of Edge: 0.5% max.
   Embedment Flange Spacing: shall be no greater than 3.1"

2. Compressive Strength of Tile when tested by ASTM D 695-08 not to be less than 25,000 PSI.
3. Tensile Strength of Tile when tested by ASTM D 638-08 not to be less than 12,500 PSI.
4. Compressive Strength of Tile when tested by ASTM D 695-02a not to be less than 25,000 psi.
5. Flexural Strength of Tile when tested by ASTM D 790-03 not to be less than 30,000 psi.

1.05 DELIVERY, STORAGE AND HANDLING

A. Surface Applied Detectable/Tactile Warning Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings and tile type shall be identified by part number.

B. Surface Applied Detectable/Tactile Warning Tiles shall be delivered to location at building site for storage prior to installation.

1.06 SITE CONDITIONS

A. Environmental Conditions and Protection: Maintain minimum temperature of 40°F in spaces to receive Surface Applied Detectable/Tactile Warning Tiles for at least 24 hours prior to installation, during installation, and for not less than 24 hours after installation.

B. The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the general public. Provide barricades or screens to protect the general public.

1.07 GUARANTEE

A. Surface Applied Detectable/Tactile Warning Tiles shall be warranted in writing for a period of five (5) years from date of final completion. The guarantee includes defective work, breakage, deformation, fading and loosening of tiles.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The Engineered Polymer Composite Surface Applied Detectable/Tactile Warning Tile specified is based on Access Tile manufactured by Access Products, Inc. (888-679-4022) existing engineered and field tested products, which have been in successful service for a period of three (3) years are subject to compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.

B. Color: Yellow conforming to Federal Color No. 33538. Color shall be homogeneous throughout the tile.

2.02 MATERIALS

A. Fasteners: Color matched, corrosion resistant, flat head drive anchor: ¼" diameter x 1 ½" long as supplied by Access Products, Inc.

PART 3 EXECUTION

3.01 INSTALLATION

A. During all surface preparation and Surface Applied Detectable/Tactile Warning Tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.

B. The application of all tiles, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers. Not recommended for asphalt applications.

C. Coordinate with the Contractor or Engineer to ensure that the surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review manufacturer and contract drawings with the Contractor prior to the construction and refer any and all discrepancies to the Engineer.

D. Set the tile true and square to the curb ramp area as detailed in the design drawings, so that its location can be marked on the concrete surface. A thin permanent marker works well. Remove tile when done marking its location.

E. The surface to receive the Surface Applied Detectable/Tactile Warning Tile is to be mechanically cleaned with a diamond cup grinder or shot blaster to remove any dirt or foreign material. This cleaning and roughening of the concrete surface should include at least 4 inches around the perimeter of the area to receive the tile, and also along the cross pattern established by the corresponding areas on the backside of the tile. Those same areas should then be cleaned with a clean rag soaked in Acetone.

F. Immediately prior to installing the Surface Applied Detectable/Tactile Warning Tile, the concrete surfaces must be inspected to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oil, grease, sealers and determined to be structurally sound and cured for a minimum of 30 days.

G. Using Acetone, wipe the backside of the tile around the perimeter and along the internal cross pattern, to remove any dirt or dust particles from the area to receive the adhesive.

H. Apply adhesive to the back of the tile following the perimeter and internal cross pattern established by the tile manufacturer. Sufficient adhesive must be placed on the prescribed areas to have full coverage across the 2" width of the adhesive locator and shall be applied to within 1/4" continuously around the perimeter edge of the tile. The entire tube of adhesive shall be applied to the back of each tile, sizes 24" x 36" and greater.

I. Set the tile true and square to the curb ramp area as detailed in the design drawings.

J. Working from the center of the tile outwards, proceed to drill and install all fasteners in the tile's molded recesses.

K. Standing with both feet applying pressure around the molded recess provided in the tile, drill a hole true and straight to a depth of 3½" using a 1/4" masonry drill bit. Drill through the tile without hammer option (on the drill) until the tile has been successfully penetrated, then with hammer option (on the drill) to drill into the concrete. Maintaining foot pressure on both sides of the hole while drilling

prevents concrete dust from accumulating between the tile and concrete which can affect the tile being installed flush and may compromise installation integrity.

L. Immediately after drilling each hole, before moving on to the next, and while still applying foot pressure, mechanically fasten tiles to the concrete substrate using a leather bound or hard plastic mallet to set the fasteners. Ensure the fastener has been placed to full depth in the dome, straight, and flush to the top of dome. Drive the pin of the fastener with the mallet, taking care to avoid any inadvertent blows to the truncated dome or tile surface.

M. Following the installation of the fasteners, the concrete dust should be vacuumed, brushed or blown away from the tile's surface and adjacent concrete. Using Acetone on a rag, wipe the concrete around the tile's perimeter to ensure a clean, dry surface to receive perimeter sealant.

N. Following the concrete curing stage, protective plastic wrap is to be removed from the tile surface by cutting the plastic with a sharp knife, tight to the concrete/tile interface. If concrete bled under the plastic, a soft brass wire brush will clean the residue without damage to the tile surface.

O. Do not allow foot traffic on installed tiles until the perimeter caulking sealant has cured sufficiently to avoid tracking. Curing time is weather dependant (average cure time at 75° F is 30 minutes). Adhesive or caulking on the surface of the tile can be removed with Acetone.

P. If tiles are custom cut to size, if pre-molded recesses (to receive fasteners) are removed by the cut, or to maintain a tight installation to the substrate then any truncated dome can be center-drilled with a 1/4 inch masonry drill bit to create a through hole, and the through hole must be countersunk with a suitable carbide countersink bit to receive mechanical fasteners. Care should be taken to not countersink too widely or deeply. Fasteners should be flush with the top of the truncated dome when countersunk properly.

3.02 CLEANING, PROTECTING AND MAINTENANCE

A. Protect tiles against damage during construction period to comply with Tactile Tile manufacturer's specification.

B. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.

C. Clean Tactile Tiles not more than four days prior to date schedules for inspection intended to establish date of substantial completion in each area of project. Clean Tactile Tile by method specified by Tactile Tile manufacturer.

D. Comply with manufacturers maintenance manual for cleaning and maintaining tile surface and it is recommended to perform annual inspections for safety and tile integrity.

END OF SECTION

SECTION 32 31 13

CHAIN LINK FENCING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Scope: provide labor, materials and equipment for the installation of the chain link fences and gates as shown on the drawings and as specified. The contractor shall supply a total color coated chain link fencing system of the design, style and strength defined herein. The system shall include all components (i.e., framework, chain link fabric, gates, cables and fittings) required.

B. Related work specified elsewhere includes:

(1) Section 00 31 32, Geotechnical Data.

(2) Section 01 33 00, Submittals

(3) Section 12 93 00, Site Furnishings

(4) Section 31 20 00, Earthwork

(5) Section 31 63 29, Drilled Piers

(6) Section 32 11 00, Subgrade Preparation and Base Material

(7) Section 32 13 13, Landscape Concrete

(8) Section 32 80 00, Irrigation

(9) Section 33 41 00, Site Drainage

1.02 ACCESSIBILITY COMPLIANCE

A. Openings: Openings in path of travel must comply with California Building Code exit door requirements.

B. Gates: Gates in path of travel must comply with California Building Code exit door requirements.

C. Bottom of Gates: Bottom of Gates in path of travel to have a smooth uninterrupted surface and comply with California Building Code exit door requirements.

1.03 SUBMITTALS

A. Per Section 01 33 00. Submit for approval six (6) copies of manufacturer's information and shop drawings for fencing, gates, posts, rails, tension wire, fabric, netting, cables and hardware.

B. Submit two (2) samples showing finish of fence framing system, hardware, cables, netting and fence fabric.

1.04 SOILS REPORT

A. A soil investigation report has been prepared for the project.

B. The report (and other reports, if needed) is available in the office of the Architect and the Construction Manager for inspection by the Contractor. Unless otherwise specified, it is intended that all work be performed in accordance with the provisions of the report.

C. Excavations for drilled piers may require casings and installation of concrete by means of pumping under the direction of the Geotechnical Engineer.

1.05 SOILS BORINGS

A. Subsurface soils investigations have been made at the site and logs of the test holes are available with the Soils Report. Such investigations have been made for the purposes of design only, and neither the Landscape Architect, the Owner, nor the Soils Engineers guarantee adequacy or accuracy of the data, or that data are representative of all conditions to be encountered. Such information is made available for general information only and shall not relieve the Contractor of the responsibility for making his own investigations.

1.06 PROJECT CONDITIONS

A. Coordination: coordinate this work with the work of other Sections to avoid delay and interference with other work.

B. Protect excavations by shoring, bracing, sheeting, underpinning, or other methods, as required, to prevent cave-ins or loose dirt from entering excavations. Barricade open excavations and post warning lights at work adjacent to public streets and walks.

C. Promptly repair damage to adjacent facilities caused by operations. Cost of repair at Contractor's expense.

D. Promptly notify the Inspector of unexpected subsurface conditions.

E. Excavations and Sidewall Support: excavations to depths greater than 4.5-feet will require shields or shoring per OSHA regulations and OSHA recommendations and procedures.

F. Excavations Stabilization and Dewatering Considerations: in instances where excessive caving or unstable wall conditions are encountered, the Geotechnical Engineer may recommend that trench shields be used both for worker safety and to maintain integrity of the trench. Minimizing the length of excavation open at one time will also minimize excavation instability. Also, for this condition, the Geotechnical Engineer recommends the need to keep excavations open as short a time as possible before backfilling. The risk of excavation wall squeezing and bottom heave increases with time.

1.07 QUALITY ASSURANCE

A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.08 ASTM REFERENCES

A53 / A53M - 10	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
A 90/A90M-11	Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
A 569/A569M-977	Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality

A1011 / A1011M - 10	Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
B 6-09	Specification for Zinc
B 117-11	Practice for Operating Salt Spray (Fog) Apparatus
D 1499-05	Practice for Operating Light- and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Plastics
D 3359-09e2	Test Methods for Measuring Adhesion by Tape Test
E 8-98	Test Methods for Tension Testing of Metallic Materials
E 8M-11	Test Methods for Tension Testing of Metallic Materials (Metric)
E 376-11	Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods
F 567-11a	Practice for Installation of Chain-Link Fence
F 626-08	Specification for Fence Fittings
F 668-11	Specification for Poly(Vinyl Chloride) (PVC)-Coated Steel Chain-Link Fence Fabric
F 900-11	Specification for Industrial and Commercial Swing Gates
F 934-96	Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials
F 969-96(2008)	Practice for Construction of Chain-Link Tennis Court Fence
F 1043-11a	Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework

1.09 PRODUCT HANDLING AND STORAGE:

A. Upon receipt at the job site, all materials shall be checked to ensure that no damages occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage and to protect against damage, weather, vandalism and theft.

PART 2 - MATERIALS

2.01 GENERAL

A. Manufacturer: framework and fabric for color chain link fence systems shall conform to Polyolefin Coated Chain Link Fencing, Permafused II™, Master Halco, Inc., 4000 W. Metropolitan Drive, Suite 400, Orange, CA 92868, Phone (800) 229-5615 Fax (714) 385-0107, http://www.fenceonline.com, Ameristar or equal.

2.02 STEEL FRAMEWORK

A. Steel pipe - Type I: ASTM F 1083 and ASTM A 53 Gr B, standard weight schedule 40 or 80 per plan; minimum yield strength of 35,000 psi outside diameter sizes as indicated. Hot-dipped galvanized with minimum average 1.8 oz/ft² (550 g/m²) of coated surface area.

B. Polyolefin Coated finish: in accordance with ASTM F1043, apply supplemental color coating of minimum 10 mils (0.254mm) of thermally fused polyolefin in black color to match fabric.

C. The color of all framework shall be black.

D. Bottom of fence shall be provided with a bottom rail.

2.03 FABRIC

A. Polyolefin elastomeric coating, 6 mil (0.15mm) to 10 mil (0.25mm) thickness, thermally fused to zinc-coated steel core wire: Per ASTM F668 Class 2b. Minimum Core wire tensile strength of 75,000 psi (517 MPa).

B. Size: Where noted at gates: helically wound and woven to height of as indicated on Drawings, 1.0" diamond mesh, 11-gauge wire gauge, (Steel core wire size is 11 gauge and the coated wire size is 9 gauge).

C. Size: helically wound and woven to height of as indicated on Drawings, 2.0" diamond mesh, 9-gauge wire gauge, (Steel core wire size is 11 gauge and the coated wire size is 9 gauge).

D. Color: Black ASTM F 934.

E. Selvage: top edge knuckled. Bottom edge knuckled.

2.04 POLYOLEFIN COATED ACCESSORIES

A. Chain link fence accessories: [ASTM F 626] Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing. Fittings should match Master Halco specifications.

B. Post caps: formed steel, cast malleable iron, or weather tight closure cap for tubular posts. Provide one cap for each post. Where top rail is used, provide tops to permit passage of top rail.

C. Top rail and rail ends: pressed steel per ASTM F626, for connection of rail and brace to terminal posts.

D. Top rail sleeves: 7-inch (178 mm) expansion sleeve with a minimum .137-inch wire diameter and 1.80-inch length spring, allowing for expansion and contraction of top rail.

E. Wire ties: 9 gauge [0.148-inch (3.76 mm)] galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge [0.092" (2.324 mm)] for rails and braces. Hog ring ties of 12-1/2 gauge [0.0985" (2.502 mm)] for attachment of fabric to tension wire.

F. Brace and tension (stretcher bar) bands: pressed steel, minimum 300-degree profile curvature for secure fence post attachment. At square post provide tension bar clips.

G. Tension (stretcher) bars: one piece lengths equal to 2-inches (50 mm) less than full height of fabric with a minimum cross-section of 3/16" x 3/4" (4.76 mm x 19 mm). Provide tension (stretcher) bars where chain link fabric meets terminal posts.

H. Tension wire: thermally fused polyolefin applied to zinc coated steel wire: Per ASTM F 1664 Class 2 b, 6 gauge, [0.192" (4.88 mm)] diameter core wire with tensile strength of 75,000 psi (517 MPa).

I. Truss rods & tightener: steel rods with minimum diameter of 5/16" (7.9 mm). Capable of withstanding a tension of minimum 2,000 lbs.

J. Nuts and bolts are galvanized but not polyolefin coated. Use touch up paint to color coat nuts and bolts.

2.05 SETTING MATERIALS

A. Concrete: minimum 28-day compressive strength of 3,000 psi (20 MPa). Refer to Section 32 1313.

2.06 SWING GATES

A. Swing gates shall be manufactured and coated to meet the requirements of ASTM F900. The color of all gates shall be black, Polyolefin Coated finish, in accordance with ASTM F1043; apply supplemental color coating of minimum 10 mils (0.254mm) of thermally fused polyolefin in black color to match fabric.

B. Gate Frames: standard steel pipe, 1-7/8" outside diameter.

C. Gate Kick Plates: steel plate and as shown on the drawings.

D. Accessible Gate Latch: as required to meet California Building Code requirements for accessible access. Submit manufacturers cut sheet and sample.

E. All lock keys shall be keyed alike with Schlage locks. Provide locks keyed alike to what the owner uses.

F. Gate Tension Bars: 1/4" x 3/4" tension bars tied to frame at 14" spacing with 11-gauge, 1" wide steel bands and 3/8" diameter bolts and nuts.

G. Openings: Openings in path of travel must comply with California Building Code exit door requirements.

H. Gates: Gates in path of travel must comply with California Building Code exit door requirements.

I. Bottom of Gates: Bottom of Gates in path of travel to have a smooth uninterrupted surface and comply with California Building Code exit door requirements.

PART 3 - EXECUTION

3.01 PREPARATION

A. All new installation shall be laid out by the contractor in accordance with the Drawings.

3.02 INSTALLATION

A. Install chain link fence in accordance with ASTM F567. Fence posts shall be set at spacing of a maximum of 8' o.c. Gate posts shall be spaced according to the gate openings specified in the construction plans. The "Site Concrete" section of this specification shall govern post-base placement and material requirements. Install fabric on the side towards the pool and attach with wire ties or clip to line posts at 14-inches o.c. and to rails, braces and tension wire at 24-inches o.c.

3.03 POST

A. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30° or more.

B. Set posts evenly spaced, plumb and true to lines with top line uniform in concrete to depths herein specified. Brace end, corner, pull and gateposts with same material as top rail and truss to line posts with 3/8" rods and tighteners. Line posts shall be evenly spaced 8' or less apart. Top rail shall pass through line post tops and form a continuous brace within each stretch and be securely fastened to terminal posts. Splices in top rail shall be made with couplings at approximately 20' spacing. Each post to be set in a concrete footing sized in accordance with the drawings. Set top of footing as shown on drawings, hold below concrete mowband and concrete border. Extend post to 6" from bottom of concrete footing. Gate post footings to be per manufacturer's recommendations.

3.04 GATES

A. Gate openings shown in plans to be face-to-face dimension of gate posts. Swing of gates to be as shown. Contractor shall verify grade conditions at bottom of gate and submit shop drawings that respond to field conditions.

B. Gates to be provided with same fabric as fence. Fabric to have knuckled selvage top and bottom. Shop drawings to indicate necessary rail sizes and trussing appropriate for gate opening. Gates to be supplied with accessible positive-type latching devices. Double gates to have a plunger rod, catch and gate catch.

C. Gates shall be structurally stable vertically and laterally, in any position.

D. Install gates level, plumb, and secure for full opening without interference. Attach hardware, using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust gate to operate smoothly, easily, and quietly throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

E. Provide gates with same fabric as fence. Supply gates with positive-type latching devices with provisions for padlocking. Double leaf gates shall have a center plunger rod, catch and semi-automatic gate latch. After hinges are placed, final adjustments made, and bolts tightened, the hinge clamp and gate post at each location shall be mutually drilled and tapped, and 1/4" machine bolt set to lock hinge in position. This applies to all hinges.

F. Openings: Openings in path of travel must comply with California Building Code exit door requirements.

G. Gates: Gates in path of travel must comply with California Building Code exit door requirements.

H. Bottom of Gates: Bottom of Gates in path of travel to have a smooth uninterrupted surface and comply with California Building Code exit door requirements

3.05 FABRIC

A. Fabric Attachment: fabric shall be attached to line posts with fabric bands or clips spaced approximately 14" apart, and to top rails and tension wires with wire ties spaced 24" apart. At all corners and vertical ends of fabric, install stretcher bars banded to posts and gate frames at 24" maximum.

B. Attach all fence fabric to the playing side of the fence.

3.06 RAILS

A. Splices at top rails shall be made with couplings at approximately every 20'. Coupling shall produce a continuous brace of railing from end to end of each stretch of fence. Every fifth coupling in a stretch shall be fitted with a heavy spring to allow for expansion and contraction of rail. Rails shall be rigidly clamped to end and corner post with appropriate fittings. Bottom rail shall be clamped at each post. Stretch all fabric tight, free from sags and bulges.

3.07 FASTENINGS

A. Provide 1/4" maximum exposure on bolts. Provide smooth bolt ends.

3.08 CLEANUP

A. At completion, leave project clean and ready for use.

(1) Legally dispose of waste materials, debris, and rubbish off the site.

(2) Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from exposed and semi-exposed surfaces.

(3) Repair, patch, and touch up marred surfaces to specified finish, to match adjacent surfaces.

(4) Broom clean paved surfaces, rake clean planting areas and other surfaces of grounds.

3.09 CLOSEOUT

A. Include copies of the material submittals and manufactured material suppliers and installers name and telephone number in the Operations and Maintenance manuals as part of the closeout documents.

END OF SECTION

SECTION 32 80 00

IRRIGATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Install irrigation system, sleeves, and conduits and pull boxes complete as shown and as specified.

1.02 RELATED SECTIONS

A. Section 32 13 13, Landscape Concrete

B. Section 32 90 00, Planting

1.03 QUALITY ASSURANCE

A. Qualifications:

(1) The contractor shall use an installer that complies with and submits written evidence of the following:

(2) All irrigation sub-contractors bidding on this project must have a California license and be experienced in the installation, in Northern California, of irrigation systems for at least 5 years and have completed five (5) projects in Northern California of comparable size, type and complexity, in the past three (3) years.

(3) Experience: Assign a full-time employee to the job as foreman for the duration of the Contract with a certified landscape technician, certification through CLCA or minimum of four (4) years experience in landscape installation and maintenance supervision, with experience or training in turf management, entomology, pest control, soils, fertilizers and plant identification.

(4) Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work to be accomplished to perform the task in a competent, efficient manner acceptable to the Owner.

(5) Coordinate shutoff of irrigation systems with the Owner and be responsible for any damage caused to adjacent landscaping by Contract work.

B. Requirements:

(1) Supervision: The foreman shall directly supervise the work force at all times and be present during the entire installation. Notify Owner's Representative of all changes in supervision.

(2) Identification: Provide proper identification at all times for landscape maintenance firm's vehicles and a labor force uniformly dressed in a manner satisfactory to Owner's Representative.

C. Manufacturer's Specifications: Follow manufacturer's current printed specifications and Drawings in all cases where the manufacturers of articles used in the Contract furnish directions covering points not specified or shown in the drawings.

D. Ordinances and Regulations: All local, municipal and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything

contained in these Specifications shall not be construed to conflict with any of the above codes, regulations or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard, or larger size than is required by the above codes and regulations, the provisions of these Specifications and Drawings shall take precedence.

E. Explanation of Drawings:

(1) Due to the scale of the Drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. Carefully investigate the conditions affecting all of the work and plan accordingly, and furnish all required fittings. Install system in such a manner to avoid conflicts with planting, utilities, site improvements and architectural features.

(2) Do not install the irrigation system as shown on the Drawings when it is obvious in the field that obstructions, grade differences or discrepancies in arc dimensions exist that might not have been considered in engineering. Bring such obstruction or differences to the attention of the Landscape Architect. In the event this notification is not given, the Contractor shall assume full responsibility for any revision necessary.

1.04 SUBMITTALS

A. Materials List and Notifications:

(1) Within thirty (30) days after the Notice to Proceed, submit manufacturer's cut sheets and complete lists of materials proposed for installation, and obtain the Landscape Architect's written approval thereof before proceeding. Use only accepted materials and items of equipment.

(2) List all materials by manufacturer's name and model number.

(3) Notification: Submit written notification describing all acceptable and non-acceptable site conditions.

(4) Water Pressure: Submit written notification of findings of existing water pressure.

B. Manuals:

(1) Prior to the final acceptance of the irrigation system, furnish two (2) individually bound Owner's Manuals to the Landscape Architect for use by the Owner. The manual shall contain complete enlarged drawings, diagrams and spare parts lists of all equipment installed, showing manufacturer's name and address. In addition, each Owner's Manual shall contain the following:

a. Index sheet indicating the Contractor's name, address and phone number.

b. Copies of equipment warranties and certificates. Include certificate for irrigation controller and warranty for controller.

c. List of equipment with names, addresses and telephone numbers of all local manufacturers' representatives.

d. Complete operating and maintenance instructions in sufficient detail to permit operating personnel to understand, operate and maintain all equipment.

e. Parts list of all equipment such as controllers, valves, solenoids and heads.

C. Record Drawings:

(1) Dimension the location of the following items from two (2) permanent points of reference such as building corners, sidewalks, road intersections, etc.:

a. Connection to existing water lines.

b. Connection to electrical power.

c. Ball valves.

d. Routing of sprinkler pressure lines.

e. Remote control valves.

f. Routing of control valves.

g. Quick coupling valves.

h. All sleeve locations.

i. Routing of all control wiring.

j. Include all invert elevations below 12".

(2) Deliver one reproducible set of Record Drawings to the Landscape Architect within seven (7) working days before the date of Final Review. Delivery of the Record Drawings shall not relieve the Contractor of the responsibility of furnishing required information in the future.

D. Controller Plan:

(1) Permanently install one "bubble diagram" controller plan adjacent to controller housing. The plan shall show the area controlled by each valve and any major permanent structure, such as buildings and roads.

(2) Charts to be waterproof and installed as accepted by the Landscape Architect.

E. Maintenance Material - supply the following tools to the Owner:

(1) Three (3) sets of specialized tools required for removing, disassembling and adjusting each type of sprinkler, valve or other equipment supplied on this project.

(2) Two (2) keys for each type of equipment enclosure.

(3) Two (2) keys for each type of automatic controller.

(4) Two (2) quick-coupler keys and matching hose swivels for each type of quick-coupling valve installed.

(5) All lock keys shall be keyed alike.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Furnish and deliver materials in manufacturer's packaging, bearing original legible labeling.

B. Handle and store all equipment in accordance with manufacturer's current printed specifications.

1.06 SEQUENCING AND SCHEDULING

A. Acceptance: Do not install main line and lateral trenching prior to acceptance by Inspector of rough grades completed under another Section.

B. Coordination: Coordinate with the work of other sections to insure the following sequence of events:

(1) Sleeves and Conduits: Installation of all sleeves and conduits to be located under paving and through walls prior to placement of those materials.

1.07 WARRANTY

A. In addition to manufacturer's guarantees or warranties, work shall be warranted for two (2) years from date of final acceptance against defects in material, equipment and workmanship. Warranty shall also cover repair of damage to any part of the premises resulting from leaks or other defects in materials, equipment and workmanship to the satisfaction of the Owner.

B. Include a copy of the warranty forms in the Owner's Manual.

1.08 OPERATION

A. Routine: Inspect and adjust all spray head, bubbler heads and control valves, including raising or lowering of spray head heights to accommodate plant growth and weather conditions.

B. Controller: Inspect regularly for power interruption and reset clock as required. Adjust station timing to accommodate changes in plant growth and weather conditions.

C. System Failure: Perform all repairs within one (1) operating period. Replacements to match removed products and materials in all respects. Report promptly all damage not resulting from Contractor's operations. Repair all damage caused by Contractor at no expense to Owner.

D. Climate Change: Set and program automatic controllers in response to seasonal requirements and requirements of newly planted materials.

E. Program automatic controller for climatologically controlling operation for at least 10 months of growing conditions before the end of the 12-month maintenance period. Obtain letter of certification from manufacturer's representative certifying the controller is properly programmed.

1.09 SOILS REPORT

A. A soil investigation report has been prepared for the project.

B. The report is available in the office of the Architect and the Construction Manager for inspection by the Contractor. Unless otherwise specified, it is intended that all work be performed in accordance with the provisions of the report.

C. Drilled piers may encounter ground water. Excavations for drilled piers may require casings and installation of concrete by means of pumping under the direction of the Geotechnical Engineer.

1.10 SOILS BORINGS

A. Subsurface soils investigations have been made at the site and logs of the test holes are available with the Soils Report. Such investigations have been made for the purposes of design only, and neither the Landscape Architect, the Owner, nor the Soils Engineers guarantee adequacy or accuracy of the data, or that data are representative of all conditions to be encountered. Such information is made available for general information only and shall not relieve the Contractor of the responsibility for making his own investigations

PART 2 - PRODUCTS

2.01 PIPE

A. All piping shall be continuously and permanently marked with the manufacturer's name or trademark, nominal size, and schedule or class indicating the pressure rating.

B. Polyvinyl chloride (PVC) 1120-1220, Class 200 and Class 315 shall conform to ASTM D2241. Schedule 40 and 80 shall conform to ASTM D1785.

C. Piping on pressure side of irrigation control valves:

(1) Pipe to be polyvinyl chloride (PVC) 1120-1220, Schedule 40, Class 200 and Class 315 as noted on below.

(2) Sizes ¾", 1", 1-1/4", and 1-1/2": Use polyvinyl chloride (PVC) 1120-1220, Schedule 40 and with solvent weld Schedule 40 fittings.

(3) Sizes 2", 2-1/2" and 3": Use polyvinyl chloride (PVC) 1120-1220, Class 315 with solvent weld Schedule 40 fittings.

(4) Sizes 4" and greater use Class 200 rubber gasketed (ring-tite) pipe with rubber gasketed deep bell Series 200 PVC injection molded IPS fittings. Fittings are to conform to ASTM D3139, carry a maximum pressure rating of 200 psi. Fittings are available from Multi Fittings Corp, Port Huron, MI, 800-523-3539 or Harco. Use lubricant approved by the pipe manufacturer.

D. Piping on non-pressure side of irrigation control valves:

(1) Polyvinyl chloride (PVC) 1120-1220, Schedule 40.

(2) Copper pie as shown on drawings

2.02 FITTINGS

A. Fittings for Solvent Welded Pipe: Schedule 40 and Schedule 80, polyvinyl chloride, standard weight, as manufactured by Sloane, Lasco, or accepted equal, to meet ASTM D2466-73 and D2467-73.

2.03 NIPPLES

A. Plastic: Schedule 80, Type I, Grade 1 polyvinyl chloride (PVC); threaded both ends; ASTM D1784 and D1785; uniformly gray in color.

2.04 IRRIGATION CONTROLLER

A. Refer to Drawings.

2.05 CONTROL WIRES

A. Type: Copper with UL accepted for direct burial, size 14-1. Common ground wire with white insulating jacket; individual control wires with insulating jacket of color other than white. Use red wires for control valve wires and black wires for extra wires.

B. Splices: 'DBR', or 'DBY' by 3M.

2.06 REMOTE CONTROL VALVE

A. As shown on Drawings.

2.07 ISOLATION VALVE

A. For isolation valves 3" and larger: Specification: Nibco, Resilient Wedge Iron Body Gate Valve, model F-619-RW-SON, Flanged, non-rising stem or accepted equal. Match the line size.

B. For ball valve at remote control valve: Specification: KBI, Lo-Torque Schedule 80 Plastic Ball Valve or accepted equal. Match the line size or size of remote control valve.

C. For isolation valves 2-1/2" and smaller: Specification: Nibco T-113 Bronze Ball Valve or accepted equal. Match the line size.

2.08 VALVE BOXES

A. As shown on Drawings or accepted equal. Christy Concrete, unless otherwise noted, marked with valve number or valve type inscribed on lid.

2.09 PULL BOXES

A. As shown on the Drawings, Christy N-9.

2.10 DETECTION WIRE

A. Sheathed #12 copper wire.

2.11 SLEEVE AND CONDUIT MATERIALS

A. For Water Lines: PVC 1120-1220, Class 315 pipe.

B. For Control Wires and Conduits: PVC 1120-1220, Schedule-40 electrical conduit. Install pull ropes in empty conduits.

C. For Control Wires and Water Lines: Twice the diameter of the largest pipe going through the sleeve.

2.12 MISCELLANEOUS INSTALLATION MATERIALS

A. Solvent Cement and Primers for Solvent-weld Joints: Conforming to ASTM D2564 #P-70 primer and Weld-on #711 glue or make and type accepted by manufacturer(s) of pipe and fittings. Maintain cement proper consistency throughout use.

B. Teflon Tape: Use only Teflon tape on all threaded PVC fittings.

2.13 MISCELLANEOUS EQUIPMENT/ACCESSORIES

A. Concrete Pads: Poured-in-place concrete boxes and vaults.

B. Thrust Blocks: Concrete and the size shall be based on an average safe soil bearing load of 700 lbs. per square foot. See Concrete Section of Specifications.

C. Sleeves and Conduits: See Drawings.

2.14 REMOTE CONTROL VALVE TAGS

A. Christy remote control valve tags or accepted equal.

2.15 OTHER EQUIPMENT

A. As shown on the Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Sleeves and Conduits: Verify that all installed sleeving and conduits are undisturbed and are free of defects or errors introduced by the work of other sections.

B. Water Pressure: Test and verify that existing water pressure is the minimum pressure to operate the irrigation system as specified on the Drawings.

C. Stub-outs: Verify that all stub-outs to be provided under another contract are correctly sized, located and installed as noted on Drawings. Mark all below grade stub-outs, spare sleeves, and boxes.

D. Notification: Submit written notification to Inspector within ten (10) working days of above inspections describing all acceptable and non-acceptable site conditions.

3.02 CONNECTIONS TO SERVICES

A. Coordinate connection to points of connection where applicable.

B. Temporarily connect to potable water source with backflow prevention device if required so that work may proceed and be tested before irrigation water connection is installed.

C. Field verify with Owner the locations of connections to water sources, stub outs, backflow prevention devices, irrigation controller, isolation valves, and remote control valves.

D. Refer to Planting Plan of location of valve boxes.

E. Coordinate connection of irrigation controllers to electrical power source. Contractor to connect to the power

3.03 INSTALLATION

A. Conduits and Sleeves:

(1) Coordination

a. Provide conduit and sleeve materials and coordinate installation with other trades.

b. Do not install other trades conduit, pipes or materials in irrigation trenches.

c. Coordinate with track layout for location of electrical and signal conduits and boxes at track finish line.

2) Extent: Install conduits and sleeves where control wires and pipes pass under paving or through walls as shown on Drawings. Extend twelve inches (12") beyond edges of paving and walls and cap ends until ready for use.

B. Excavating and Trenching:

(1) Dig trenches wide enough to allow a minimum of three inches (3") between parallel pipelines. Provide a minimum cover from finish grade as shown on drawings.

C. Pipe Line Assembly:

(1) General:

a. Install pipe and fittings in accordance with manufacturer's current printed Specifications.

b. Clean all pipes and fittings of dirt, scales and moisture before assembly.

c. Thrust blocks:

(2) For irrigation mainlines which are 2 ½" diameter and greater, install thrust blocks at changes of direction and size changes greater than ½". Refer to Drawings.

(3) The size of the thrust blocks shall be per pipe manufacturer's instructions and based on the maximum thrust force expected during test pressures as well as peak operating pressures and the load-bearing capacity of the soil.

(4) Install thrust blocks at shutoff valves.

a. Install thrust blocks at the termination points of the mainline.

b. Do not install Concrete or thrust blocks over valve wires.

c. Do not conduct a pressure test within 48 hours of the thrust block pours.

(5) Solvent-welded Joints for PVC Pipes:

a. Solvents: Use solvents and methods specified by pipe manufacturer.

b. Curing Period: Minimum of one (1) hour before applying any external stress on the piping and at least 24 hours before placing the joint under water pressure.

(6) Threaded Joints for Plastic Pipes:

a. Quick Coupler Valve Swing Joint Assembly: Use non-hardening pipe joint compound.
b. Use Permatex on all other threaded PVC fittings.

c. Joining: Use strap-type friction wrench only. Do not use metal-jawed wrench. Assemble finger tight plus one or two turns.

(7) Laying of Pipe:

a. Bedding On-grade: Remove from trench all rocks or clods. Bed pipe in at least 2 inches of soil excavated from trench. Backfill on all sides of piping to provide a uniform bearing.

b. Snaking: Snake pipe from side to side of trench bottom to allow for expansion and contraction. Minimum allowance for snaking is one (1) additional foot per 100 ft. of pipe.

c. Moisture Restrictions: Do not lay PVC pipe when there is water in the trench. Do not assemble PVC pipe unless the pipe is dry.

D. Isolation Valves: Group valves together, aligned in a row where grouped, and locate where shown on drawings. Install box flush with finish grade, not necessarily level. Locate boxes outside of track surfacing.

E. Control Valves:

(1) Install in valve boxes where shown on Drawings and group together where practical.

(2) Manifold valves where connecting to the mainline.

(3) Where two or more valves are installed adjacent to each other, provide at least twelve inches (12") separation. Align boxes in a row.

(4) Permanently mark valve box lid with 2" black valve number and controller letter. Install remote control valve tags at each valve.

F. Automatic Controller:

(1) General: Install per local code and manufacturer's current printed Specifications.

(2) Connection to Valves: Connect remote control valves to controller in clockwise sequence to correspond with station setting beginning with Stations 1, 2, 3, etc. Match valve numbers as shown on Irrigation Plan.

(3) Connect all controllers to lightning rod as required for lightning protection.

(4) Labeling: Affix controller letter (i.e., "A") on inside of controller cabinet door with minimum of one-inch (1") high permanent letter.

(5) Irrigation Diagram: Affix a non-fading, waterproof copy of irrigation diagram to cabinet door below controller name. Irrigation diagram to be sealed between two plastic sheets, 20 mil. minimum thickness. Use a reduced copy of the Record Drawing for the irrigation diagram clearly showing all valves operated by the controller, station, number, valve size, and type of planting irrigated. Color code area operated by each valve.

(6) Connect controller to existing electrical power as required. Install per code and manufacturer's current printed Specifications.

G. Closing of Pipe and Flushing of Lines:

(1) Capping: Cap or plug all openings as soon as lines have been installed to prevent entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.

3.04 SLEEVING

A. Install sleeves where control wires and pipes pass through or under walls.

B. Install sleeves for control wiring and pipe under walks and paving as shown on the drawing and as required to facilitate a smooth construction sequence.

C. Sleeves to be of adequate size to accommodate retrieval for repair of wiring or piping and shall extend a minimum of 12" beyond edges of walls, walks and paving.

D. Coordinate sleeve installation with other trades as required.

E. Install one spare 3" diameter sleeve adjacent to sleeves shown on Drawings and required to complete work. Cap both ends and mark location on pavement as accepted by Inspector.

3.05 PIPELINE ASSEMBLY

A. Install pipe in accordance with manufacturer's instructions.

B. Solvent weld PVC pipe and fittings using primers, solvents and methods recommended by manufacturer, except where screw connections are required. Clean pipe and fitting of dirt and moisture before assembly. PVC pipe may be assembled on ground surface beside trench. Snake pipe from side to side of trench bottom to allow for expansion and contraction. Make all connections between PVC pipe and metal valves or pipe with threaded fittings using PVC male adapters.

C. Use Permatex pipe joint compound (#51D) on threaded PVC fittings, except for sprinkler heads. Assemble threaded PVC fittings finger tight plus one or two turns.

3.06 CONTROL WIRING

A. Install control wires with sprinkler mains and laterals in common trenches wherever possible. Lay to the side of pipeline. Tie wires in bundles at 10' intervals and allow slack for contraction between ties.

B. Provide a minimum of 30" of looped extra ground and control wire at each valve and at 200' intervals on long wire runs. Snake wires in trench to allow for contraction of wires.

C. Control wire splices at remote control valves to be crimped and sealed with specified splicing materials.

D. Line splices will be allowed only on runs of more than 2500'. Place splices inside of a valve box below grade and mark with a marker.

E. Install two additional wires in wire bundles for potential connection to controller. Run from farthest valve to controller without splices. More than two wires may be required due to branching of mainline. Install different color wire than active valve wire.

F. Crimp control wire splices at control valves. Seal with specified splicing materials. In-line splices will be allowed only on runs exceeding 2500 feet and only in junction boxes.

3.07 DETECTION WIRE

A. Install wire on top of the irrigation main supply line. Install wire on top of the potable water line when the potable line is in a separate trench. Connect detection to each quick coupling valve stake to serve as a ground.

3.08 FIELD QUALITY CONTROL

A. Testing of Irrigation System:

(1) Make hydrostatic tests with quick coupler valves installed and capped, remote control valves installed, flow valve open, ball valve open and laterals disconnected when welded PVC joints have cured at least 24 hours. Center load piping with backfill to prevent pipe from moving under pressure. Keep all couplings and fittings exposed.

(2) Install two (2) pressure gauges at opposite ends of mainline system. Pump system up to a minimum of 125 psi the day preceding the scheduled test and verify that pressure is holding. Inspect system early following day and immediately notify Inspector if the test confirmation must be postponed.

(3) Apply continuous static water pressure of 125 psi in accordance with CalTrans Standard Specifications Section 20-5.03H, except after a drop in pressure (5 psi maximum), then the pressure must stabilize and remain stable for a one (1) hour minimum period before acceptance of the test.

(4) Leaks resulting from tests shall be repaired and test repeated until system passes tests.

B. Adjustment of the System:

(1) Flush and adjust all sprinkler heads for optimum performance and to prevent over spray onto walks, roadways and buildings.

(2) Set all sprinkler heads perpendicular to finished grades unless otherwise noted on the Drawings.

(3) When the landscape sprinkler system is completed, perform a coverage test in the presence of the Inspector to determine if the water coverage for planting and turf areas is adequate.

(4) Test controllers individually in the presence of the Inspector and the Landscape Architect. Demonstrate that all control valves operate electronically.

(5) Demonstrate to Landscape Architect that irrigation scheduling programmed into controller is adequate for plant requirements without causing runoff, and that scheduling capacities of controller are utilized.

3.09 BACKFILL AND COMPACTING

A. General: After system is operating and required tests and reviews have been made, backfill excavations and trenches with clean soil, free of debris.

B. Backfill for All Trenches: Regardless of the type of pipe covered, compact to minimum 95% density under pavements and 85% under planted areas.

C. Compacting: Compact trenches only in areas to be planted by thoroughly flooding the backfill. Jetting process may be used in those areas.

D. Finishing: Dress off areas to finish grades.

E. Owner's testing agency will test backfill compaction in areas under paving.

3.10 FLOW SENSOR AND MASTER VALVE

A. Verify that existing flow sensor and master valve are installed, connected to the controller and in conformance with the manufacturer's General and Technical Specifications.

3.11 MAINTENANCE

A. The entire sprinkler irrigation system shall be under full automatic operation for a period of 2 days prior to any planting.

B. The Owner's Representative reserves the right to waive or shorten the operation period.

C. Maintain/repair system for full duration of plant maintenance period.

D. Maintain the landscape to ensure water use efficiency.

E. Submit a regular maintenance schedule with the Certificate of Completion. The regular maintenance schedule shall include, but not be limited to, routine inspection; adjustment and repair of the irrigation system and its components; aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; weeding in all landscape areas, and removing and obstruction to emission devices. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

F. Repair of irrigation equipment shall be done with the originally installed components or their equivalents.

G. Implement sustainable or environmentally-friendly practices for landscape maintenance.

3.12 IRRIGATION SCHEDULE

A. Program the controller for the plant establishment period and the one 12-month irrigation schedule. Program and adjust controller to apply water as required for healthy plant growth, maintenance and water conservation.

B. For the efficient use of water, prepare manage, and evaluate irrigation schedule to utilize the minimum amount of water required to establish and maintain plant health and meet the following criteria:

(1) Irrigation scheduling shall be regulated by automatic irrigation controllers.

(2) Overhead irrigation shall be scheduled between 10:00 p.m. and 6:00 a.m. unless weather conditions prevent it. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

(3) For implementation of the irrigation schedule, particular attention must be paid to irrigation run times, emission device, flow rate, and current reference evapotranspiration, so that applied water meets the Estimated Total Water Use. Total annual applied water shall be less than or equal to Maximum Applied Water Allowance (MAWA). Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (e.g., CIMIS) or soil moisture sensor data.

(4) Program the controller to operate automatically based on Evapotranspiration (ET) data ET.

(5) Parameters used to set the automatic controller shall be developed and submitted for each of the following

a. The plant establishment period.

b. The established landscape.

c. Temporarily irrigated areas.

(6) Each irrigation schedule shall consider for each station all of the following that apply:

a. Irrigation interval (days between irrigation);

b. Irrigation run times (hours or minutes per irrigation event to avoid runoff);

c. Number of cycle starts required for each irrigation event to avoid runoff;

d. Amount of applied water scheduled to be applied on a monthly basis;

e. Application rate setting;

f. Root depth setting;

g. Plant type setting;

h. Soil type;

i. Slope factor setting;

j. Shade factor setting

k. Irrigation uniformity or efficiency setting.

3.13 REVIEWS PRIOR TO ACCEPTANCE

A. Notify the Owner's Representative in advance for the following reviews, according to the time indicated:

(1) Pre-construction conference - 7 days.

(2) Supply line pressure test and control wire installation - 72 hours.

(3) Coverage and controller test - 72 hours.

(4) Final inspection - 7 days.

(5) Landscape Irrigation Audit: Before sodding of the turf, and upon completing the installation of the irrigation system for the turf, conduct an irrigation audit by a certified landscape irrigation auditor. Submit written report showing distribution uniformity and irrigation efficiency by valve station, recommended 12-month schedule and estimate of annual water consumption. Include a copy of this report in the Operation and Maintenance Manual.

(6) Make correction and adjustments as required to provide the following minimum Distribution Uniformity:

a. Rotary head irrigation: 70%

b. Spray head irrigation: 62.5%

B. No reviews will commence without record drawings, without completing previously noted corrections, or without preparing the system for review.

C. Submit the signed Certificate of Completion and the following as part of the Maintenance and Operations Manual specified:

(1) Submit the signed Certificate of Completion

(2) Record drawings.

(3) Irrigation scheduling parameters used to set the controller.

(4) Irrigation controller schedule.

(5) Landscape maintenance schedule.

(6) Irrigation audit report.

(7) Soil analysis report and documentation verifying implementation of soil preparation.

(8) Letter of certification from controller manufacturer's representative certifying the controller is properly programmed for ET operation.

(9) Written verification of static and dynamic water pressure.

Certificate of Completion

The signature below certifies that based upon periodic site observations, the irrigation system has been completed in accordance with the contract irrigation drawings and specifications.

Date	
Project Name	Contractor Company Name
Project Address	Contractor License No.
Project Owner Representative	Contractor Representative Name and Title (print)
Project Owner Mailing Address	Contractor Mailing Address
Project Owner Telephone Number	Contractor Telephone Number
Project Owner Email Address	Contractor Email Address
	Contractor Representative Signature

3.14 FINAL REVIEW AND CLEANUP:

A. Operate each system in its entirety for the Owner's Representative at time of final review. Any items deemed not acceptable by the Owner's Representative shall be reworked to the complete satisfaction of the Owner Representative.

B. Provide evidence to the Owner's Representative that the Owner has received all accessories and equipment as required before final review can occur.

C. Final acceptance and start of warranty period will occur no later than the end of the plant maintenance period.

D. For time of final review, Contractor shall arrange a meeting with the Owner's maintenance personnel to demonstrate the operation of the irrigation systems automatically in order to verify acceptance and to familiarize the maintenance personnel with the system and recommended programming.

E. All work shall be left in a condition satisfactory to the Owner Representative.

3.15 CLOSEOUT

A. Operate each system in its entirety for the Inspector at time of final review. Any items deemed not acceptable by the Inspector shall be reworked to the complete satisfaction of the Inspector.

B. Provide evidence to the Inspector that the Owner has received all accessories and equipment as required before final review can occur.

C. Final acceptance and start of warranty period will occur no later than the end of the plant maintenance period.

D. Include copies of the material submittals and manufactured material suppliers and installers name and telephone number and the items required as part of the Certificate of Completion in the Operations and Maintenance manuals as part of the closeout documents.

E. Include warranty and manufacturer's warranty information of specified items with warranties.

END OF SECTION

SECTION 32 90 00

PLANTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide planting work, erosion control and planting maintenance complete as shown on the drawings and as specified.

B. Related work specified elsewhere includes:

(1) Section 31 20 00, Earthwork

(2) Section 32 13 13, Landscape Concrete

(3) Section 32 80 00, Irrigation

1.02 QUALITY ASSURANCE

A. Reference Standards:

(1) Manufacturer's recommendations.

(2) "Sunset Western Garden Book," Lane Publishing Co., Menlo Park, California; current edition.

(3) "American Standards for Nursery Stock," American Association of Nurseryman, 230 Southern Building, Washington, D.C. 20005.

(4) A soil investigation report has been prepared for the project. The report is available in the office of the Architect and the Construction Manager for inspection by the Contractor. Unless otherwise specified, it is intended that all work be performed in accordance with the provisions of the report. Drilled piers may encounter ground water. Excavations for drilled piers may require casings and installation of concrete by means of pumping under the direction of the Geotechnical Engineer.

(5) Weed Control Methods Handbook, The Nature Conservancy, Tu, M., Hurd, C. & J.M. Randall. 2001. http://tncweeds.ucdavis.edu.

B. Qualifications:

(1) Experience: Assign a full-time employee to the job as foreman for the duration of the Contract with a certified landscape technician, certification through CLCA or minimum of four (4) years experience in landscape installation and maintenance supervision, with experience or training in turf management, entomology, pest control, soils, fertilizers and plant identification.

(2) Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work to be accomplished to perform the task in a competent, efficient manner acceptable to the Owner.

C. Requirements:

(1) Supervision: The foreman shall directly supervise the work force at all times and be present during the entire installation. Notify Project Inspector of all changes in supervision.

(2) Identification: Provide proper identification at all times for landscape maintenance firm's vehicles and a labor force uniformly dressed in a manner satisfactory to Project Inspector.

D. Plant Material Standards:

(1) Quality and Size of Plants: Conform to the State of California Grading Code of Nursery Stock, No. 1 grade. Use only nursery-grown stock, which is free from insect pests and diseases.

(2) Comply with federal and state laws requiring inspection for plant diseases and infestations. Submit inspection certificates required by law with each shipment of plants, and deliver certificates to the Owner. Obtain clearance from the County Agricultural Commissioner as required by law, before planting plants delivered from outside the County in which planted.

E. Testing Agency: Soil and Plant Laboratory, Inc. 1101 S. Winchester Blvd. Suite G-17, San Jose, CA 95128; Tel. (408) 727-0330.

E. Test compost using a laboratory participating in the US Composting Council's Seal of Testing Assurance Program, using appropriate test methods from the Test Methods for the Examination of Compost and Composting manual.

1.03 SUBMITTALS, per General Requirements

A. Product Data: Manufacturer's current catalog cuts and specifications of the following:

(1) Fertilizers

(2) Soil Amendment (compost)

i. Compost with test results on a US Composting Council Seal of Testing Assurance Compost Technical Data Sheet

(3) Mulch

(4) Tree ties and stakes

(5) Mycorrhiza

B. Samples:

(1) Plants: Submit typical sample of each variety or entire quantity to site for acceptance by Landscape Architect.

(2) Organic Mulch: Submit two 1-pint samples.

(3) Import Sandy Loam topsoil: Submit two 1-pint samples.

(4) Soil Amendment (compost): Submit samples.

C. Certificates of Compliance for the following:

(1) Soil amendment, chemical and physical properties.

(2) Quantity of soil amendment required for soil preparation.

(3) Receipts for quantity of soil amendment delivered for soil preparation.

(4) Import Sandy Loam topsoil.

(5) Within 30 days of Notice to Proceed, provide a letter from the contactor certifying that all plant materials are available.

D. Topsoil Analysis: After acceptance of rough grading and topsoil placement, obtain two samples of topsoil and submit to Soil and Plant Laboratory, Inc for "horticultural suitability" analysis report, including evaluation of physical and chemical properties of soil and recommendations for adding amendment and fertilizers to the soil.

Upon acceptance of the Laboratory's report by the Landscape Architect, the recommendations in the report shall become a part of the Specifications and the quantities of soil amendment; fertilizer and other additives shall be adjusted to conform with the report. Request Testing Laboratory to send one copy of test results directly to Landscape Architect and one copy to the Owner.

E. Substitutions:

(1) If the Contractor desires to substitute a product, he shall list each item and note it as a "substitution" and provide the following information:

a. Descriptive information describing its similarities to the specified product.

b. Reason Contractor wants the substitution.

c. The price difference in the two different products.

(2) If the product is accepted and, in the opinion of the Landscape Architect, the substituted product does not perform as well as it should, the Contractor shall replace it with the specified product at no additional cost to the Owner.

1.04 PROJECT/SITE CONDITIONS

A. Site Visit: At beginning of work, visit and walk the site with the Project Inspector to clarify scope of work and understand existing project/site conditions.

1.05 WARRANTY AND REPLACEMENT

A. Pre-Emergence Weed Killer: Warrant the work against weed growth for a period of four (4) months after application.

B. Warrant all plants and planting to be in a healthy, thriving condition until the end of the maintenance period, and deciduous plants beyond that time until active growth is evident.

C. Replace all dead plants and plants not in a vigorous condition immediately as directed by the Project Inspector at Contractor's expense. Install replacement plants before the final acceptance at the size specified.

D. Warrant all plant material for a period of one year after final acceptance of the maintenance work against defects in the plant prior to installation.

E. Warrant plant installation and maintenance by Contractor against defects for a period of one year.

PART 2 - PRODUCTS

2.01 PLANTS

A. Plant the variety, quantity and size indicated. The total quantity tabulated are considered approximate and furnished for convenience only.

B. Tag plants of the type or name indicated and in accordance with the standard practice recommended by the American Association of Nurserymen.

C. Install healthy, shapely and well-rooted plants with no evidence of having been rootbound, restricted or deformed.

D. Take precautions to ensure that the plants will arrive at the site in proper condition for successful growth. Protect plants in transit from windburn and sunburn. Protect and maintain plants on site by proper storage and watering.

E. Trees: select straight trunks with the leader intact, undamaged and uncut with all old abrasions and cuts completely callused over. Do not prune plants prior to delivery.

F. Measure trees and shrubs with branches in normal position. Height and spread dimensions indicated refer to the main body of the plant, and not from branch tip to tip.

G. Substitutions will not be permitted, except as follows:

(1) If proof is submitted to the Landscape Architect that any plant specified is not obtainable, a proposal will be considered for use of nearest equivalent size or variety with an equitable adjustment of contract price.

(2) Substantiate and submit proof in writing to the Landscape Architect within 10 days after the effective date of Notice to Proceed.

2.02 FERTILIZERS

A. Commercial fertilizer, pelleted or granular form, conform to the requirements of Chapter 7, Article 2, of the Agricultural Code of the State of California for fertilizing materials as follows:

Type A: Slow release fertilizer: Lawn Restore Fertilizer, 10% Nitrogen, 2% Phosphoric Acid and 6% Potash (10-2-6) available from Peaceful Valley Farm Supply, Grass Valley, CA, www.groworganic.com, 888-784-1722 or approved equal

Type B: AgSafe 20-10-5, 21-gram Planting Tablets complete fertilizer 20% Nitrogen, 10% Phosphate and 5% Potash (20-10-5) slow-release plant food with minors, 10% humus, Mycorrhizae, plant extracts, and fish extracts for two year root zone feeding. Product P101 Grower & Landscaper Bulk Case (21g),

500 tablets (21g) per case, available from Agritab Corporation, Clearfield, UT, www.agritab.com, 800-398-3803.

Type C: AgSafe 20-10-5,10-gram Planting Tablets complete fertilizer 20% Nitrogen, 10% Phosphate and 5% Potash (20-10-5) slow-release plant food with minors, 10% humus, Mycorrhizae, plant extracts, and fish extracts for two year root zone feeding. Product P102 Grower & Landscaper Bulk Case (10g), 1,000 tablets (10g) per case, available from Agritab Corporation, Clearfield, UT, www.agritab.com 800-398-3803.

(1) Iron Sulfate, 31% Fe

(2) Potassium Sulfate (0-0-50)

(3) Soil Sulfur: Tiger Organic 0-0-0-90 Sulfur

(4) Agricultural Gypsum

(5) Treble Superphosphate: 0-48-0

If commercial fertilizer having this analysis is not obtainable, other similar commercial fertilizer may be used providing it meets the acceptance of the Landscape Architect.

2.03 SOIL AMENDMENT (Compost)

A. Approved Products: Super-Humus Compost. Available at BFI Organics, 1601 Dixon Landing Road, Milpitas, CA, 408-945-2836, "Wonder Grow" available from TMT Enterprises, 408-432-9040, Redi-Crop, 408-888-7632, or Lopez Ag Service Organic Compost, 916-682-5450, Al., Organic Compost from Z-Best, with the following properties:

B. Reaction (pH): 5.5 to 8.0 as determined in saturated paste.

C. Screened to 1/4" minus and having the following graduation:

Percent Passing	Sieve Designation
85- 100	9.51mm (3/8")
50-80	2.38mm (No. 8)
0-40	500 micron (No. 35)

D. Soluble salts as determined by Saturation Extract Solution less than 10 mmhos/cm or ds/M.

E. Carbon to nitrogen ratio less than 35:1.

F. Organic content: Minimum of 50% base on dry weight and determined by ash method. Minimum of 250 lbs organic matter per cubic yard of compost.

G. Moisture Content: 35-60%.

H. Shall be free of glass, metal and visible plastics.

I. Odor shall be soil-like (musty or moldy) not sour, ammonia-like or putrid.

J. Characterization: identifiable wood pieces are acceptable but the balance of material should be soil-like without recognizable grass or leaves.

K. Color: Dark brown to black.

L. Submit sample to the Landscape Architect two weeks before accepted delivery of amendment to the project with laboratory organic amendment analysis report to include above information and iron content. Laboratory organic amendment analysis report is to be from a sample that is no older than one month old.

1. The compost provider must be a compost producer and a participant in the United States Composting Council (USCC) Seal of Testing Assurance (STA) program.
2. The compost producer must be fully permitted as a compost producer in accordance with requirements of the California Integrated Waste Management Board (CIWMB), Local Enforcement Agencies (LEA) and any other State and Local Agencies that regulate solid waste facilities. If exempt from State permitting requirements, the composting facility must certify that it follows all guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.
3. Compost may be derived from any single or mixture of any of the following feedstock materials: Green material consisting of chipped, shredded, or ground vegetation; or clean processed recycled wood products, Biosolids, Manure or Mixed food waste.
4. Compost the feedstock materials such that weed seeds, pathogens and deleterious materials are reduced as specified under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3.
5. Metal concentrations in the composted mulch must not exceed the maximum metal concentrations listed in Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.
6. Compost shall comply with the following table:

Physical and Chemical Requirements

Property	Test Method	Requirement
pH	TMECC 04.11-A Elastometric pH 1:5 Slurry Method pH Units	6.0–8.5
Soluble Salts	TMECC 04.10-A Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0–10.0
Moisture Content	TMECC 03.09-A Total Solids & Moisture at 70+/- 5 deg C % Wet Weight Basis	30–60
Organic Matter Content	TMECC 05.07-A Loss-On-Ignition Organic Matter Method (LOI) % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A Germination and Vigor, % Relative to Positive Control Seed Emergence Seedling Vigor	 80 or Above 80 or Above
Stability	TMECC 05.08-B Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	Inches % Passing 5/8 - 95% 3/8 - 70% Max. Length 4 inches
Pathogen	TMECC 07.01-B Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	<1000 (Pass)
Pathogen	TMECC 07.01-B	

	Salmonella < 3 MPN/4 grams dry wt.	<3 (Pass)
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Plastic, Glass and Metal % > 4mm fraction	Combined Total: < 0.5
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Sharps % > 4mm fraction (Sewing needles, hypodermic needles)	None Detected

NOTE: TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

2.04 MULCH

A. Bark Mulch: Pro-chip decorative mulch, small, 1-inch maximum size in any direction, redwood color, or equivalent as accepted by the Landscape Architect. Available at BFI Organics, 1601 Dixon Landing Road, Milpitas, CA, 408-945-2836.

B. Submit one (1) sample of bark mulches to the Landscape Architect for acceptance within two weeks of award of Contract. Resubmit until acceptable to Owner, at no extra cost.

2.05 PLANT BACKFILL: Use a mixture of 2 parts soil from the hole, and 1 part amendment.

2.06 SOIL

A. Imported Top soil shall be free of subsoil, clay, lumps, stones, and other objects over 1" in diameter, and without objectionable material and be imported soil as follows:

(1) Imported topsoil shall be fertile, friable, natural, productive soil containing a normal amount of humus, and shall be capable of sustaining healthy plant life. Top soil shall be free of subsoil, heavy or stiff clay, rocks, gravel, brush, roots, weeds, noxious seeds, sticks, trash, and other deleterious substances. Soil shall not be infested with nematodes or with other noxious animal life or toxic substances. Soil shall be obtained from well-drained, arable land, and shall be of an even texture. Soil shall not be taken from areas on which are growing any noxious weeds such as Morning Glory, Sorrel, or Bermuda Grass.

(2) Imported top soil shall have a pH value of between 6.0 and 7.5, a boron concentration of the saturation extract of less than 1 ppm, salinity of the saturation extract at 25 degrees C. of less than 4.0 millimoles, and a sodium absorption rate (SAR) of less than 8.

(3) It shall be a "Sandy Loam" as classified in accordance with USDA Standards.

(4) Make the site of the source of supply of topsoil available to the Landscape Architect for observation and review prior to any hauling or placing of soil. In addition, submit for review a 1-quart sample of soil, together with a standard soil analysis report by Soil and Plant Laboratory similar Lab Report 70399 showing chemical analysis stating source, fertility, agricultural suitability and particle size distribution of the soil, recommendations for soil amendments and compatibility with the on–site soil.

B. On-site topsoil as follows:

(1) Planting soil is defined as on-site surface soil. Satisfactory planting soil shall be free of subsoil, clay, lumps, stones, and other objects over 1" in diameter, and without weeds, roots, and other objectionable material.

(2) Strip planting soil to whatever depths encountered, a minimum of six inches in a manner to prevent intermingling with the underlying subsoil or other objectionable material. Topsoil stripping is limited to area indicated on drawings.

(3) Remove heavy growths of grass from areas before stripping.

(4) Stockpile topsoil in storage piles in areas shown, or where designated by Owner. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust.

(5) If herbicide contamination is suspected then a radish/ryegrass growth trial must be performed. Consult with Landscape Architect prior to decision to test or not.

2.07 MYCORRHIZA

A. MycoApply® All Purpose Granular available from Mycorrhizal Applications, Inc www.mycorrhizae.com, PO Box 1181 Grants Pass, OR 97528, Telephone 866-476-7800, or 541.476.3985 fax, 541.476.1581

2.08 TREE SUPPORT POLES

A. As shown on Drawings.

2.09 TIES

A. Rubber strap, 32-inch minimum length without sharp edges adjacent to trunk, V.I.T. cinch-tie, or accepted equal.

2.10 GYPSUM: Agricultural Gypsum

2.11 ROOT BARRIER

A. As shown on the drawings, or accepted equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. General: Verify that existing site conditions are as specified and indicated before beginning work under this section.

(1) Grades: Inspect to verify grade of planting areas.

(2) Damaged Earth: Inspect to verify that earth rendered unfit to receive planting due to concrete water, mortar, limewater or any other contaminant dumped on it has been removed and replaced with clean earth from a source approved by the Owner's Representative.

B. Unsatisfactory Conditions: Report in writing to Owner's Representative.

C. Acceptance: Beginning of installation means acceptance of existing conditions by installer.

D. Coordination: Coordinate with other trades for topsoil stripping and planting soil protection so that adequate, healthy, friable and acceptable topsoil is provided consistent with this section.

3.02 PREPARATION

A. Protection:

(1) Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment prior to commencing work.

(2) Be responsible for proper repair to utilities, walls, pavements and other site improvements damaged by operations under this section.

(3) Pay for repairs made by contractor(s) designated by Owner.

(4) Protect existing woody roots, shrubs and trees to remain.

(5) Protect existing soil and slopes that exceed 3:1 slope. Do not disturb grade of slopes steeper than 3:1

B. Grass Removal: Remove surviving clumps of grass and dispose off-site. Rip and cross rip the existing soil 12" deep and till the dead organic matter into the existing soil.

C. Surface Grade: Remove grass, weeds, debris and rocks larger than 1". Dispose of accumulated debris.

D. Runoff: Take measures and furnish equipment and labor necessary to control the flow, drainage, and accumulation of water to run off the grounds as is intended by the grades.

E. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site throughout duration of work.

F. Irrigation System Replacement: Cut, cap and remove existing irrigation equipment as required and noted on drawings and coordinate installation of new system and modifications of existing system as required.

G. Install landscape drainage as noted on drawings and specified in Section 32 85 00.

3.03 SOIL PLACEMENT

A. Soil Placement:

(1) Provide soil as noted on the drawings.

(2) Protect improvements from damage due to landscape work.

(3) Existing Soil Excavation: where import soil is required, excavate existing soil, as required, to clear existing vegetation and roots, meet finish grades and allow for soil preparation.

(4) Inspect planting areas and remove all base rock and other foreign materials. Rip all planting areas in two directions full depth of compacted fill, to a minimum of 12-inches, into undisturbed native soil prior to backfilling. Scarification of any planting area, which cannot be accomplished with a tractor, shall be

accomplished by an alternative method approved by the Landscape Architect to the specified depth to ensure proper drainage.

(5) Uniformly distribute and spread soil backfill in planting areas in layers not to exceed 24" and compact to a maximum of 85% relative compaction.

(6) When the planting soil differs in clay and silt content from the subsoil it is to be placed upon, install a 4-inch thick lift of planting soil on the subgrade and rototill into the subgrade 6-inches deep before installing the remaining required planting soil.

(7) Do not work planting soil in a wet or muddy condition or dump or spread in areas where subgrade is not in proper condition.

(8) Water settling, puddling, and jetting of fill and backfill materials, as a compaction method, is not acceptable.

(9) Maintain moisture content of materials during compaction operations within required moisture range to obtain indicated compaction density.

(10) Provide a minimum depth of import soil as noted on the drawings.

3.04 FINE GRADING AND SOIL PREPARATION FOR SLOPES EXCEEDING 3:1 SLOPE

A Before proceeding with the work: Carefully inspect all areas and verify all dimensions and quantities. Immediately inform the Landscape Architect of any discrepancy between the drawings and specifications and actual conditions and secure acceptance to proceed.

B. Inspect planting areas and remove and dispose of all invasive weeds, base rock and other foreign material including soils contaminated with cement or other materials or debris. Request photographs of invasive weeds if required for identification.

C. Planting operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped until conditions are satisfactory.

D. Thoroughly wet down the planting areas to settle the soil. Allow soil to dry so as to be workable.

E. Protect tree root systems from damage caused by equipment, runoff, and spillage of noxious materials and storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

F. Do not store construction materials, debris, or excavated material inside tree root zones.

G. Do not permit vehicles within tree root zones; prevent soil compaction over root systems.

H. Planting Soil Preparation:

(1) Inspect planting areas and remove all rock, other foreign material and other objects over 1" in diameter. Scarify planting areas in two directions to a maximum of 1 inch.

(2) Do not work planting soil in a wet or muddy condition or dump or spread in areas where subgrade is not in proper condition.

(3) Water settling, puddling, and jetting of fill and backfill materials, as a compaction method is not acceptable.

(4) Maintain moisture content of materials during compaction operations within required moisture range to obtain indicated compaction density.

(5) Provide a minimum of 1 inch depth of friable soil in planting areas.

I. Planting area soil of planting areas shall be in a loose, friable condition prior to planting.

J. Drag to a smooth, even surface. Grade to form all swales, pitch to drain to ensure uniform surface drainage. Areas requiring grading include adjacent transition areas which shall be uniformly level or sloped between finish elevations.

K. After the rototill work, float areas to a smooth, uniform grade as indicated on the drawings. Slope all planting areas to drain. Roll, scarify, rake and level as necessary to obtain true, even planting surfaces. Remove rocks, sticks and debris 1/2 inch or larger in size in turf areas. Secure acceptance of the grade by the Landscape Architect before any planting.

L. Scarify all planting areas that become compacted prior to planting.

3.05 FINE GRADING AND SOIL PREPARATION FOR AREAS FLATTER THAN 3:1 SLOPE

A. Before proceeding with the work: Carefully inspect all areas and verify all dimensions and quantities. Immediately inform the Landscape Architect of any discrepancy between the drawings and specifications and actual conditions and secure acceptance to proceed.

B. Inspect planting areas and remove and dispose of all invasive weeds, base rock and other foreign material including soils contaminated with cement or other materials or debris; Request photographs of invasive weeds if required for identification.

C. Planting operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped until conditions are satisfactory.

D. Thoroughly wet down the planting areas to settle the soil. Allow soil to dry so as to be workable.

E. Planting Soil Preparation:

(1) Inspect planting areas and remove all rock, other foreign material and other objects over 1" in diameter. Rip all planting areas in two directions full depth of compacted fill to a minimum of 12 inches.

(2) Do not work planting soil in a wet or muddy condition or dump or spread in areas where subgrade is not in proper condition.

(3) Water settling, puddling, and jetting of fill and backfill materials, as a compaction method is not acceptable.

(4) Maintain moisture content of materials during compaction operations within required moisture range to obtain indicated compaction density.

(5) Provide a minimum of 12 inches depth of friable soil in planting areas.

F. Planting area soil of planting areas shall be in a loose, friable condition prior to planting.

G. Drag to a smooth, even surface. Grade to form all swales, pitch to drain inlets, curb, etc., to ensure uniform surface drainage. Areas requiring grading include adjacent transition areas which shall be uniformly level or sloped between finish elevations.

H. Spread soil amendment, iron or gypsum, and Type A fertilizer evenly over installed and rough graded topsoil in all turf areas at the following rates:

(1) Soil Amendment: 6 cubic yards per 1,000 square feet

(2) Fertilizer: Type A at 10 lbs. per 1,000 square feet.

(3) Soil Sulfur: 20 lbs. per 1,000 square feet or

(4) Gypsum: 20 lbs. per 1,000 square feet.

(5) Iron Sulfate: 15 lbs. per 1,000 square feet.

(6) Potassium Sulfate (0-0-50): 12 lbs. per 1,000 square feet.

(7) Treble Superphosphate: 0-48-0: 12 lbs. per 1,000 square feet

I. Rototill above additives into soil, 8 inches deep.

J. After the rototill work, float areas to a smooth, uniform grade as indicated on the drawings. Slope all planting areas to drain. Roll, scarify, rake and level as necessary to obtain true, even planting surfaces. Remove rocks, sticks and debris 1/2 inch or larger in size in turf areas and 1 inch or larger in ground cover areas. Secure acceptance of the grade by the Landscape Architect before any planting.

K. Scarify all planting areas that become compacted prior to planting.

3.06 TREE, SHRUB AND GROUNDCOVER PLANTING

A. Mark tree and shrub locations on site using stakes, gypsum or similar accepted means and secure location acceptance by the Landscape Architect before plant holes are dug. Adjust as necessary prior to planting.

B. Excavate plant pits as shown on the drawings:

C. Test drainage of tree pits by filling with water (minimum 6"). The retention of water in planting beds and plant pits for more than eight (8) hours shall be brought to the attention of the Landscape Architect. If rock, underground construction work, tree roots, poor drainage, or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by Landscape Architect.

D. Break and loosen the sides and bottom of the pit to ensure root penetration. Soil immediately below the rootball should be left undisturbed to provide support for the plant.

E. Carefully remove and set plants without damaging the rootball. Superficially cut edge roots vertically on three sides using a knife.

F. Set plants with top of the rootball 2 inches above finished grade. Backfill remainder of hole and soak thoroughly by jetting with a hose and pipe section. Water backfill until saturated the full depth of the hole.

G. Backfill plant holes with mix as specified, free from rocks, clods or lumpy material as follows:

(1) Adjacent to the rootball, backfill native soil free of soil amendments to within 12" of finish grade and foot tamp to prevent settlement.

(2) Backfill remainder of the hole with a mixture of 2 parts native soil free of soil amendments, and 1 part amendment:

(3) Mix Mycorrhiza planting backfill with the planting backfill in the top 1" of the planting hole as close to the root ball and evenly distributed as possible at the following rates

4" pot or plug plant	- 1 teaspoon
1 gallon can plant	- 1 tablespoon
3 gallon can plant	- 3 tablespoons
5 gallon can plant	- 3 tablespoons
15 gallon can plant	- 6 tablespoons.
24-inch box plant	- 8 tablespoons
Larger plants	- 4 tablespoons per inch of trunk caliper at 6" above finish grade

H. Install fertilizer Type 'B' for 1-gallon plants and larger adjacent to the rootball per the manufacturer's specifications. Install fertilizer Type 'C' for 4" pot or plug plant adjacent to the rootball per the manufacturer's specifications.

I. Build 6" high watering basin berms around trees and shrubs to drain through rootball.

J. Stake trees as detailed. Drive stake until solid and remove excess stake protruding above top tree tie to prevent rubbing against branches.

K. Remove any soil from top of plant rootballs and secure Landscape Architect's acceptance of rootball height prior to mulching.

L. After acceptance of rootball height, mulch watering basins with organic mulch to 2-inch depth and thoroughly water.

3.07 GROUND COVER PLANTING

A. Plant in neat, straight, parallel and staggered rows as indicated on plan. Plant first row one-half required ground cover spacing behind adjacent curbs, structures, walls or other plant bed limits. Plant ground cover to edge of water basins of adjacent trees and shrubs.

3.08 VENTS and CLEANOUTS

A. Install plumb, level and square to adjacent structure or paving or as otherwise directed by Landscape Architect.

B. Connect to PVC pipe and storm drain system and make a complete watertight connection.

3.09 SUBSURFACE DRAINS

A. Install subsurface drains where indicated on the drawings and backfill with permeable material as specified. Provide not less than 3" of permeable material under pipe. Bell and spigot, and tongue and groove concrete pipe shall be laid without mortar in the joints, and lengths shall be pressed firmly together to prevent infiltration of fine material. Lay all pipe perforations down. Where subsurface drains connect to site drainage or plumbing systems, verify inverts of connections and lay pipe accordingly to drain. Connect to PVC pipe and storm drain system and make a complete watertight connection

3.10 MULCH

A. Mulch ground cover areas and areas noted to be mulched with organic mulch to a 3-inch depth. Hold bark mulch away from base (trunk) of plant 2" to 4" or as directed by the Landscape Architect.

3.11 WATERING

A. Water plants immediately after planting. Apply water to all plants as often and in sufficient amount as conditions may require to keep the plants in a healthy vigorous growing condition until completion of the Contract. Do supplemental hand watering of plants during the first 3 weeks of plant establishment.

3.12 MAINTENANCE OF PLANTING

A. Maintain plants from time of delivery to site until final acceptance of landscape installation.

3.13 PRE-MAINTENANCE PERIOD REVIEW AND ACCEPTANCE OF PLANTING

A. Receive acceptance of the installed planting prior to commencement of planting establishment maintenance period. Notify the Landscape Architect a minimum of seven (7) days prior to requested review. Before the review, complete the following:

(1) Complete all construction work.

(2) Present all planted areas neat and clean with all weeds removed and all plants installed and appearing healthy.

(3) No partial acceptances will be given.

3.14 PLANTING ESTABLISHMENT MAINTENANCE

A. General Requirements:

(1) The planting establishment maintenance period required shall be 365-calendar days after all planting is complete and installation accepted. A longer period may be required if the plant material is not acceptably maintained during the maintenance period. The maintenance period may be suspended at any time upon written notice to the Contractor that the landscaping is not being acceptably maintained,

and the day count suspended until the landscape is brought up to acceptable standards as determined by the Landscape Architect.

(2) Planting establishment maintenance immediately follows, coincides with, and is continuous with the planting operations and after all planting is complete and accepted; or longer where necessary to establish acceptable stands of thriving plants.

(3) Protect all areas against damage, including erosion and trespass, and provide proper safeguards. Maintain and keep all temporary barriers erected to prevent trespass.

(4) Keep all walks and paved areas clean. Keep the site clear of debris resulting from landscape work or maintenance.

(5) Repair all damaged planted areas, and replace plants and reseed erosion control areas immediately upon discovery of damage or loss.

(6) Check sprinkler systems at each watering; adjust coverage and clean heads immediately. Adjust timing of sprinkler controller to prevent flooding.

(7) Maintain adequate moisture depth in soil to ensure vigorous growth. Check rootball of plants independent of surrounding soils and hand water as required.

(8) Keep Contract areas free from weeds by cultivating, hoeing or hand pulling. Use of chemical weed killers will not relieve the Contractor of the responsibility of keeping areas free of weeds over 1-inch high at all times.

(9) Any day the Contractor fails to adequately water, replace unsuitable plans, weed, and other work determined to be necessary by the Architect, will not be credited as part of the establishment period.

B. Tree, Shrub, Groundcover Maintenance:

(1) Maintain during the entire establishment period by regular watering, cultivating, weeding, and spraying for insect pests. Prune when requested by the Landscape Architect.

(2) Keep watering basins in good condition and weed-free at all times. Maintain a daily log of watering times on the job site and make available for inspection by the Architect.

(3) Replace all damaged, unhealthy or plants with new stock immediately; size as indicated on the drawings.

C. Fertilizing:

(1) The first fertilization should be four weeks after planting. Upon approval and after submitting fertilizer delivery tags, fertilize turf areas by broadcasting Type A fertilizer, at a rate of 10 pounds per 1,000 square feet t evenly throughout.

(2) Reapply Type A fertilizer at the rate of 10 lbs. per 1,000 square feet evenly throughout to all areas every ninety (90) days until acceptable.

(3) Soil Testing During the Planting Establishment Maintenance Period:

a. Topsoil Analysis: Approximately 60 days after the initiation of the planting establishment maintenance period, obtain two representative samples of topsoil taken from accepted site locations (one from front lawns and one from courtyards) and submit to an accredited Soils Laboratory for analysis report and recommendations for maintenance fertilizer.

b. Upon acceptance of the Laboratory's report by the Landscape Architect, the recommendations in the report shall become a part of the Specifications and the quantities of fertilizer and other additives shall be adjusted to conform to the report.

c. When taking the soils samples, use a soil probe and pull at least 30 plugs from the site to a depth of 6" to 8" deep. Mix them all together in the same container and call it one sample. Send in approximately a quart sample for each test.

(4) Apply fertilizer as necessary to maintain vigorous, green plants and stimulate root growth as required.

(5) Observe plant's color, and if a soil pH imbalance is suspected, take soil samples and obtain laboratory analysis for confirmation. Take necessary action recommended in laboratory analysis such as top dressing with soil sulfur, leaching soil, etc.

3.15 FINAL PLANTING REVIEW AND ACCEPTANCE

A. At the conclusion of the planting establishment period, schedule a final review with the Owner, the Owner's maintenance person, and the Landscape Architect. On such date, all project improvements and all corrective work shall have been completed. If all project improvements and corrective work is not completed, continue the planting establishment, at no additional cost to the Owner, until all work has been completed. This condition will be waived by the Owner under such circumstances wherein the Owner has granted an extension of time to permit the completion of a particular portion of the work beyond the time of completion set forth in the Agreement.

B. Submit written notice, requesting review at least 10 days before the anticipated review.

C. Prior to review, weed and rake all planted areas, repair plant basins, plumb tree stakes, clear the site of all debris and present in a neat, orderly manner.

3.16 CLOSEOUT

A. Include copies of the material submittals and manufactured material suppliers and installers name and telephone number in the Operations and Maintenance manuals as part of the closeout documents.

B. Include warranty per Article 1.5 and manufacturer's warranty information of specified items with warranties.

END OF SECTION

SECTION 32 92 13
HYDROSEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish labor, material and equipment for the installation of the hydroseeding work and the maintenance as shown on the drawings and as specified.

1.02 RELATED SECTIONS

A. Earthwork – Section 31 20 00

1.03 QUALITY INSURANCE

A. Qualifications:
   1. Experience: Assign a full-time employee to the job as foreman for the duration of the Contract with a minimum of four (4) years experience in hydroseeding installation and maintenance supervision, with experience or training in hydroseeding, soils, fertilizers and plant identification.
   2. Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work to be accomplished to perform the task in a competent, efficient manner acceptable to the Construction Manager.

B. Requirements:
   1. Supervision: The foreman shall directly supervise the work force at all times and be present during the entire installation. Notify Construction Manager of changes in supervision.
   2. Identification: Provide proper identification at all times for hydroseeding firm's vehicles and a labor force uniformly dressed in a manner satisfactory to Construction Manager.

C. Reference Standards:
   1. Manufacturer's recommendations.
   2. "Sunset Western Garden Book," Lane Publishing Co., Menlo Park, California; current edition.
   3. "American Standards for Nursery Stock," American Association of Nurseryman, 230 Southern Building, Washington, D.C. 20005.
   4. Soils Report: A geotechnical investigation report has been prepared for the project. A copy of it is available from the Architect, Engineer or Construction Manager.

D. Material Standards
   1. Comply with federal and state laws. Submit inspection certificates required by law with each shipment of materials, and deliver certificates to the Project Inspector. Obtain clearance from the County Agricultural Commissioner as required by law, before materials delivered from outside the County in which planted.

E. Testing Agency: Soil and Plant Laboratory, Inc. 1101 S. Winchester Blvd., Suite G-173, San Jose, CA 95128, Tel. (408) 727-0330, or other accredited laboratory.

F. Integrated Pest Management
   1. Conform to the requirements of the Integrated Pest Management policy of the School District.

1.04 SUBMITTALS

A. Product Data: Manufacturer's current catalog cuts and specifications of the following.
   1. Fertilizers, gypsum, potassium sulfate, Treble superphosphate
   2. Seed
   3. Compost
   4. Stabilizing agent

5. Fiber

1.05 PROJECT/SITE CONDITIONS

A. Site Visit: At beginning of work, visit and walk the site with the Civil Engineer to clarify scope of work and understand existing project/site conditions.

PART 2 PRODUCTS

2.01 SEED

A. Seed shall follow the requirements California Food and Agricultural Code and shall be labeled by the vendors supplying the seed. Seed shall have been tested for purity and germination by a seed laboratory certified by the Association of Official Seed Analysts, or a seed technologist certified by the Society of Commercial Seed Technologists, not more than twelve months prior to the application of the seed. Seed labels furnished by the seed vendors supplying the seed shall show the purity, germination and pure live seed as determined by the testing. The percentage of germination shall include the germination percentage of hard or dormant seed.

B. Individual seed species shall be pre-mixed by the seed supplier.

C. Seed shall be delivered to the project site in unopened separate containers with the seed tag attached. Containers without a seed tag attached will not be accepted.

D. Legume seed shall be pellet inoculated with a viable bacteria compatible for use with that species of seed. Inoculated seed shall be labeled to show the weight of the seed, the date of inoculation and the weight and source of inoculant materials. Pellet inoculated seed shall be inoculated in conformance with the requirements on Bulletin 1842, Range-Legume inoculation and Nitrogen Fixation by Root-Nodule Bacteria of the University of California, Division of Agriculture and Natural Resources. Inoculant shall be added at the minimum rate of 2 pounds inoculant per 100 pounds of seed.

E. Legume seed shall be pellet-inoculated or industrial-inoculated and shall conform to the following:

Pellet inoculated seed shall have a calcium carbonate coating. Pellet inoculated seed shall be sown with 30 days of inoculation. Industrial-inoculated seed shall be inoculated with Rhizobia and coated using an industrial process by a manufacturer whose principal business is seed coating and seed inoculation. Industrial-inoculated seed shall be sown within 180 calendar days after inoculation.

Scientific Name	Common Name	Lbs/Acre Hydroseed
Trifolium Hirtum	Hykon Rose clover	20
Bromus carinatus 'Bay Area' or 'Berkeley'*	California brome	40
Pounds Pure Live Seed Per Acre	Total	60

* CA native seed source

2.02 FERTILIZERS

A. 22-07-11 + Minors commercial fertilizer shall conform to the requirements of the California Department of Agriculture. Commercial fertilizer shall have a polyon coating for delayed release and shall have a guaranteed chemical analysis of 22 percent nitrogen, 7 percent phosphoric acid and 11 percent water soluble potash plus minor elements. Available from Reforestation Technologies Inc. in Salinas 831-424-1494 http://www.reforest.com or equal product substituted under the provisions of Section 01 25 00 – Substitution Procedures.

B. Agricultural Gypsum

C. Potassium Sulfate (0-0-50).

D. Treble Superphosphate (0-48-0).

If commercial fertilizer having this analysis is not obtainable, other similar commercial fertilizer may be used providing it meets the acceptance of the Engineer.

2.03 COMPOST

A. Compost shall be derived from green material consisting of chipped, shredded or ground vegetation or clean processed recycled wood products or a Class A, exceptional quality biosolids composts, as required by the United States Environmental Protection Agency (EPA), 40 CFR, Part 503c regulations or a combination of green material and biosolids compost.

B. The compost shall be processed or completed to reduce weed seeds, pathogens and deleterious material, and shall not contain paint, petroleum products, herbicides, fungicides or other chemical residues that would be harmful to plant or animal life.

C. Other deleterious material, plastic, glass, metal or rocks shall not exceed 0.1 percent by weight or volume. A minimum internal temperature of 135°F shall be maintained for at least 15 continuous days during the composting process.

D. The compost shall be thoroughly turned a minimum of 5 times during the composting process and shall go through a minimum 90-day curing period after the 15-day thermophilic compost process has been completed. Compost shall be screened through a maximum 3/8 inch screen.

E. The moisture content of the compost shall not exceed 35 percent. Compost products with a higher moisture content may be used provided the weight of the compost is increased to equal the compost with a moisture content of 35 percent.

F. Compost will be tested for maturity and stability with a Solvita test kit. The compost shall measure a minimum of 6 on the maturity and stability scale. Available from Z-Best Products, Zanker Road Landfill, San Jose, CA, Telephone: 408-263-2383.

2.04 STABILIZING AGENT

A. Stabilizing agent shall be shall be in a dry powder form shall be a processed organic adhesive used as a soil or straw tackifier derived from *Plantago ovata*, such as M-Binder or equal product substituted under provisions of Section 01 25 00. Available from Pacific Coast Seed, Livermore, CA, telephone: 925-373-4417 or S&S Seeds, Carpinteria, CA, telephone: (805) 684-0436.

2.05 FIBER

A. Fiber shall be produced from natural or recycled fiber, such as wood chips or similar wood materials or from newsprint, chipboard, corrugated cardboard or a combination of these processed materials, and shall be free of synthetic or plastic materials. Fiber shall not contain more than as determined by the Technical Association of the Pulp and Paper Industry Standard T 413, shall contain less than 250 parts per million boron and shall be otherwise nontoxic to plant or animal life. Fiber shall have a water holding capacity of not less than 1200 percent. Fiber shall be of such character that it will disperse into a uniform slurry when mixed with water. Water content of fiber shall not exceed 15 percent of the dry weight of the fiber. Available as EcoFibre available from Fiber Marketing International, Inc., Renton, WA 98056, toll-free 1-800-426-6002, office: 425-277-9966, www.fibermarketing.com or equal product substituted under provisions of Section 01 25 00.

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Hydroseeding shall conform to the provisions in these special provisions.

B. Hydroseeding work shall consist of applying hydroseeding materials to areas shown on the plans and other areas disturbed by construction activities.

C. Before proceeding with the work: Carefully inspect all areas and verify all dimensions and quantities. Immediately inform the Engineer of any discrepancy between the Drawings and Specifications and actual conditions and secure authorization to proceed.

D. Hydroseeding operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture, wind or other unsatisfactory conditions prevail, the work shall be stopped until conditions are satisfactory.

E. Erect and maintain such barricades as necessary and be responsible for protection of property and the public from hazards due to the Work.

F. Provide control on the site as required to abate any dust or other air pollution nuisance on or adjacent to the site. Dirt shall not be allowed to accumulate on streets or sidewalks nor be washed into sewer. Noise from construction operations shall be kept to a minimum.

G. Maintain premises and public properties free from accumulations of waste and debris due to the Work. Legally dispose of waste materials, debris, and rubbish off the site.

H. Remove temporary facilities upon completion of project.

I. Prior to installing hydroseeding materials, soil surface preparation shall conform to the earthwork provisions including all rills and gullies exceeding 2 inches in depth or width shall be leveled. Vegetative growth, temporary erosion control materials, leaf litter and other debris shall be removed from areas to receive hydroseeding.

J. Drag to a smooth, even surface. Grade to form swales, pitch to catch basins, streets, curb, to ensure uniform surface drainage. Areas requiring grading include adjacent transition areas which shall be uniformly level or sloped between finish elevations.

K. Hold finish grade and mulch surface in planting areas below adjacent pavement surfaces, tops of curbs, structures, as shown on the Drawings.

L. Float areas to a smooth, uniform grade as indicated on the Drawings. Slope hydroseeding areas to drain. Roll, scarify, rake and level as necessary to obtain true, even surfaces. Remove rocks, sticks and debris, 1 inch or larger in size, from all hydroseeding areas. Secure acceptance of the grade by the Engineer before hydroseeding.

M. Areas to receive hydroseeding shall be scarified to a depth of one-inch. After scarification, one-inch water shall be uniformly applied to germinate weeds. Allow weeds to germinate a minimum of 14 days before removal of weeds.

3.02 HYDROSEED

A. Incorporate the following seed uniformly in hydromulch at the specified rates per acre. Provide seed of the latest crop, labeled in accordance with the California Food Agricultural Code with the following ingredients per acre:
   Wood Fiber: 2,000 lbs/acre
   Stabilizer: 100 lbs/acre
   Treble Superphosphate (0-48-0): 130 lbs/acre

Potassium Sulfate (0-0-50): 200 lbs/acre
Soil Sulfur: 300 lbs/acre
Seed rate: 60 lbs/acre

3.03 APPLICATION

A. The application shall be applied to the during the first fall season following the earthwork.

B. The following mixture in the proportions indicated shall be applied with hydroseeding equipment within 60 minutes after the seed has been added to the mixture:

Wood Fiber: 2,000 lbs/acre
Stabilizer: 100 lbs/acre
Treble Superphosphate (0-48-0): 130 lbs/acre
Potassium Sulfate (0-0-50): 200 lbs/acre
Soil Sulfur: 300 lbs/acre
Seed rate: 60 lbs/acre

C. The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.

D. The proportions of hydroseeding materials may be changed by the Engineer to meet field conditions.

E. At the Contractor's option, the hydroseeding materials may be applied in a manner different from that specified above. Soil surface preparation, vegetative growth and temporary erosion control removal, soil scarification, watering and week kill as described above shall be accomplished. Seed and fertilizers shall be evenly spread and raked into the soil to assure good seed to soil contact. The seeding method must be approved by the Engineer prior to seeding. Seeded areas will then be evenly covered with one-quarter (1/4) inch of compost. After compost has been applied, a light sprinkling of water shall be applied to secure the compost to the surface. Water shall not be applied in an amount that will induce germination for areas that do not have automatic irrigation. The application of fiber and stabilizing agent will then be required.

3.04 WATERING

A. All hydroseeded areas to be watered by natural rainfall.

3.05 PRE-MAINTENANCE PERIOD REVIEW AND APPROVAL OF HYDROSEEDING

A. Receive acceptance of the installed hydroseeding prior to commencement of planting establishment maintenance period. Notify the Project Inspector a minimum of seven (7) days prior to requested review. Before the review, complete the following:
   1. Complete construction work.
   2. Present areas neat and clean with all weeds removed.
   3. No partial acceptance will be given.

3.06 HYDROSEEDING ESTABLISHMENT MAINTENANCE

A. General Requirements:
   1. The hydroseeding establishment maintenance period required shall be 90 calendar days after hydroseeding is complete and installation accepted. A longer period may be required if the plant material is not acceptably maintained during the maintenance period. The maintenance period may be suspended at any time upon written notice to the Contractor that the hydroseeding is not being acceptably maintained, and the day count suspended until the hydroseeding is brought up

to acceptable standards as determined by the Project Inspector.

2. Protect areas against damage, including erosion and trespass, and provide proper safeguards. Maintain and keep temporary barriers erected to prevent trespass.
3. Keep walks and paved areas clean. Keep the site clear of debris resulting from hydroseeding work or maintenance.
4. Repair damaged hydroseeding areas, and replace hydroseeding immediately upon discovery of damage or loss.
5. Reseed damaged areas as soon as evident.
6. Repair hollow, settled or eroded areas by filling, rolling and reseeding.

3.07 FINAL HYDROSEEDING REVIEW AND ACCEPTANCE

A. At the conclusion of the hydroseeding establishment period, schedule a final review. On such date, all project improvements and all corrective work shall have been completed. If all project improvements and corrective work are not completed, continue the hydroseeding establishment, at no additional cost to the Owner, until all work has been completed. This condition will be waived by the Owner under such circumstances wherein the Owner has granted an extension of time to permit the completion of a particular portion of the work beyond the time of completion set forth in the Agreement.

B. Submit written notice-requesting review at least 10 days before the anticipated review.

END OF SECTION

SECTION 33 41 00
SITE DRAINAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide and install storm and roof drain pipe and appurtenances.

B. Provide and install storm and roof drain system structures, including clean-outs, catch basins, drainage inlets, etc.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification apply to this Section.

B. Related Sections include the following:
   1. Trenching, Backfilling and Compaction - Section 31 23 16

1.03 SUBMITTALS

A. In accordance with Section 01 33 00, Submittal Procedures:
   1. Submit choice of storm drain pipe and cleanouts, drainage structures (catch basins, inlets), and drainage grates to Engineer for review prior to ordering.

1.04 REFERENCES

A. City of South San Francisco Design and Construction Standards, latest edition (City Standards).

B. South San Francisco Unified School District Standard Design and Construction Standards.

C. California Plumbing Code (latest edition).

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Storm drain pipe shall be delivered, handled, and stored in a way that prevents damage to the pipe, or the entry of foreign materials into the pipe.

B. Regardless of cause, damaged pipe shall be replaced with new products at the expense of the Contractor.

C. Precast structures shall be delivered, handled and stored in a way that prevents damage.

D. Installed precast structures and cast-in-place structures shall be protected from damage.

E. Regardless of the cause, damaged structures shall be replaced by new products or repaired to the satisfaction of the Engineer at the expense of the Contractor.

1.06 GRADE AND ALIGNMENT CONTROL

A. General
   1. The necessary installation procedures that will insure the pipes are installed at the location and grade staked in the field shall be used.

B. Method
   1. One of the following methods shall be utilized to control grade and alignment:
      a. Batter boards set at 25' intervals with a string line set over at least three batter boards.
      b. Electronic "Laser" beam set at structure locations or grade breaks. At least three grade points shall be checked to verify the set grade.

c. Survey instrument set at structure to site between structures at the set grade.

C. Equipment
1. The Contractor shall furnish all equipment necessary to install and inspect the pipe installation. Grade rod shall be held to a minimum in all cases.

PART 2 PRODUCTS

2.01 STORM DRAIN PIPE

A. Storm drain 10" diameter and larger shall be either HDPE Type S, smooth interior wall, or Polyvinyl Chloride Pipe (PVC), SDR 26, Series 46.

B. HDPE plastic pipe shall conform to the requirements of Section 64 of the Caltrans Standard Specifications for Type S, smooth interior wall, and shall be furnished with "water tight" gasketed couplings.

C. Storm drain smaller than 10" diameter shall be ridged PVC SDR 26, with water tight couplings.

D. Perforated subdrainage pipe and fittings shall be rigid PVC, SDR 26, with perforations.

2.02 DRAINAGE STRUCTURES

A. Drop inlets shall be as manufactured by US Concrete, Oldcastle Precast, Christy Concrete Products, Dura-Drain or approved equal, and shall be of the model indicated on the plans. Grates and frames shall be galvanized steel heavy duty H-20 traffic rated in hard surfaced areas with ½" maximum openings and bolt down grates. Within landscape areas standard duty boxes with bolt down galvanized steel grates should be used. Drainage structure inside dimensions are shown in plan view of the civil utility plans (I.E. 1212= a 12"x12" inside dimension of the storm drain structure). Drainage structures labeled as P4, P6 or P8 shall be dura drain inlets manufactured by Oldcastle Precast.

B. Private Cleanouts shall comply with the details as shown on the Drawings. Cleanouts within landscape areas shall have concrete lids marked "storm drain". Cleanouts in hardscape areas shall have traffic rated boxes and steel or cast iron traffic rated lids marked "storm drain".

C. Catch Basins (curb inlets) shall be precast concrete structures as manufactured by Oldcastle Precast, or approved equal, and shall be of the model indicated on the plans. Manhole lids shall be metal 24" in diameter and marked 'SD" or "Storm Drain. Curb inlets shall have a galvanized steel guard bar at mid height of the curb opening.

2.03 CLEANOUTS

A. Private Cleanouts shall comply with the details as shown on the Drawings. Cleanouts shall have grates that match the trench drain grates.

PART 3 EXECUTION

3.01 VERIFY EXISTING CONDITIONS

A. The exact location and depth of the existing storm drains is unknown and is shown based on the best information available.

B. Contractor shall pot hole in the vicinity of each connection point to verify the exact location and size of the existing storm drain. This information shall be presented in the form of a field sketch through the RFI process for review and confirmation by the Engineer that the line is adequate to serve the proposed project.

3.02 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Storm drain pipe shall be delivered, handled and stored in a way that prevents damage.

B. Regardless of the cause, damaged pipe shall be replaced by new products at the expense of the Contractor.

C. Precast structures shall be delivered, handled and stored in a way that prevents damage.

D. Installed precast structures and cast-in-place structures shall be protected from damage.

E. Regardless of the cause, damaged structures shall be replaced by new products or repaired to the satisfaction of the Engineer at the expense of the Contractor.

3.03 STORM DRAIN PIPE

A. Trenching shall be as indicated in Section 31 23 16, Trenching, Backfilling and Compaction.

B. Pipe laying shall be as indicated in paragraph 3.06 herein.

C. No pipe shall be installed which is cracked, damaged or otherwise unsuitable for use in the opinion of the Engineer.

D. Where these pipes are ended without a structure, the pipes shall be plugged/capped and the end marked with a marker post, which shall be a 2" PVC Sch 40, from the bottom of the trench to 3 feet above the ground.

E. Where pipes connect to other pipes without a structure ('blind connection'), manufactured fittings compatible with the pipe, shall be used wherever possible. Where not possible, care shall be taken to ensure that the connecting pipe does not project more than 1/2" beyond the inside wall of the main pipe, and the joint shall be secured with a concrete collar.

3.04 STORM DRAINAGE STRUCTURES

A. Excavation and backfill shall conform to Section 31 23 16, Trenching, Backfilling and Compaction.

B. Joints shall be made watertight. Any visible leaks shall be permanently plugged.

C. Sleeve new walls where shown to allow for pipe penetration.

D. Pipe entrances and exits from existing and proposed structures shall be mortared to form a smooth, watertight seal.

3.05 PIPE LAYING

A. No pipe shall be laid when trench conditions are unsuitable to allow performing the job in a workman-like manner.

B. Perforated subdrain pipe shall be installed with the perforations facing down.

C. Where ground water occurs, pumping shall continue until backfilling has progressed to a sufficient height to prevent flotation of the pipe. Water shall be disposed of in such a manner as to cause no property damage or be a hazard to public health. In accordance with Section 31 23 16, Trenching, Backfilling and Compaction.

D. Pipe shall be laid with bell ends facing in the direction of laying, and shall progress uphill.

E. Pipe deflections where permitted shall not exceed that recommended by the pipe manufacturer.

F. Every precaution shall be taken to prevent foreign material from entering the pipe. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the

connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. If foreign materials do enter the pipe, they shall be removed continuously as work progresses.

G. At times when pipe laying is not in progress, the open ends of laid pipe shall be closed by a water-tight plug.

H. Maintain minimum clearance of 6" at all utility crossings.

3.06 CLEANOUTS

A. Cleanouts shall be constructed consistent with the details shown on the Drawings.

B. Cleanout boxes shall be set flush with finished surface grades.

3.07 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

B. Properly repair all surfaces disturbed by construction.

END OF SECTION