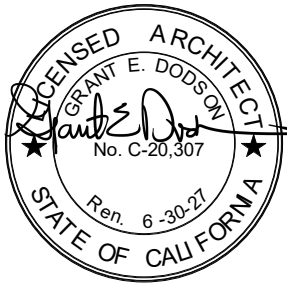
PROJECT MANUAL FOR
COMMUNITY DAY SCHOOL MODERNIZATION

MERCED CITY SCHOOL DISTRICT
444 W. 23RD ST.
MERCED, CA 95340

PREPARED BY:

DARDEN ARCHITECTS, INC.
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6790 N. WEST AVENUE
FRESNO, CALIFORNIA 93711



ARCHITECT



STRUCTURAL ENGINEER



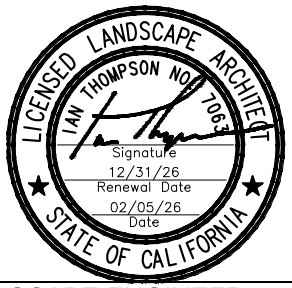
MECHANICAL ENGINEER



ELECTRICAL ENGINEER



CIVIL ENGINEER



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END OF SECTION

SECTION 00 22 13.03 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Supplementary Instructions to Bidders consisting of procedures and conditions for the use of documents of various types and formats for bidding of this project.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Hard Copy Format: Documents printed on paper medium.

B. Electronic Image Format: Electronic Files consisting of Bid Documents in an image format such as PDF's, TIFF's and etc. These files are to be READ ONLY.

1.3 SUBMITTALS

A. Submit in accordance with the following:
   1. Bidder's Usage Agreement for Bid Documents:
      a. Hard Copy and Electronic Image Format Form.

PART 2 - PRODUCTS

(NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SCHEDULES:

A. BIDDER'S USAGE AGREEMENT FOR BID DOCUMENTS:
   1. HARD COPY AND ELECTRONIC IMAGE FORMAT: When the Bid Documents are being issued electronically, the HARD COPY AND ELECTRONIC IMAGE FORMAT FORM shall be used.
      a. This form shall be submitted and signed as a condition of receiving Bid Documents.

3.2 BIDDER'S USAGE AGREEMENT FOR BID DOCUMENTS HARD COPY AND ELECTRONIC IMAGE FORMAT

Project Name:
_____

DA Project No.: _____

I, _____, as duly authorized agent of _____ ("Bidder") as prospective bidder on the above named project ("Project") is requesting a copy of the project BID DOCUMENTS (bidding requirements, contract requirements, specifications, contract drawings, resource drawings if any, and addenda to date).

A. Bidder is being provided copies of Bid Documents for the Project, which consists of two parts. One part of the Bid Documents is in the Hard Copy Format ("HCF") and the other part is in the Electronic Image Format ("EIF") on CD-ROM. Bidder acknowledges that HCF Documents and the EIF Documents are being provided as the official record set of documents issued for bidding. It is the Bidder's responsibility to review and obtain all information from both the HCF and the EIF documents necessary for a complete and accurate bid. This request is subject to the following conditions, which the Bidder hereby agrees to abide by:

B. Bidder shall pay a non-refundable deposit for the Bid Documents in the amount of (See Instructions to Bidders) per set. In the event the Bidder is not the successful bidder, the bidder agrees to permanently dispose of the HCF and EIF on the Project CD-ROM.

C. Bidder acknowledges that neither the EIF documents nor the CD-ROM will be updated by the Design Team. The CD-ROM contains the original documents and will not be updated regardless of when Bidder obtains the CD-ROM. Any changes to the contract documents will be issued as a separate document.

D. Bidder is further warned that while the EIF information appears to be extremely accurate, this apparent accuracy is an artifact of the techniques used to generate it and is no way intended to imply actual accuracy. The Bidder acknowledges and takes full responsibility for the accuracy, correctness of measurements, areas, inventories derived, conclusions drawn, and information extracted from the EIF documents.

E. Bidder understands and agrees the HCF and EIF documents are instruments of Architect's and Architect's Consultants' ("Design Team") professional service and are intended for one-time use by Bidder in the bidding of the Project. All HCF and EIF documents are and shall remain the property of the Design Team, who is deemed to be the author of the drawings and data, and the Design Team shall retain all common law, statutory law, and all other rights, including copyrights, with respect to Bidder.

F. The Bidder shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from Bidder or any other person or entity that gains information from the Bid Documents or copies any part of the Bid Documents, or uses the Bid Documents or copies any part of the Bid Documents, for purposes other than the bidding of this project, and will be liable to the Design Team for fees equal to the fees paid by the client pursuant to developing the documents for this project.

DARDEN ARCHITECTS, INC.

Description of the HCF Documents and the EIF Documents on CD-ROM, provided:

_____

_____

_____

_____

_____

_____

Print Name (Bidder) Title

_____

Signature Date:

END OF SECTION

SECTION 01 11 13 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Construction of the work for **COMMUNITY DAY SCHOOL,** Merced, California. The work is defined as all material, labor, equipment and services necessary to do all work shown on the drawings and called for in the Specifications. The Work shall be as indicated on the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. The words "OWNER" and "DISTRICT" are synonymous and interchangeable, when used throughout this Project Manual.

1.3 SUBMITTALS

A. Submit per Specification Section - SUBMITTAL PROCEDURES.

B. Quality Assurance/Control Submittals:

1. Certificates: indicate compliance with the Asbestos Hazard Emergency Regulations Act.

C. Fire Prevention Safety Plan: Submit Local Fire Authority approved plan prior to the start of on-site construction.

1.4 QUALITY ASSURANCE

A. Contractor's Qualifications:

1. Contractor shall have experience and successfully completed 3 projects of similar scope and size to that indicated for this project.
2. Contractor shall have demonstrated that they have the resources to perform all requirements of this project.

B. Regulatory Requirements:

1. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work, and in accordance with Specification Section - REGULATORY REQUIREMENTS:
    a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Certifications:

1. Certify in writing that no materials containing Asbestos are incorporated in the work per the Asbestos Hazard Emergency Regulations Act.

D. Contractor's Duties:

1. Except as specifically noted, provide and pay for:
    a. Labor, material and equipment.
    b. Tools, construction equipment and machinery.
    c. Heat and utilities required for construction. See Specification Section - TEMPORARY FACILITIES AND CONTROLS.
    d. Other facilities and services necessary for proper execution and completion of Work.
2. Pay legally required sales, consumer and use taxes.

3. Secure and pay for all site specific as necessary for proper execution and completion of Work.
    a. Licenses.
    b. Permits and Fees.
    c. Government Fees.
    d. Royalties.
4. Give required notices.
5. Promptly submit written notice to Architect of observed variance.
6. Enforce strict discipline and good order among employees. Do not employ on Work:
    a. Unfit persons.
    b. Persons not skilled in assigned task.

1.5 FIRE PREVENTION SAFETY PLAN

A. Responsibility: Contractor is responsible for the development and implementation of fire prevention program.
    1. Refer to DSA Bulletin: Fire Safety During Construction and Demolition.
    2. Refer to TEMOPRARY FACILITIES AND CONTROLS for requirements.

1.6 WORK UNDER OTHER CONTRACTS

A. General Requirements:
    1. Work under separate contracts will occur throughout the duration of the project. The work being installed under separate contracts will occur around adjacent to the Contract project site.
    2. Contractor shall coordinate its work with the work under separate Contracts and shall cooperate with the Contractors of these separate Contracts as they occur.
    3. Should the Contractor damage and/or otherwise alter work installed under separate contracts, the Contractor is responsible for the repair and/or correction of installed work.
    4. Prior to the installation of the Work, coordinate the work installed or to be installed by separate contracts relative to this project scope of work.

B. Work by Owner:
    1. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this contract or work by Owner. Coordinate the work of this Contract with work performed by Owner.
    2. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be constructed simultaneously with work under this Contract.
        a. Items that are Owner Furnished Contractor Installed and Owner Furnished Owner Installed as indicated on the Contract Drawings and as defined in Specification Section - OWNER FURNISHED ITEMS.
    3. .

C. Work Under Separate Contracts by Others:
    1. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the work of this Contract with work performed under separate contracts.

D. Future Work:
    1. The Contract Documents include requirements that will allow the Owner to carry out future work following completion of this Project; provide for the following future work:

1.7 PROJECT CONDITIONS

A. Access to Site:
    1. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of the Project.

2. Contractor shall be responsible for coordinating access to and from the site throughout the duration of the project. Access to and from the site may vary, based upon timing and duration of separate contracts.

B. Contractor Use of Premises:
1. Confine operations at sites to areas permitted by:
a. Laws.
b. Ordinances.
c. Permits.
d. Contract Documents.
2. Do not unreasonably encumber site with materials or equipment.
3. Assume full responsibility for protection and safekeeping of Contractor's and Owner's material stored on premises, and keep the site and building secure at all times.
4. Obtain and pay for use of additional storage Work areas needed for operations.
5. Limit use of Site Work and storage.

1.8 SCHEDULING

A. The Work of this Project will be constructed under a single contract.
1. It is anticipated that the start of construction will be around:
a. March 2026

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. General: All Alternate descriptions are general in nature. Refer to the contract drawings for specific scope of work.

B. DEDUCTIVE ALTERNATE BID NO. 1:
1. Base Bid: See Specification Section SUMMARY OF WORK
2. Alternate: This alternate deletes the Concrete Masonry Unit, Block wall shown on the Overall Site Plan, Sheet SD/A101. If this alternate is accepted, the wall shall be replaced with Chain Link fencing shown on the Partial Site Plan, Sheet SD/A103.

END OF SECTION

SECTION 01 21 13 – ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Provide all material, labor, equipment and services necessary to completely install all allowance materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   2. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by CHANGE ORDER.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Lump-Sum Allowances:
   1. Allowance shall include cost to Contractor of specific products and materials ordered under allowance and shall include taxes, freight, and delivery to Project site.
   2. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.3 SYSTEM DESCRIPTION

A. Selection and Purchase:
   1. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
   2. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
   3. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Although not considered a CHANGE ORDER, submit proposals for purchase of products or systems included in allowances, in the form specified for a CHANGE ORDER.
   2. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
   3. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 QUALITY ASSURANCE

A. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with other work being performed.
      b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
   2. Progress: Scheduled by the Contractor during the performance of the work.

a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
   b. Maintaining installed work until the Notice of Substantial Completion has been filed.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 MAINTENANCE

1. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   a. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULES

A. Allowance No. 1 - $__,___.__:
   1. Includes: _____ as specified in Specification Section – _____.

END OF SECTION

SECTION 01 23 00 – ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Provide all material, labor, equipment and services necessary to completely install or remove all materials, accessories and other related items necessary to add or delete from the Project as indicated by the alternates in the Contract Documents.
      a. Any services such as utilities that are meant to pass thru the Alternate areas that serve other areas not involved shall be maintained as part of the Base Bid whether indicated or not.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the BID FORM for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the work. No other adjustments are made to the Contract Sum.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
   1. Quality Assurance/Control Submittals:
      a. Notification Letter:
         1) Submit three (3) copies of Notification Letter to all concerned on the status of all ALTERNATES.

1.4 QUALITY ASSURANCE

A. Procedures:
   1. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into the Project.
      a. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
      b. Provide Lump Sum Price (and all itemized prices) for construction of the Base Bid and each Alternate Bid on the BID FORM.
   2. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
   3. Execute accepted alternate under the same conditions as other work of the Contract.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. General: All Alternate descriptions are general in nature. Refer to the contract drawings for specific scope of work.

B. **DEDUCTIVE** ALTERNATE BID NO. 1:

1. Base Bid: See Specification Section SUMMARY OF WORK.
2. Alternate: This alternate deletes the Concrete Masonry Unit, Block Wall shown on the Overall Site Plan, Sheet SD/A101. If this alternate is accepted, the wall shall be replaced with Chain Link fencing.

END OF SECTION

SECTION 01 25 00 – SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Work that is substituted for Work specified in DIVISIONS 02 through 49 shall meet the requirements of this Section.
   2. Provide all material, labor, equipment and services necessary to completely install all approved substituted materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   3. See the INSTRUCTIONS TO BIDDERS or the GENERAL CONDITIONS for any time limits set for the submittal of substitutions.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Claimant: Bidder, Sub-Contractor, Contractor, Distributor, Supplier, Manufacturer or other entity that is submitting a claim for a substitution.

B. Substitutions: Substitutions are not a part of the Submittal Process described in Specification Section – SUBMITTAL PROCEDURES. Substitution Requests by a claimant must be reviewed and approved by the Architect before any submittal will be accepted. It is the claimant's responsibility to provide clear and concise documentation to expedite the Architect’s review. If the Substitution Request requires re-submission(s) due to the Claimant's inadequate documentation, no time extension will be allowed.
   1. Changes to the structural, accessibility, or life-safety portions of the DSA-approved Contract Documents shall be submitted to and approved by DSA as a Construction Change Document, prior to the fabrication and installation as required by California Administrative Code, Title 24, Part 1, Section 4-338, and DSA IR A-6.

C. "Or Equal" / "Or Approved Equivalent": Claimant shall request a substitution in accordance with this Specification Section – SUBSTITUTION PROCEDURES.

D. The Project Manual employs the following methods of specifying products. Claimant shall conform to the directives below for this Project:
   1. Product, system or design specified only by reference standards:
      a. Select any product, system or design meeting reference standards.
   2. Product, system or design specified by naming several products, systems, designs and/or manufacturers:
      a. Select any product, system, design and/or manufacturer named.
   3. Product, system or design specified by naming several products, systems and/or manufacturers and reference standards:
      a. Products, systems, designs and/or manufacturer names indicate products, systems, designs and/or manufacturers that (in the Architect's opinion) meets the reference standards.
      b. Select any of the named manufacturer's products, systems or designs meeting the reference standards.
   4. Product, system or design specified by naming one or more products, systems, designs and stating "or equal to," "or approved equivalent," with the specified products, systems or designs:

a. Select product, system or design specified, "or approved equivalent."

5. Product, system or design specified by naming only one product, system or design:
   a. Select product, system or design specified, "or approved equivalent."
6. Product, system or design specified by naming only one product, system or design and followed by the statement "DISTRICT STANDARD – NO SUBSTITUTIONS":
   a. Provide product, system or design specified. No substitutions allowed.

E. Cost to Claimant for review of Substitution Request:
1. Each review of a Substitution Request by the Architect and/or it's Consultant(s) will be billed to the Claimant at an hourly rate of **$212.00** an hour, two hour minimum for each review, whether approved or rejected.
   a. Waiver of review fees:
      1) When the product has been discontinued or is unavailable.
         a) EXCEPTION: Where the claimant has failed to order in a timely manner and waits until the last minute, no consideration of the waiver of fees will be allowed; no time extensions will be allowed.
      2) When the Owner has requested a substitution.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - INSTRUCTIONS TO BIDDERS:
B. Content of Request:
1. Check made payable to DARDEN ARCHITECTS, INC. for the minimum two hour review period for **$424.00**, non-refundable.
   a. When additional time is required to review a substitution request beyond the first two hours, the Architect or its consultants will bill the claimant for the time expended in the review process.
2. Complete the attached **SUBSTITUTION REQUEST FORM** substantiating compliance of proposed substitution with Contract Documents. **NO OTHER FORMS WILL BE ACCEPTED.**
3. Attach to the SUBSTITUTION REQUEST FORM an itemized comparison of proposed substitution with product, system or design specified.
4. For products or systems, attach to the SUBSTITUTION REQUEST FORM:
   a. Product, system or design identification, including manufacturer's name and address.
5. Manufacturer's product information: MUST BE HIGHLIGHTED AND PROJECT SPECIFIC. SUBMITTALS NOT ADEQUATELY MARKED-UP ACCORDING TO PROJECT SPECIFICS WILL BE REJECTED:
   a. Literature including product, system or design description, performance and test data and reference standards.
   b. Samples.
   c. Warranties.
6. For construction methods, attach to the SUBSTITUTION REQUEST FORM:
   a. Detailed description of proposed methods.
   b. Drawings illustrating methods.

C. Submit three (3) copies of Substitution Request including all attached data.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Product, system or design qualifications:
   a. In making a request for substitution, Claimant certifies that:
      1) Claimant has personally investigated proposed product, system or design, and determined that it is equal or superior in all respects to that specified.
      2) Claimant shall provide the same guarantee or warranty for substitution as for product, system or design specified.

3) Claimant shall coordinate installation of accepted substitution into the Project, making such changes as may be required for the Project to be complete in all respects.
4) Claimant waives all claims for additional costs related to substitution which subsequently become apparent for integrating the substituted product, system or design into the Project.
5) Claimant waives all claims for time extension(s) due to improper documentation requiring re-submission(s) of a Substitution Request Review.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. Products (and installation standards), systems or methods used for this Project shall comply with CARB standards in effect at the Project Site, and at the time of installation.

C. Acceptance of Substitutions:
1. Procedures:
a. The Contract is based on products, systems or designs described in the Contract Documents.
b. Architect will consider proposals submitted in accordance with time limits set within the Specification Section - INSTRUCTIONS TO BIDDERS.
c. Architect is solely responsible for judging the acceptance of substitutions.
1) Acceptance of a substitution does not waive the product manufacturer's responsibility for product liability. The Architect will judge (based on the substitution submission data) for function and use – product liability shall remain the responsibility of the product manufacturer.
d. Substitute products, systems or designs shall not be used unless the substitutions have been specifically approved for this Project by the Architect.
1) Substitute products, systems or designs that are related to structural, fire and life safety or access compliance shall not be used unless such substitution have been specifically approved for this Project by the Architect and the appropriate authority having jurisdiction.
2. Substitutions will not be considered if:
a. They are indicated or implied on product submittals in accordance with Specification Section - SUBMITTAL PROCEDURES. Substitutions are not Submittals, and must be reviewed and approved prior to being submitted as a Submittal.
b. Acceptance will require substantial revision of Contract Documents.
c. They are submitted after the date set for substitutions within this Contract, unless:
1) The specified or drawing item that has been verified to be discontinued or is otherwise unavailable.
2) The Owner proposes a cost savings for the product, system or method.
3) The Owner proposes early occupancy, and the proposed substitution allows for that convenience.
3. Substitutions affecting DSA-regulated items shall be considered as construction documents (CCD's) and shall be approved prior to fabrication and installation per DSA IR A-6 and Section 338(c) Part 1, Title 24 CCR.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

A. Substitution Request Form:
1. See the form attached to the end of this section.

2. The attached form will be reproduced (and sequentially numbered by the Contractor after the award of the Contract) by the Claimant for any and all proposed substitutions.
3. **NO OTHER FORMS WILL BE ACCEPTED.**

Attachment

SUBSTITUTION REQUEST FORM

TO: DARDEN ARCHITECTS, INC.
6790 N. West Avenue
Fresno, CA 93711

_____ Check attached for minimum review $424.00.

CHECK APPROPRIATE LINE:

_____ Substitution Request Prior to Bid (During Bid Period)
_____ Product or System Substitution
_____ Design Change Substitution

_____ Substitution Request After Award of the Contract
_____ Product or System Substitution
_____ Design Change Substitution

The Contractor Awarded the Contract for this Project shall assign sequential Substitution Request # below.

Leave blank if submitted during the Bid Period.

SUBSTITUTION REQUEST #_____

WE HEREBY SUBMIT FOR YOUR CONSIDERATION THE FOLLOWING PRODUCT OR METHOD AS SUBSTITUTION FOR THE SPECIFIED OR DRAWING ITEM FOR THIS PROJECT:

PROJECT: _____

SPECIFIED ITEM: _____

_____	_____	_____	_____
Specification Section #	Page #	Paragraph #	Description

OR

DRAWING ITEM: _____

_____	_____	_____
Drawing #	Detail Cut #	Description

PROPOSED CREDIT IF ANY: _____

PROPOSED SUBSTITUTION:

_____
_____
_____
_____

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents to which the proposed substitution will require for its proper installation.

The undersigned claimant certifies: (Modifications by the claimant to the following list is cause for automatic rejection without further review)

- The proposed substitution does not affect dimensions shown on drawings or code requirements indicated.
- The undersigned claimant shall compensate the Architect at a rate of $212.00 an hour, two hour minimum for each review (check for $424.00 must be attached to this form), for investigation and comments whether or not the request is approved for changes required to the building design, including engineering design, detailing, and construction costs caused by the requested substitution. The Architect is herein defined as any of those firms or individuals listed by reference on the Drawings, including all Consultants identified herein.
- The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
- Maintenance and service parts will be locally available for the proposed substitution.
- Attach information for a minimum of three projects where the substitution has been used locally within a 200-mile distance of this project, including names, addresses and telephone numbers of Owners who have accepted this product into their projects.
- Attach all cost data with explanations if different from Specified or Drawing item. Include in that explanation a discussion on quality of proposed substitution and cost differential.
- The undersigned claimant shall pay for any subsequent changes in incorporating the proposed substitution that were not apparent at the time of approval into the Work, including compensation to the Architect as described in item 2 above.

The undersigned Claimant(s) declares under penalty of perjury per the California Government Code Section 12650, et seq., that the claim of function, appearance and quality are equivalent or superior to the specified or drawing item, and further know and understand that submission for certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.

SUBMITTED BY CLAIMANT:

Signature_____
Firm_____
Address_____
_____
Date_____
Telephone_____

ADDITIONAL CLAIMANT SIGNATURE REQUIRED:

The Contractor or Construction Manager if submitted after the Award:
Signature_____
Firm_____

DESIGN CONSULTANT USE ONLY:

___ Check Not Attached - Not Accepted
___ Accepted
___ Accepted as Noted
___ Not Accepted
___ Received Past Time Period Allowed by Public Contract Code #3400.
By _____Date _____
Remarks_____
_
_____
_____
_____
_____

END OF SECTION

SECTION 01 29 73 – SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment, and services necessary to completely document Schedule of Values.

B. Related Requirements: The following Project Manual Sections contain requirements that relate to this section:

1. 01 11 13 SUMMARY OF WORK.
2. 01 21 13 ALLOWANCES.
3. 01 23 00 ALTERNATES.
4. 01 32 16 CONSTRUCTION SCHEDULE.
5. 01 32 26 FORMS AND REPORTS.
6. 01 33 00 SUBMITTAL PROCEDURES.
7. 01 41 00 REGULATORY REQUIREMENTS.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring and controlling the construction project. Activities included in a Schedule of Values and Payment Request consume cost for time and resources.

B. Activity Code: Identifies each activity so as to be organized, group and sorted into Sub-Schedules, Areas of Work, and Reports.

C. Allowances: Contract amounts allocated for specific activities of the project as identified in the contract documents.

D. Application for Payments: A statement furnished by the Contractor allocating portions of the Contract Sum to various portions of the Work stipulating the amount of work that has been completed to date.

E. Contingency: Contract amounts allocated for non-specific activities, to cover changes in the contract document work, unforeseen conditions and added scope of work to the project.

F. Major Scope: Significant portions of work identified as, but not limited to, Base Bid, Alternate Bids, and Construction Phases, and Funding Criteria.

G. Responsible Party: Entity that is responsible for performing the work of each activity as identified, but not limited to, General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.

H. Schedule of Values: A statement furnished by the Contractor allocating portions of the Contract Sum to various portions of the Work.

I. Scope Type: Segments of work identified as, but not limited to, Building ID, On-Site, and Off-Site.

J. Sub-Schedules: Separated activities identified as part of the same element of work and arranged to show correlation with related elements.

K. Unit Prices: A price per unit of measurement for materials, equipment, or services, or a portion of the Work that are applicable during the duration of the Work.

1.3 SUBMITTALS

A. General:

1. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.

B. Format for Submittals: A tabular form type schedules.

1. Provide a working electronic copy of schedule file.
   a. Provide schedule files on Compact Disc (CD) or Digital Versatile Disc (DVD) (WINDOWS Formatted Disks) in a form that can be reviewed and used by the Owner, and Architect.
2. Provide PDF electronic copy of schedule file.

3. Provide **Two (2)** paper copies of schedules.
    a. Sheet size shall be of adequate size to clearly show the required information for the entire construction period.
    b. All required documentation shall have the Submittal number posted in the upper-right hand corner of the page.

C. Assurance/Control Submittals:
1. Schedule of Values.
    a. Schedule of Bid Values.
        1) Submit within **fourteen (14)** days after the Award of Contract.
    b. Complete Schedule of Values.
        1) Submit at the earliest possible date, but no later than **fifteen (15)** days prior to the date scheduled for submittal of initial Application for Payment.
2. Application for Payment and Certification.
    a. Application for Payment and Certification Forms.
        1) Submit along with the Complete Schedule of Values submittal.
    b. Initial Application for Payment.
        1) Submit **seven (7)** prior to due date.
    c. Application for Payment for Progress of Work.
        1) Submit monthly by the date directed by Owner.
    d. Application for Payment at Substantial Completion.
        1) Submit after Architect issues the Certificate of Substantial Completion.
    e. Final Application for Payment.
        1) Submit after competing Project Closeout requirements.
3. Schedule of Unit Price.

1.4 SYSTEM DESCRIPTON

A. General:
1. The Architect considers the project Schedule of Values requirements to be significant to both the Contractor and the Owner. The development, submittal, and acceptance of the Schedule of Values, (Bid and Complete), and subsequent development and maintenance of the Application for Payments must be given high priority.
    a. No payment will be made without the Architect's review and acceptance of the Schedule of Values.
    b. Progress payments may be withheld in whole or part should the Contractor fail to comply with the requirements of this section.
    c. No separate payment will be made to the Contractor for any of the requirements of this section. All such costs shall be part of the Contractor's planned project overhead costs included in its bid.

B. Performance Requirements:
1. Schedule of Bid Values: The Schedule of Bid Values shall be a breakdown of the Bid(s) submitted in the Bid Proposal and shall include all work that was bid on, regardless the scope of work awarded for construction. The breakdown shall be sufficient for the use by the Owner and Owner's Consultants to evaluate and determine cost of major scopes of work and the value of other owner agreements that are associated with the dollar value of the bid proposal.
    a. Refer to Specification Section - SUMMARY OF WORK.
    b. Refer to Specification Section - ALLOWANCES.
    c. Refer to Specification Section - ALTERNATES.
2. Complete Schedule of Values: Breakdown of the Contract Sum by specific line-item values, based on the individual activities in the Baseline Project Construction Schedules and to be the basis for the development of the Application for Payment.
    a. Refer to Specification Section - CONSTRUCTION SCHEDULES.

3. Application for Payments: Shall be derived from Baseline Project Construction Schedule utilizing the costs in the Complete Schedule of Values, and from subsequent Project Construction Schedule Updates, reflecting the Work performed as of planned and actual dates.
    a. Refer to Specification Section - CONSTRUCTION SCHEDULES.
4. Unit Prices: If the Scope of Work or estimated quantities of Work by the Contract Documents is increased or decreased, Unit Prices are added to or deducted from the Contract Sum by appropriate modification.

1.5 QUALITY ASSURANCE

A. Qualifications:
    1. The Contractor must have the capacity and capability of supporting the project by producing schedule-related data within **two (2)** days of request by the Architect, or Owner.
B. Regulatory Requirements:
    1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Coordination:
    1. Coordinate preparation of the Schedule of Bid Values with the submitted Bid Proposal and reflect the major scope of work breakdown described in Specification Section – SUMMARY OF WORK and Specification Section -- ALTERNATES.
    2. Coordinate preparation of the Complete Schedule of Values with the preparation of the Baseline Project Construction Schedule. Refer to Specification Section -- CONSTRUCTION SCHEDULES.
    3. Correlate line items in the Complete Schedule of Values with other required administrative forms and schedules, including, but not limited to, the following:
        a. Application for Payment forms with continuation sheets.
        b. Submittals Schedule.
        c. Items required to be indicated as separate activities in the Baseline Project Construction Schedule.
B. Project Information:
    1. Identification: Include the following Project Identification on all Schedule of Values and Application for Payment.
        a. Project Name and Location.
        b. Name of Owner and Address.
        c. Name of Architect and Address.
        d. Architect's Project Number.
        e. Contractor's Name and Address.
        f. Submittal Date.

2.2 SCHEDULE OF BID VALUES

A. Format:
    1. Arrange the Schedule of Bid Values in tabular form.
        a. Provide and identify separate columns to indicate the following;
            1) SPECIFICATION SECTION.
            2) DESCRIPTION.
            3) RESPONSIBLE PARTY.
            4) MAJOR SCOPE.
            5) DOLLAR VALUE.
            6) PERCENTAGE OF THE CONTRACT SUM.
        b. Provide and identify separate line-items to indicate the following;

1) Activity.
2) Contract Conditions.
3) Allowance(s).
4) Contingency (ies).
5) Grand Totals.

B. Content:

1. SPECIFICATION SECTION: Use the specification section number in the Project Manual Table of Contents to identify and establish each line-item.
2. DESCRIPTION: Provide a description of the work for each line-item associated with the specification section and responsible party.
3. RESPONSIBLE PARTY: Identify the party responsible for performing the work of each line-item associated with the specification section and description.
4. MAJOR SCOPE: Designate Major scope of work as identified and itemized in BID PROPOSAL.
    a. Provide separate columns for each Major Scope of Work identified.
5. DOLLAR VALUE: Sub-Total of the cost for each activity line-item, with the amounts rounded to the nearest dollar.
    a. Assign a dollar value for each line-item to each Major Scope of the project excluding General Conditions, General Requirements and General Contractor’s Overhead and Profit.
6. PERCENTAGE OF THE CONTRACT SUM: Dollar Value as a percentage of the Contract Sum to the nearest one-hundredth percent, adjusted to total one hundred percent.
7. Activity: Provide at least one activity item-line for the work in each Specification Section.
    a. Provide separate activity line items for each Contractor or Subcontractor providing work under the same specification section.
8. Contract Conditions:
    a. Identify and provide separate activity line-item for cost items that are directly related to Division 01 - GENERAL REQUIREMENTS.
    b. Identify and provide separate activity line-item for cost items that are directly related to Division 00 - CONDITIONS OF THE CONTRACT.
9. Allowances: Identify and provide separate activity line-item for each Allowance that is assigned for specific work in any specification section. Dollar value to exclude General Contractor's Overhead and Profit.
10. Contingencies: If required, identify and provide separate activity line-item for each Contingency that is not assigned to specific work in any specification section. Dollar value to exclude General Contractor's Overhead and Profit.
    a. If required, provide separate line items for Owner Contingency and Contractor Contingency.
11. Grand Total: Summation of dollar value for each column equal to the Bids received.

2.3 COMPLETE SCHEDULE OF VALUES

A. Format:

1. Provide a comprehensive, fully developed, detailed Complete Schedule of Values in tabular form.
    a. Provide and identify the following separate columns to indicate the following for each item listed;
        1) SPECIFICATION SECTION.
        2) ACTIVITY CODE.
        3) DESCRIPTION.
        4) RESPONSIBLE PARTY.
        5) MAJOR SCOPE.
        6) SCOPE TYPE.
        7) DOLLAR VALUE.

b. Provide and identify separate line-items to indicate the following;
   1) Activity.
   2) Sub-Schedules.
   3) Contract Conditions.
   4) Allowances.
   5) Purchase Contracts.
   6) Contingencies.
   7) Grand Totals.

B. Content:
1. SPECIFICATION SECTION: Use the specification section number in the Project Manual Table of Contents to identify and establish each line-item.
2. ACTIVITY CODE: Provide the Activity Identification Code for each line-item indicated as separate activities in the Baseline Project Construction Schedule.
3. DESCRIPTION: Provide a description of the work for each line-item associated with the specification section and responsible party.
4. RESPONSIBLE PARTY: Identify the party responsible for performing the work of each line-item associated with the specification section and description.
5. MAJOR SCOPE: Designate Major scope of work as identified and itemized in BID PROPOSAL
6. SCOPE TYPE: Identify each line-item that is associated with a segment of work.
7. DOLLAR VALUE: Sub-Total of the cost for each activity line-item, with the amounts rounded to the nearest dollar.
   a. Assign a dollar value for each line-item to each Major Scope of the project excluding General Conditions, General Requirements and General Contractor's Overhead and Profit.
8. Activity: Provide at least one activity item-line for the work in each Specification Section.
   a. Provide separate activity line items for each Contractor or Subcontractor providing work under the same specification section.
   b. Include entities responsible for performing the work of each activity, identified as, but not limited to, General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.
   c. Include separate activity line-items for cost items that are directly related to Division 01 - GENERAL REQUIREMENTS and are direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
      1) Submittals,
      2) Field Engineering,
      3) Operation and Maintenance Manuals.
      4) Demonstration and Training.
9. Sub-Schedules:
   a. Major Scope of Work: Provide Sub-Schedules for line-items that are associated with each designated major scope of work as identified in Bid Proposal, and defined in Specification Section -- SUMMARY OF WORK and Specification Section -- ALTERNATES that requires itemization of each line-item value.
   b. Scope Type: Provide Sub-Schedules for line-items that are associated with each specific scope type.
      1) Building Costs: Detailed cost breakdown of all cost items that are directly related to the Project per Building.
         a) When the Project Building(s) is of sufficient size to warrant, break the building costs down into areas of work compatible with the Contractor's Means and Methods for construction sequences.
         b) Building areas may consist of floor and roof levels and partial floor and roof levels.
      2) Project Site Costs: Detailed cost breakdown of all cost items that are directly related to the Project Site.

a) When the Project Site is of sufficient size to warrant, break the site costs down into areas of work compatible with the Contractor's Means and Methods for construction sequences.

10. Contract Conditions: As defined in the Schedule of Bid Values and the following;
    a. Expand to include separate activity line-items for cost items that are directly related to Division 01 - GENERAL REQUIREMENTS and are not direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
        1) Temporary Facilities.
        2) Field Supervision.
        3) Project Identification Sign.
        4) Project Closeout Requirements.
            a) Punch List Activities, and Project Record Documents.
    b. Expand to include separate activity line-item for cost items that are directly related to Division 00 - CONDITIONS OF THE CONTRACT REQUIREMENTS and are not direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
        1) On-Site Facilities and Supervision.
        2) General Contractor's Overhead and Profit.
        3) Performance and Labor and Material Bonds.
11. Allowances: Identify and provide separate activity line-item for each Allowance that is assigned for specific work in any specification section. Dollar value to exclude General Contractor's Overhead and Profit.
12. Purchase Contracts: Provide separate line-item in the Schedule of Values for each Purchase Contract, showing the value of the Purchase Contract.
13. Contingencies: If required, identify and provide separate activity line-item for each Contingency that is not assigned to specific work in any specification section. Dollar value to exclude General Contractor's Overhead and Profit.
    a. If required, provide separate line items for Owner Contingency and Contractor Contingency.
14. Grand Total: Summation of dollar value for each column equal to the Bids received.

2.4 UNIT PRICES

A. Unit Prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead and profit.
    1. Breakdown prices into:
        a. Delivered cost of products(s) including tax.
        b. Total installed cost excluding overhead and profit.
        c. Add Contractor's and subcontractor's overhead and profit costs after subtotal and provide a final total.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of Unit Prices. Methods of measurement and payment for Unit Prices are specified in those sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established Unit Prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to the Contractor.

PART 3 - EXECUTION

3.1 APPLICATION AND CERTIFICATION FOR PAYMENT

A. General Requirements:
    1. Coordination: Coordinate the preparation of the Application for Payment with the preparation of the Complete Schedule of Values and Project Construction Schedule.
        a. Entries shall match data on the Complete Schedule of Values and Project Construction Schedule and Project Schedule Updates, if revisions were made.

2. Application and Certification for Payment Forms: Use forms accepted by the Architect and Owner for Applications for Payment.
    a. Form shall be based on AIA Document G702 Application and Certification for Payment and AIA Document G703 Continuation Sheets.
    b. Submit form for acceptance with initial submittal of Complete Schedule of Values.
3. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of the Contractor. Project Inspector or Architect will return incomplete applications without action.
    a. Use signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include Waivers of Lien and similar attachments if required.
4. Identification: Include the following Project Identification on all Application for Payment:
    a. Project Name and Location.
    b. Owner Name.
    c. Architect's Project Number.
    d. Contractor Name and Address.
    e. Application Number.
    f. Application Date.
    g. Period To:

B. Format.
1. Provide a comprehensive, fully developed, detailed Application for Payment with Continuation Sheets in tabular form.
    a. Provide and identify the following separate columns to indicate the following for each item listed;
        1) ACTIVITY CODE.
        2) DESCRIPTION.
        3) SCHEDULED DOLLAR VALUE.
        4) WORK COMPLETED.
            a) FROM PREVIOUS APPLICATION.
            b) THIS PERIOD.
        5) TOTAL COMPLETED.
        6) PERCENTAGE OF COMPLETION.
        7) BALANCE TO FINISH.
        8) RETAINAGE.
    b. Provide and identify separate line-items to indicate the following the following;
        1) Activity.
        2) Sub-Schedules.
        3) Contract Conditions.
        4) Allowance(s).
        5) Purchase Contracts (if applicable).
        6) Contingency (ies).
        7) Grand Totals.
        8) Change Orders.

C. Content:
1. ACTIVITY CODE: Provide the Activity Identification Code for each line-item of Work as indicated as separate activities in the Project Construction Schedule.
2. DESCRIPTION OF WORK: Provide the same description as indicated in the Schedule of Values for each line item.
3. SCHEDULED DOLLAR VALUE: Provide the same amount as indicated in the Schedule of Values for each line item.
4. WORK COMPLETED: with the following sub-columns.
    a. FROM PREVIOUS APPLICATION, include Dollar Value for work completed in previous Application for Payment, whether or not payment has been received.

b. THIS PERIOD, include only the Dollar Value for work completed at the time of Application for Payment.

5. TOTAL COMPLETED: The sum Dollar Value of Work Completed and Materials Presently Stored.
6. PERCENTAGE OF COMPLETION: The percentage value of the total Work Completed and the Stored to Date divided by the Scheduled Value.
7. BALANCE TO FINISH: The dollar value of the Scheduled Value minus the Total Completed.
8. RETAINAGE: The dollar value of the percentage of retention per contract agreement.
9. Activity:
   a. Use the Complete Schedule of Values and Baseline Project Schedule as a guide to establish activity line-items for the Application for Payment.
   b. Include separate activity line-items when a work activity is separated into stages and requires separate payments for each stage.
   c. Provide separate line-items for each part of the Work where separate payments will be requested including, but not limited to, submittals, materials, equipment, fabrication and installation.
   d. Provide separate line items for materials stored but not yet installed, where separate payments will be requested.
10. Sub-Schedules: As described in the Complete Schedule of Values.
11. Contract Conditions: As described in the Complete Schedule of Values.
12. Allowances: As described in the Complete Schedule of Values.
13. Purchase Contracts: As described in the Complete Schedule of Values
    a. Indicate Owner payments or deposits, if any, and balance to be paid by the Contractor.
14. Contingencies: As described in the Complete Schedule of Values.
15. Grand Totals: As described in the Complete Schedule of Values.
16. Change Orders:
    a. Include amounts of approved Change Orders or Construction Change Directives issued before the last day of construction period covered by application.

D. Supplemental Information:
   1. Materials Stored: Include in Application for Payment the amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed.
      a. Differentiate between items stored on-site and items stored off-site.
      b. Provide certificate of insurance or Bonded Warehousing, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
      c. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
      d. Provide summary documentation for stored materials indicating the following:
         1) Materials previously stored and included in previous Applications for Payment.
         2) Work completed for this Application utilizing previously stored materials.
         3) Additional materials stored with this Application.
         4) Total materials remaining stored, including materials with this Application.
   2. Waivers of Mechanic's Lien: With each Application for Payment, submit Waivers of Mechanic's Liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
      a. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
      b. When an Application shows completion of an item, submit conditional final or full waivers.
      c. Owner reserves the right to designate which entities involved in the Work must submit waivers.
      d. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
      e. Waiver Forms: Submit waivers of lien on forms executed in a manner acceptable to Owner.

E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for payment include the following:
   1. List of Subcontractors.
   2. Schedule of Values.
   3. Contractor's Construction Schedule (preliminary if not final).
   4. Products List (preliminary if not final).
   5. Schedule of Unit Prices.
   6. Submittal Schedule (preliminary if not final).
   7. List of Contractor's Staff Assignments.
   8. List of Contractor's Principal Consultants.
   9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   10. Initial Progress Report.
   11. Report of Preconstruction Conference.

F. Application for Payment for Progress of Work:
   1. Each Application for Payment shall be consistent with previous applications and payments as certified by the Project Inspector, Architect, and paid for by the Owner.
   2. Payment Applications shall be submitted to the Architect by the date established by the Owner. The maximum period of time covered by each Application for Payment is for one month.
   3. Payments Applications shall be updated to reflect any revised activity in the Project Schedule Updates.

G. Application for Payment at Substantial Completion: After the issuing of the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portions of the Work claimed as substantially complete.
   1. Include documentation supporting the claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

H. Final Application for Payment: Submit Final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement accounting for final changes to the Contract Sum.
   4. "Contractor's Affidavit of Payment of Debts and Claims."
   5. "Contractor's Affidavit of Release of Liens."
   6. "Consent of Surety to Final Payment."
   7. Evidence that claims have been settled.
   8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   9. Final liquidated damages settlement statement.

3.2 SCHEDULE OF UNIT PRICES

A. Specification Section - CAST-IN-PLACE CONCRETE:
   1. Concrete slabs per thickness per square foot.
   2. Concrete foundations per cubic yard.
   3. Concrete walls per cubic yard.

B. Specification Section - PLUMBING:
   1. Utility trenching, pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.

C. Specification Section - ELECTRICAL:

1. Utility trenching, sleeve pipe or conduit pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.

D. Specification Section - COMMUNICATIONS:
   1. Utility trenching, sleeve pipe or conduit pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.

E. Specification Section - ELECTRONIC SAFETY AND SECURITY:
   1. Utility trenching, sleeve pipe or conduit pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.

F. Specification Section - EARTHWORK:
   1. Scarification and compaction of existing soil per cubic yard.
   2. Excavation and compacted placement of existing suitable site soil for non-engineered fill per cubic yard.
   3. Delivery and compacted placement of import soil per cubic yard.
   4. Delivery and compacted placement of import soil for grading per cubic yard.
   5. Rough grading per square foot.
   6. Finish grading per square foot.

G. Specification Section - STORM DRAINAGE:
   1. Delivery and installation of catch basins per individual catch basin size.
   2. Trenching, pipe placement and backfill per pipe diameter size per linear foot at specific trench depths.
   3. Miscellaneous storm drainage items per item.

END OF SECTION

SECTION 01 31 13 – CONTRACTOR'S PROJECT MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the administrative and procedural provisions for construction operations.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. BIM: Building Information Modeling.

B. CAD: Computer Aided Design and Drafting.

C. RFI: Request for Information. Seeking information required by or clarifications of the Contract Documents.

D. MINUTES: A method of documenting key topics discussed with a focus on decisions made and directions given and by whom during a meeting. A verbatim transcript is not necessary.

1.3 SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.

B. Key Personnel Names: Within fifteen (15) days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities, list telephone numbers, and e-mail addresses. Provide names, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project. Keep list available and current at all times.

1.4 COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in the Contract Documents to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.5 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's CAD drawings will be provided by Architect, if available, for Contractor's use during construction, as per written request made by the Contractor.

1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in Auto CAD.
4. Contractor, and other parties granted access by Contractor to Architect's digital data files, shall execute attached data licensing agreement form "USER AGREEMENT FOR ELECTRONIC FILES."

B. Web-Based Project Management Software Package: Use of Contractor' web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion, is acceptable.

1. Web-based Project management software includes, at a minimum, the following features:
    a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
    b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
    c. Document workflow planning, allowing customization of workflow between project entities.
    d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
    e. Track status of each Project communication in real time, and log time and date when responses are provided.
    f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
    g. Processing and tracking of payment applications.
    h. Processing and tracking of contract modifications.
    i. Creating and distributing meeting minutes.
    j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
    k. Management of construction progress photographs.
    l. Mobile device compatibility, including smartphones and tablets.
2. Provide up to seven (7) Project management software user licenses for use by users as identified by Owner and Architect.

3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
   1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with bookmarks enabling navigation to each item.
   2. Name file with submittal number or other unique identifier, including revision identifier.
   3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.
   4. Do not submit password protected documents or restricted documents.

1.6 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
   1. RFIs submitted to Architect by other parties controlled by Contractor will be returned without response.
   2. Coordinate and submit RFIs in a prompt manner to avoid delays in work.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Owner name.
   3. Owner's Project number.
   4. Name of Architect.
   5. Architect's Project number.
   6. Date.
   7. Name of Contractor.
   8. RFI number, numbered sequentially.
   9. RFI subject.
   10. Specification Section number and title and related paragraphs, as appropriate.
   11. Drawing number and detail references, as appropriate.
   12. Field dimensions and conditions, as appropriate.
   13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   14. Contractor's signature.
   15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
      a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Use forms accepted by the Architect and Owner. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
   1. The following Contractor-generated RFIs will be returned without action:
      a. Requests for approval of submittals.
      b. Requests for approval of substitutions.
      c. Requests for approval of Contractor's means and methods.
      d. Requests for coordination information already indicated in the Contract Documents.
      e. Requests for adjustments in the Contract Time or the Contract Sum.
      f. Requests for interpretation of Architect's actions on submittals.
      g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within five (5) days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include not less than the following:
1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three (3) days if Contractor disagrees with response.

1.7 COORDINATION DRAWINGS

A. Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    f. Indicate required installation sequences.
    g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
2. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Above Ceiling: Indicate subframing for support of ceiling**,** and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenums to accommodate layout of light fixtures, fire sprinklers, mechanical ducts, support structures, structural elements (beams, joist, trusses) and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
    a. Runs of vertical and horizontal conduit 1-1/4 inchesin diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following: Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Site Utility Coordination: Show the following:
    a. Existing and proposed underground and surface utility improvements including gas, domestic water, fire water, chilled water, hot water, irrigation, storm sewer, sanitary sewer, electrical power, and communications. No site improvements shall be installed prior to Architect's and Owner's review of coordination drawing. Architect's and Owner's review is only for general conformance with the Contract Documents. Contractor is responsible to obtain their own GPR Services to locate utilities within the construction site area.

C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
1. Schedule submittal and review of Structural Steel, Wood Framing, Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
4. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
5. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
6. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.

D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
   1. File Preparation Format:
      a. Same digital data software program, version, and operating system as original Drawings, operating in Microsoft Windows operating system.
   2. File Submittal Format: Submit or post coordination drawing files using PDF format, or in a format as requested by the Architect.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
   1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conduct matters relating to the Work.
   2. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Introductions, responsibilities and personnel assignments.
      b. Tentative construction schedule.
      c. Phasing.
      d. Critical work sequencing and long lead items.
      e. Designation of key personnel and their duties.
      f. Lines of communications.
      g. Use of web-based Project software.
      h. Review of General Conditions/Requirements.
      i. Procedures for processing field decisions and Change Orders.
      j. Procedures for RFIs.
      k. Procedures for Submittals.
      l. Procedures for Substitutions.
      m. Procedures for testing and inspecting.
      n. Procedures for processing Applications for Payment.
      o. Distribution of the Contract Documents.
      p. Submittal procedures.
      q. Sustainable design requirements.
      r. Preparation of Record Documents.
      s. Use of the premises.
      t. Work restrictions.
      u. Working hours.
      v. Owner's occupancy requirements.
      w. Responsibility for temporary facilities and controls.
      x. Procedures for moisture and mold control.
      y. Procedures for disruptions and shutdowns.
      z. Construction waste management and recycling.
      aa. Parking availability.
      bb. Office, work, and storage areas.
      cc. Equipment deliveries and priorities.
      dd. Project Safety.

ee. Security.
ff. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owner and Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   a. Contract Documents.
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Review of mockups.
   i. Possible conflicts.
   j. Compatibility requirements.
   k. Time schedules.
   l. Weather limitations.
   m. Manufacturer's written instructions.
   n. Warranty requirements.
   o. Compatibility of materials.
   p. Acceptability of substrates.
   q. Temporary facilities and controls.
   r. Space and access limitations.
   s. Regulations of authorities having jurisdiction.
   t. Testing and inspecting requirements.
   u. Installation procedures.
   v. Coordination with other work.
   w. Required performance results.
   x. Protection of adjacent work.
   y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conduct matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
   a. Preparation of Record Documents.

b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Procedures for completing and archiving web-based Project software site data files.
d. Submittal of written warranties.
e. Requirements for preparing operations and maintenance data.
f. Requirements for delivery of material samples, attic stock, and spare parts.
g. Requirements for demonstration and training.
h. Preparation of Contractor's punch list.
i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
j. Submittal procedures.
k. Coordination of separate contracts.
l. Owner's partial occupancy requirements.
m. Installation of Owner's furniture, fixtures, and equipment.
n. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at weekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conduct matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
        1) Review schedule for next period.
    b. Review present and future needs of each entity present, including the following:
        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Status of sustainable design documentation.
        5) Deliveries.
        6) Off-site fabrication.
        7) Access.
        8) Site use.
        9) Temporary facilities and controls.
        10) Progress cleaning.
        11) Quality and work standards.
        12) Status of correction of deficient items.
        13) Field observations.
        14) Status of RFIs.
        15) Status of Proposal Requests.
        16) Pending changes.
        17) Status of Change Orders.
        18) Pending claims and disputes.
        19) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: Each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conduct matters relating to the Work. Advise Owner and Architect of scheduled meeting dates.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    c. Review present and future needs of each contractor present, including the following:
        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site use.
        8) Temporary facilities and controls.
        9) Work hours.
        10) Hazards and risks.
        11) Progress cleaning.
        12) Quality and work standards.
        13) Status of RFIs.
        14) Proposal Requests.
        15) Change Orders.
        16) Pending changes.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS
NOT APPLICABLE

PART 3 - EXECUTION
NOT APPLICABLE

END OF SECTION

USAGE AGREEMENT FOR ELECTRONIC FILES
Release of Liability

Documents Transmitted By: Darden Architects, Inc. 6790 N. West Ave. Fresno CA 93711

PROJECT NAME: _____

ARCHITECT PROJECT NO.: _____

PROJECT ARCHITECT: _____

I _____, as a duly authorized agent of_____ (Contractor) have an agreement for construction services on the above named project. The Contractor acknowledges having received at least one (1) complete set of Contract Documents for the project and has posted all Addenda and all other contract documents issued to date.

The Contractor is requesting the electronic CAD files of work prepared by the Architect and/or Architect's Consultants (Design Team) on the subject project, so that the information therein may be utilized in the Contractor's work on the same project. The Contractor understands that these files are being provided as a courtesy and they are strictly intended for the Contractor's sole convenience and they are not recognized Contract Documents. This request is subject to the following conditions, which the Contractor hereby agrees to abide by:

1. It is understood and agreed to that any files and/or documents provided are instruments of professional service by the Design Team and are intended for one-time use solely in the construction of this project. They are and shall remain the property of the Architect or the Architect's Consultants, who is deemed to be the author of the drawings and data, and who shall retain all common law, statutory law, and all other rights, including copyrights.

2. The Contractor shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from contractor's use of these electronic files, or in any way connected with the modification, misinterpretation, misuse, or reuse by the Contractor or by others.

3. The Contractor agrees that by using these electronic files, the Contractor is in no way relieved of the duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm and coordinate all dimensions and other details, take field measurements, verify field conditions and coordinate with all other contractors for the project.

4. It is agreed to that these electronic files are not Contract Documents. Differences may exist between electronic files and corresponding hard-copy Contract documents. The Design Team makes no representation regarding the accuracy or completeness of the electronic files provided to the contractor. In the event that a conflict arises, the signed and sealed hard-copy Contract Documents shall govern. Contractor is responsible for determining if any conflict exists.

5. The Contractor understands that the Design Team makes no representation as to the compatibility of these files with Contractor's computer hardware or software. The Contractor understands that the accuracy of the information is an artifact of the techniques used to generate it and is in no way intended to imply actual accuracy. It is also understood that the automated conversion of information and data from the system and format used by the Design Team to an alternate system or format cannot be accomplished without the possibility of introduction of inexactitudes, anomalies and errors.

6. Because information presented on the electronic files can be modified, unintentionally or otherwise, the Design Team reserves the right to edit the drawings to remove information deemed not necessary and/or remove all indications of ownership and/or involvement from each electronic display.

7. The Design Team will only furnish those drawings directly applicable to the shop drawings the contractor wishes to create. The Contractor understands that not all electronic files may be available at the Design Team's discretion.

8. The Contractor understands that the Architect's Consultants may have Additional Conditions for release of their electronic files or documents, and the Contractor hereby agree to abide by the Consultants conditions in addition to the stated conditions in this agreement. Additional Conditions (if any) are attached to this agreement.

9. The Contractor understands that the Architect and the Architect's Consultants will incur certain costs in providing the requested electronic files. The Contractor agrees to pay the Design Team a service fee of $120.00 per sheet, per delivery, prior to any delivery of the electronic files to compensate the Design Team for the labor to prepare and transmit the files and for the additional risk that this transfer will occasion.

10. Under no circumstances shall delivery of the electronic files for use by the Contractor be deemed a sale by the Owner, the Design Team, or any member of the Design Team. The Design Team makes no warranties, either expressed or implied, of merchantability or fitness for any particular purpose. In no event shall the Design Team be liable for any loss of profit or any consequential damages as a result of Contractor's use or reuse of the electronic files.

Darden Architects, Inc.

Description of the requested documents and/or CAD files:

___ Civil ___ Structural ___ Mechanical ___ Electrical ___ Other(s)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ _____

Printed Name Title

_____ _____

Signed Dated

SECTION 01 32 16 – CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:

1. Provide all material, labor, equipment and services necessary to completely provide Construction Schedules, Materials, accessories, and other related items necessary to complete the Project as indicated by the Contract Documents.
    a. Provide an acceptable Critical Path Method (CPM) construction schedule and updating methods.
    b. Use specific scheduling software.
    c. Designate the Contractor's acceptable scheduling representative or utilize an acceptable scheduling consultant.
    d. Prepare and submit a Preliminary Project Schedule (PPS).
    e. Prepare and submit a CPM Baseline Project Schedule (BPS), and submit "cost-loaded" schedule data for the express use in the Monthly Progress.
    f. Produce acceptable Monthly Schedule Updates (MSU), provide monthly schedule narrative reports, and attend monthly scheduling meetings.
    g. Prepare Short Interval Schedules (SIS).
    h. Prepare and submit Fragnet Submittals, when seeking time extensions, and/or float consumption.
    i. Prepare acceptable recovery schedule(s) if the progress is unsatisfactory, and the requirement to gain acceptance from Architect for schedule revisions and sequence changes.
    j. Schedule Inclement Weather impacts and resulting Mud impacts (if any) into the CPM Baseline Project Schedule (BPS), and for the requirement for time extension requests for unusually severe weather.
2. Provide projected Construction Schedule for entire Work and revise periodically.
3. Provide separate sub-schedule, showing all submittal information and the time frames in which they are to be submitted, that include the following:
    a. Coordination Drawings.
    b. Product Data.
    c. Shop Drawings.
    d. Samples.
    e. Quality Assurance/Control Submittals.
    f. Closeout Submittals.
4. Provide sub-schedules to define critical portions of entire schedule.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. BPS: Baseline Project Schedule.

B. CPM Critical Path Method: The longest continuous chain of activities through the schedule that establishes the minimum overall project duration.

C. "Activity": A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources, including manpower, equipment or materials. Work activities shall include, but not limited to, mobilization; submittals; Architect's review of submittals; procurement; delivery;

installation and checkout of equipment or material; subcontractor's items of work and major construction activities.

1. Critical activities are activities on the critical path.
2. Predecessor activity is an activity that must be completed before a given activity can be started.

D. "Event": An event is the starting or ending point of an activity.

E. "Fragnet": A detailed proposed change in time based on an activity or activities, but do not show effect to the completion date.

F. "Milestone": A key or critical point in time for reference or measurement.

G. "Float": Float for any activity, milestone completion date or contract completion date shall be considered a resource available to both the Owner and Contractor. Neither the Owner nor the Contractor shall have exclusive ownership of the float. Float shall be a resource to all parties, and shall be consumed by whoever utilizes it first.

H. "Inclement Weather": TEMPERATURE, PRECIPITATION (aka Rainfall & Rain Days) or FOG. The conditions for Inclement Weather are defined herein, and valuations of Inclement Weather are listed in the Meteorological Data NOAA Chart.

I. MSU: Monthly Schedule Updates.

J. "Mud" (aka Mud Days): Mud is a direct result of precipitation, and for this reason Mud is treated different than precipitation. Mud, or muddy site conditions, will become a candidate for time extensions, only if the amount of precipitation exceeds that which is anticipated and considered normal "Inclement Weather" for a given month.

K. NOAA: National Oceanic and Atmospheric Administration.

L. NTP: Notice to Proceed.

M. PDM: Precedence Diagram Methodology.

N. PPS: Preliminary Project Schedule.

O. SIS: Short Interval Schedules.

P. "Unusually Severe Weather": more severe than the anticipated "Inclement Weather" for any given month.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

1. Quality Assurance/Control Submittals:
   a. Submit the Contractor's Construction Schedule and Submittal Sub-Schedule within 35 calendar days after the Award of Contract date, unless otherwise stated in the General Conditions.
   b. Submit updated schedules as required by change in Work Progress.
2. All items listed below, unless otherwise indicated, shall be submitted in triplicate:
   a. Within seven (7) days after the Award of Contract:
      1) The Contractor shall provide evidence to demonstrate the competency in the use of CPM scheduling, including evidence of the use of cost-loaded Primavera CPM scheduling on projects of similar value and complexity. Upon failure of the Contractor to satisfy the Architect of its CPM scheduling competency, the Contractor shall be required to employ a qualified CPM schedule consultant who regularly performs these services and who in the opinion of the Architect possesses the capacity and qualifications required to perform CPM scheduling for this project.
   b. Within seven (7) days after the Notice to Proceed:
      1) Submit the Contractor's authorized representative and their qualifications.
   c. Within twenty-one (21) days after the Notice to Proceed:
      1) Submit Preliminary Project Schedule (PPS)
   d. Within sixty (60) days after the Notice to Proceed:
      1) Submit Baseline Project Schedule (BPS).

e. Within seventy-five (75) days after the Notice to Proceed:
   1) Submit cost-loaded schedule data.

3. Coordination Schedules:
   a. Contractor's Monthly Schedule Updates (MSU) as needed one week prior to progress payments.
   b. Contractor's Short Interval Schedules (SIS) as needed at the regularly scheduled weekly meetings.
4. Contractor's Time Extension Requests / Fragnet Submittals:
   a. "Notice of Delay" requests within twenty-four (24) hours after a delay event, on form provided at end of this section.
      1) Notice of Delay Form shall be accompanied by the required COR, CCD, RFP or other documents issued by the Architect.
   b. Fragnet Submittal Forms (in quadruplicate) within fourteen (14) days after a delay event.
      1) Fragnet Submittal Forms shall be accompanied by the required COR, CCD, RFP or other documents issued by the Architect.
5. Submittal Sub-Schedule Submittal:
   a. Submit the Submittal Sub-Schedule within 35 calendar days after the Award of Contract date, unless otherwise stated in the General Conditions.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. The Contractor shall designate, in writing, an authorized representative in its firm who shall be responsible for the preparation, revising, and updating of the cost-loaded Critical Path Method schedule (hereinafter referred to as CPM) utilizing Primavera scheduling software. The Contractor's representative shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the construction scheduling requirements set forth herein. Such authority shall not be interrupted throughout the duration of the project. The requirements for the CPM schedule are included to assure adequate planning and execution of the work and to assist the Architect and Owner in appraising the reasonableness of the proposed schedule, evaluating progress of the work and for reviewing the Progress Payment Applications.
   2. The Contractor must have scheduling capabilities (hardware and software, inclusive of plotter) located at the construction site, or readily accessible in a local area office. Any Consultant must have the capacity and capability of supporting the project by producing schedule-related data within two (2) days of request by the Contractor, Architect, or Owner.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

C. Meetings:
   1. Progress Meetings: Scheduled by the Contractor on a weekly basis for the proper coordination of the work.
      a. Minimum agenda shall be to review the work progress, and the following:
         1) Discuss field observations, problems, and decisions;
         2) Identification of any potential problems that may impede planned progress;
         3) Corrective measures to regain projected schedules;
         4) Maintenance of quality and work standards in accordance with manufacturer's warranty requirements.
   2. Participants (or designated representative of) invited to attend each of the above meetings shall be as follows:
      a. Contractor.
      b. Owner.
      c. Architect.
      d. Project Inspector.
      e. Installer.

f. Material Manufacturer(s).
g. Subcontractors, as appropriate (including any accessory subcontractors).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products specified are from companies listed below, or approved equivalent. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers listed as acceptable alternative manufacturers must still comply with the requirements of the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified product manufacturer, or approved equivalent:
      a. PRIMAVERA "Project Planner Version 3."
B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Contractor's Construction Schedule Form:
   1. Prepare in form of horizontal bar chart.
      a. Provide separate horizontal-box-column for each trade or operation.
      b. Order: Chronological order of beginning of each item of Work.
      c. Identify each column.
         1) By specification section number.
         2) By distinct graphic delineation.
      d. Horizontal time scale: Identify first workday of each week.
      e. Scale and spacing to allow space for updating.
   2. Sheet size and type: 24" x 36", transparency.
   3. Content of Contractor's Construction Schedule Form.
      a. Provide complete sequence of construction by activity.
      b. Identify Work of separate, logically grouped activities.
   4. Provide diskette copies of CPM Network, as required.
   5. Contractor shall use "Primavera" Project Planner Version P3 for Critical Path Method (CPM) Scheduling.
      a. The alternative is the means of providing Owner's Representative with files on CD's or DVD's (WINDOWS Formatted Disks) in a form that can be completely restored into "Primavera" without requiring the use of a Conversion Program or utilizing other software.
B. Submittal Sub-Schedule Form:
   1. Prepare separate Submittal Sub-Schedule, as called for in Specification Section - SUBMITTAL PROCEDURES.

PART 3 - EXECUTION

3.1 SCHEDULES [AND PROCEDURES FOR CONSTRUCTION SCHEDULES]

A. Architect will review schedules and return within 10 days after receipt.
   1. Resubmit within 7 days after return of review copy.
B. Updating:
   1. As a condition of Application Payments (Progress Payments), the Contractor shall show all changes occurring since previous submission of updated schedules, or certify in writing that no changes have occurred. Failure to provide an updated schedule or certification could

cause the Architect and Project Inspector to recommend that no payments by the Owner be made until the Contractor has complied with the conditions required for payments.

2. Indicate progress of each activity and show completion dates.

C. Distribution:

1. Print copies of schedules for distribution.
2. Distribute copies of reviewed schedules to:
   a. Job site file.
   b. Project Inspector.
   c. Architect.
   d. Sub-contractors.
   e. Other concerned parties.
3. Instruct recipients to report any inability to comply and provide detailed explanation with suggested remedies.

D. General Requirements:

1. The Architect considers the project schedule requirements to be of significant importance to both the Contractor and the Owner. The development, submittal, acceptance and maintenance of the Baseline Project Schedule (BPS) and subsequent Monthly Schedule Updates (MSU) must be given high priority.
2. Work under this section shall consist of providing a computerized, time-scaled, cost-loaded Critical Path Method (CPM) Contract Schedule using Precedence Diagram Methodology (PDM) showing in detail how the Contractor plans to execute, coordinate and generate progress billings for the work.
3. All schedule submittals (PPS, BPS, MSU's, Fragnets, schedule revisions and recovery schedules) shall include four (4) copies of the following:
   a. An electronic copy of the schedule on CD (Compact Disc).
   b. A time-scaled logic diagram or a time-scaled bar chart.
   c. A tabular report that shows early start, early finish, late start, late finish, original duration, remaining duration, total float and percentage completion appropriately organized and sorted by building, site zones, and major activity codes.
   d. A predecessor-successor tabular report organized by building, site zones, and major activity codes.
   e. A written narrative report describing the progress since last report, problems or delays experienced, mitigation undertaken, anticipated progress next month, and a listing of all submittals, RFIs, change directives, Owner-supplied equipment or other Owner-controlled and critical constraints affecting the Contractor’s progress, or anticipated to become a critical constraint in the next month.
   f. A listing of all significant changed, added or deleted activities, revised logic relationships, durations, descriptions, etc. (revisions for routine updates excluded).
   g. Except for time extension requests, a cost report must be provided listing each activity and its associated cost, percentage of work accomplished, earned value to date, previous payments and amount earned for the update period. For all new or redefined activities created through updates, change orders, or for fragnet delay analyses for time extension requests, a cost report should also be provided listing each new or redefined activity and its associated cost.
   h. A cash flow envelope report and cash flow projection diagram (S-curves) shall be submitted with the finalized, cost-loaded baseline project schedule. This report and diagram shall be based on the planned monthly progress billings expressed as a percentage of the total project cost. The report and diagram shall calculate and show two projections – one based on early starts/early finishes, and another based on late starts/late finishes. Monthly Schedule Updates (MSU) shall show actual billings plotted against early and late curves.
   i. In addition, from month-to-month, the Architect may request the Contractor provide (at no cost) the following reports or schedule plots:
      1) Total or free float report from least to most float.
      2) Plots or reports of activities grouped by subcontractors, selected trades or buildings.

3) Plots or reports of activities with scheduled early start in a given time frame (such as a 30- or 60-day look-ahead schedule).
4) Subcontractor certifications, indicating approval of the subcontractors scheduled work, acknowledging outside factors such as manpower resources, stacking of trades, multiple mobilizations, coordination of space with other trades and the stacking of trades.

4. Contractor's Construction Schedule:
   a. The Contractor's Construction Schedule shall be the basis for evaluating the job progress and time extension requests. The responsibility for developing the construction schedule, accurately updating the schedule, and monitoring the actual progress of the work compared to the planned schedule rests solely with the Contractor.
      1) Failure of the Contractor to include any element of the work or any inaccuracy in the Contractor's Construction Schedule will not relieve Contractor from the responsibility for accomplishing all the work in accordance with the Contract requirements.
   b. Progress payments may be withheld in whole or part should the Contractor fail to comply with the requirements of this section.
   c. No separate payment will be made to the Contractor for any of the requirements of this section. All such costs shall be part of the Contractor's planned project overhead costs included in its bid.

E. Early Completion Schedules:
   1. Early completion schedules may be prohibited due to certain physical or monetary constraints imposed upon the Owner. If an early completion schedule is not prohibited, and is contemplated by the Contractor as part of its bidding strategy, it is hereby expressly understood by the Contractor that early completion schedules will only be acceptable under the condition that the schedule be reasonable and realistic, and if the Contractor certifies that it has included general conditions costs in its bid sufficient for the entire contractual time of performance. It is also understood, therefore, that no damages for delay will be recoverable if the project is prolonged beyond the early completion date, but still completed within the entire contract duration.

F. Preliminary Project Schedule (PPS):
   1. Contractor shall furnish the Architect with a PPS within twenty-one (21) days after receiving the Notice to Proceed.
   2. The PPS shall indicate a detailed plan for the work to be completed in the first ninety (90) days of the contract, including planned mobilization of plant and equipment; sequence of early operations; and procurement of materials and equipment. Work beyond first ninety (90) days shall be shown in a summary-level bar chart manner.
      a. The PPS will be temporarily used to record and monitor the progress of the work until the Baseline Project Schedule has been completely developed and accepted. Recorded data on the Preliminary Project Schedule shall be incorporated into the Baseline Project Schedule during the first monthly update.
   3. Architect will review the PPS within seven (7) days for general conformance. Contractor shall incorporate any review comments into the preparation of the Baseline Project Schedule (BPS).

G. Baseline Project Schedule (BPS):
   1. Within sixty (60) days after the Notice to Proceed, Contractor shall submit a detailed BPS presenting an orderly and realistic plan for the completion of the entire project. The PBS shall be in full conformance with the requirements of this specification.
      a. The project start date, completion date and the intermediate milestone dates shown in the BPS should match Contract requirements.
   2. Unless otherwise approved by the Architect, no activity on the BPS shall have a duration longer than fifteen (15) days, with the exception of submittal, approval, fabrication and delivery (procurement) activities. Activity durations shall be the total number of days required to perform that activity, including consideration for normal and anticipated weather-related impacts that might prolong performance of that activity. National Oceanic and Atmospheric

Administration (NOAA) from the nearest observing site to the project shall be the contractual basis for determining "normal" weather or departures from normal.

3. "Responsibility" codes shall be identified for each activity to indicate the responsible subcontractor. Other codes for "area," "trade" or "submittal/procurement" shall be similarly utilized to allow schedule data to be sorted and organized into separate, coherent reports or plots.
4. The BPS shall include a separate sub-schedule for all submittal, approval and procurement activities, including owner-furnished items. Data shall include a particular specification reference, description of item of work covered, and a trade or subcontractor reference. Schedule activities that are dependent on submittal approval and/or material delivery shall not be scheduled to start earlier than the reasonably expected approval or delivery dates.
    a. Coordinate Submittal Schedule with the list of subcontractors, Schedule of Values and the list of products as well as the Contract Construction Schedule.
    b. Prepare the schedule in chronological order. Provide information as called for in specification section - SUBMITTAL PROCEDURES.
    c. Distribution: Following the Architect's response to the initial submittal, print and distribute copies to the Architect, Owner, Subcontractors, and other parties required to comply with submittal dates indicated.
5. The BPS shall not show more than 10% of the total activities as critical. The BPS shall not show more than 20% of the activities with total float of 10 working days or less. The schedule shall not show any activities with negative float. Start and Finish constraints, unless identified in the contract documents, shall be minimized as much as possible to avoid logic conflicts.
6. The BPS shall show the total cost of performing each activity. This cost shall be the total of labor, material and equipment, including general conditions, overhead and profit. The BPS shall not show a separate, individual activity for general conditions, overhead and profit. The cost of general conditions, overhead and profit shall be prorated to all cost-loaded activities. The sum of the cost for all activities shall equal the total contract value.
7. The Contractor shall submit the proposed BPS, less cost-loaded data, within sixty (60) days after NTP. The Architect will commence a review to ascertain any lack of compliance with these specifications. Absent any notice from the Architect of such problems or compliance issues, the Contractor shall submit cost-loaded data within fifteen (15) days after the BPS was submitted, or within seventy-five (75) days of NTP.
    a. The Architect will review the proposed BPS with cost loading for general conformance. Within thirty (30) days after the BPS is submitted, or fifteen (15) days after receipt of cost-loaded data, the Architect will accept the contract schedule or will return it with comments. If the proposed schedule is returned with comments, Contractor shall revise the schedule to incorporate the comments. The schedule shall be resubmitted for acceptance within seven (7) days. The accepted BPS shall become the Contract Construction Schedule.

H. Monthly Schedule Updates (MSU):

1. The Contractor shall submit an MSU, each month, which accurately indicates the actual progress of the work during the prior month. The "data date" (or date through which progress is reported) shall be identified on all update reports or schedule plots. For cost-loaded schedules, the data date shall be the progress billing cut-off date (typically the 25th of the month). Schedule updates shall be submitted within five (5) days after the Architect approves the billing percentages.
    a. The MSU shall indicate the actual start and finish dates of activities commenced or completed during the prior month. Once "as-built" start and finish dates are updated and accepted as accurate, this data shall not be changed. The MSU shall show the percentage complete for each activity.
2. Schedule calculations shall be performed as follows. If the Contractor has proceeded out-of-sequence from the planed logic, the Contractors monthly update shall use the "retained logic" option to perform schedule calculations. Also, when the duration(s) of schedule activities are calculated, the "contiguous duration" option shall be used. Interruptible durations are not acceptable.

3. The Contractor shall submit a narrative report along with the MSU. This narrative report shall include a description of the progress achieved that month, a description of problems or delays experienced, an analysis of the effect of approved time extensions to critical activities upon the project completion date, a discussion of current or anticipated delays, and if there is a lack of progress for which the Contractor is responsible, an explanation of mitigating actions taken or a proposal for recovery shall be provided. Further, if the schedule data is changed due to a routine updating only, no identification or discussion of such changes is required in the Monthly Schedule Update. However, if the work is re-sequenced, or if activities are added or deleted, these schedule data changes must be specifically identified, discussed and submitted. Specifically, such submittals shall be separate and apart from monthly update submittals.
4. As part of the MSU, and as part of the Architect's review of the Contractor's progress that month, a monthly schedule meeting shall be held. The monthly meeting shall be held on a mutually agreed date, but no later than ten (10) days after the submittal of the MSU. The Contractor's designated schedule representative shall attend. The intent of these monthly meetings is to address and resolve all schedule issues for the prior month. The Architect requires the MSU no later than seven (7) days prior to the monthly schedule meeting. The Architect may waive or postpone the monthly meeting(s).
5. The Architect will review the Contractor's MSU submittal. Any of the Architect's comments shall be incorporated into the next update for the Architect's verification.

I. Sequence Changes / Recovery Schedules / Schedule Revisions:

1. If the Architect determines that the sequence of the construction differs significantly from the Contract schedule, the Contractor shall submit a revised schedule for approval within fifteen (15) days of the Architect's request. The Contractor agrees to be bound by the Contractor's revised, re-sequenced or optimized schedules, and agrees to make no claim for such.
2. If a Contractor falls fourteen (14) days behind schedule on milestone dates or completion dates, the Contractor will be required to prepare and submit a recovery schedule for review and acceptance. The recovery schedule shall show how the Contractor intends to reschedule the work in order to regain the time lost.
3. If the Contractor intends to alter its planned sequence or approach to the work, the Contractor shall submit its requested schedule revisions or sequence changes to the Architect for review and comment. This submittal shall be separate from the routine MSU, and shall include a description of the reason(s) for the schedule changes, a description of the changes being made, a list of all added and deleted activities, changed logic relationships, changed activity durations or descriptions, etc. If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next MSU.

J. Short Interval Schedules (SIS):

1. At the regularly scheduled weekly meetings, the Contractor shall submit to the Architect and District a SIS, which is a three-week-look-ahead schedule. The SIS shall be a three-week snapshot of the work generated from the most recent monthly update. The SIS shall include the prior week, the current week, and one week thereafter. The SIS shall contain sufficient detail to evaluate inspection requirements, and for the Contractor to submit its manpower and equipment needs.

K. Time Extension Requests / Fragnet Submittals:

1. The Contractor shall provide "Notice of Delay" and a Fragnet Submittal to the Architect for all claimed time extension requests, showing the impact of the delay event on the contract schedule. The Notice of Delay form and Fragnet Submittal form is included at the end of this specification section.
2. The Fragnet Submittal shall demonstrate the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the affect on the scheduled sequence and progress of the work. The Fragnet Submittal shall be based on the latest Monthly Schedule Update. The Fragnet Submittal shall also include all supporting project documentation or delay calculations that establish entitlement and quantify the delay. All required documentation shall have the Fragnet Submittal number posted in the upper-right hand corner of the page.

3. "Float" on slack time shall not be for the exclusive use or benefit of the Contractor or Owner. Extensions of time for performance will be granted only to the extent that the equitable time adjustment for the activity or activities affected exceeds the total float along the activity path at the time the delay event occurred or when an instrument of the Contract (CCD) or change order was directed.
4. The Contractor acknowledges and agrees that mitigation of delays due to delay events may require a change to preferential sequences of work. The Contractor must propose possible mitigation plans (sequence changes and any costs) for otherwise critical path delays. The Architect will evaluate the cost of mitigation versus the cost of extended project performance. The Contractor agrees to be bound by the Contractor's revised, re-sequenced or optimized schedules, and agrees to make no claim for such.
5. Fragnet Submittals shall be provided in quadruplicate and within fourteen (14) days after a delay event, and/or with a Change Order Request (COR) in response to a CCD, RFP, or other documents issued by the Architect. In cases where the Contractor does not provide "Notice of Delay" and/or a Fragnet Submittal for a delay event within the specified time limits, then it is mutually agreed that the delay event has no time impact on the contract completion date (or interim milestones) and no time extension is required.
6. The Owner (or District) shall not be liable for any acceleration costs due to the Contractor's failure to comply with the contract requirements for requesting, documenting and demonstrating that a time extension is required for a delay event. The Contractor's obligation to timely perform per the schedule will not be excused until time extension requests are approved by the Architect. The BPS shall include delays for anticipated precipitation. Hence the duration for activities will not be adjusted, that is until the actual amount of precipitation days exceed the anticipated precipitation days indicated in the NOAA chart, and/or the resulting mud impacts affect the critical path of the schedule.
7. Upon mutual agreement by the Architect and Contractor, the Monthly Schedule Updates shall include the approved time extensions (if any). No delay events that are the subject of a float consumption request or a time extension request will be incorporated into the Monthly Schedule Update until approved by the Architect.
8. In the event of multiple delaying events, and upon approval through the time extension approval process, the delay events shall be updated into the current Monthly Schedule Update in the actual order of the delaying events.

L. Time Extensions For Unusually Severe Weather:
   1. General:
      a. "Inclement Weather": The Owner reserves the right to update Meteorological Data included in the NOAA Chart, so that it reflects the most accurate data for the project site, site conditions and locality.
      b. "Unusually Severe Weather" is more severe than the anticipated Inclement Weather for any given month.
      c. NOAA, is the National Oceanic and Atmospheric Administration
      d. "Mud" (aka Mud Days) shall be considered as muddy site conditions, which prohibit access to and around the project site, including access to the buildings. The Contractor shall understand that even if the anticipated normal precipitation were exceeded for a given month, not all Mud Days are eligible for time extensions. Only a portion of the actual Mud Days will be considered for a time extension, of which they will be the percentage of actual precipitation that are above and beyond the anticipated normal precipitation or "Inclement Weather": See "Unusually Severe Weather". Also, precipitation and Mud need to affect the activities on the critical path in order for them to impact the project schedule. If precipitation and Mud do not affect the critical path of the project, there is no effect to the project and such conditions are not eligible for time extensions. Differing site soil conditions and drainage patterns will create individual variations in how "Mud" affects the site and the progress of the Work. It is the Contractors obligation to become aware of the site soil conditions, drainage patterns, and other elements that may affect the resulting impacts due to Mud.
   2. The provisions herein specify the procedures for the determination of excusable time extensions for unusually severe weather. Inclement Weather, using the NOAA data (to be provided by the Contractor prior to first payment request and approved by the Architect -

"sample" NORMALS, MEANS AND EXTREMES data chart provided herein) and resulting Mud impacts due to anticipated precipitation, shall be scheduled into the schedule. In order for the Architect to award a time extension under this clause, the Contractor must satisfy the following conditions:

a. The Unusual Weather clause experienced at the project site during the affected contract period must be found to be Unusually Severe Weather, that is, more severe than the anticipated Inclement Weather and Mud for any given month.
b. The Unusually Severe Weather clause must actually cause a delay to the completion of the Contract. The delay must be beyond the control and without the fault of negligence of the Contractor.

3. The following "sample" schedule of anticipated monthly Inclement Weather is based on National Oceanic and Atmospheric Administration (NOAA) data for the Fresno Area and the schedule provided by the Contractor for the area where the project is located shall constitute the baseline for evaluating weather-related time extensions. The Contractor progress schedule must include the effect of anticipated Inclement Weather and Mud in all weather dependent activities. Further, the Contractor's bid shall include all costs for potential disruption as a result of anticipated Inclement Weather and Mud: Disruption to the project may involve cost and time impacts. The Contractor shall be responsible for all impacts resulting from the anticipated amount of Mud and Inclement Weather shown in the actual NOAA Meteorological Data Chart in the area where the project is located. Impacts include, but are not limited to, de-watering, mucking, temporary weather protection, gravel roadways, equipment downtime, etc.
4. Upon Notice-to-Proceed (NTP) and continuing through the Contract duration, the Contractor shall record on the Contractor Daily Reports, each occurrence of Inclement Weather and Mud, and the resulting impact to the progress of scheduled work. Each occurrence of Inclement Weather and Mud, must be verified and approved by the Inspector of Record. Inclement Weather days will be as defined by the following "sample" NOAA data and will be counted chronologically from the first to the last day of each month, with each daily incidence of "Inclement Weather" being counted as a whole day. Once the number of days of anticipated "Inclement Weather" and "Mud" are exceeded in a given month, the Contractor will become eligible for an excusable, non-compensable time extension for "Unusually Severe Weather." After anticipated "Inclement Weather" and "Mud" delays are exceeded, an "Unusually Severe Weather" delay day will occur when adverse weather prevents work on critical activities for more than fifty percent (50%) of the Contractor's scheduled work day. Upon experiencing critical path delays due to "Unusually Severe Weather," the Contractor shall seek a time extension from the Architect via the Change Order Request process. If the foregoing conditions are met, an excusable a non-compensable time extension will be granted. The Contractor will incorporate all approved Change order Request Submittals into the current Monthly Schedule Update.

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M. Meteorological Data Chart 1

EXAMPLE
Meteorological Data for Fresno, California
Normals, Means and Extremes

TEMPERATURE (degrees F)					PRECIPITATION***		FOG
	Normal		Extremes				
Month	Daily Max.	Daily Min.	Record Highest	Record Lowest	Mean* Number Calendar / Work	Normal (in)	Mean** Number Calendar / Work
					Days per Month		Days per Month
Jan	54.1	37.4	78	19	7.5/5.4	1.96	11.8/8.4
Feb	61.7	40.5	80	24	7.1/5.1	1.8	6.0/4.3
Mar	66.6	43.4	90	26	7.1/5.1	1.89	1.7/1.2
Apr	75.1	47.3	100	32	4.1/2.9	0.97	0.3/0.2
May	84.2	53.7	107	36	1.9/1.4	0.3	0.1/0.1
Jun	92.7	60.4	110	44	0.7/0.5	0.08	0.0/0.0
Jul	98.6	65.1	112	50	0.2/0.1	0.01	0.0/0.0
Aug	96.7	63.8	111	49	0.3/0.2	0.03	0.1/0.1
Sep	90.1	58.8	111	37	1.0/0.7	0.24	0.1/0.1
Oct	79.7	50.7	102	27	2.2/1.6	0.53	0.9/0.6
Nov	64.7	42.5	89	26	5.2/3.7	1.37	5.8/4.1
Dec	53.7	37.1	76	18	6.7/4.8	1.42	12.1/8.6
Year					44.1/31.5	10.6	38.8/27.7

Source: NOAA, National Oceanic and Atmosphere Administration.

* Precipitation of 0.01 inches or more.

** Heavy Fog visibility 1/4 mile or less.

*** Refer to the term Mud, for mud impacts.

Above data is subject to change, based upon the locality of the project. Contractor shall assemble the data and submit to The Architect for confirmation, review and modifications:

Obtain data from NOAA (828) 271-4800, or the Local Weather Office.
http://www.ncdc.noaa.gov

FRAGNET SUBMITTAL FORM

Date: _____ Fragnet No.: _____
From: Name of Contractor Sheet _____ of _____
To: Darden Architects, 6790 N. West Avenue, Fresno, CA 93711 (559) 448-8051

Description of Delay: By reference to attached schedule Fragnet, the following delay occurred:
_____
_____
_____

_____ Continued on Sheets ____ of ____
Time Extension Requested:_____ work days x 1.4 = _____ calendar days.
Time Requested for Activity:_____ Time Requested for Project:_____
Related Documents: The following construction documents provide evidence of the delay event:
RFI Nos.: _____ SI Nos.:_____
CCD Nos.: _____ RFP Nos.:
_____
Daily Reports Dated:_____ and attached.
Project Correspondence Dated:_____ and attached.
Other Documentation:_____

Schedule-Related Information: By reference to the attached Fragnet, provide the following:
Predecessor Activity to Fragnet: _____
Successor Activity to Fragnet: _____

Affected CPM Schedule Activities (list IDs and descriptions):
_____
_____
_____

NOTICE OF DELAY FORM

Date: _____
From: Name of Contractor Sheet _____ of _____
To: Darden Architects, 6790 N. West Avenue, Fresno, CA 93711 (559) 448-8051

Description of Delay: the following delay occurred:
_____
_____
_____
_____ Continued on Sheets ____ of ____

Related Documents: The following construction documents provide evidence of the delay event:
RFI Nos.: _____ SI Nos.: _____
CCD Nos.: _____ RFP Nos.: _____
Daily Reports Dated:_____ and attached.
Project Correspondence Dated:_____ and attached.
Other Documentation:_____

Affected CPM Schedule Activities (list IDs and descriptions):
_____
_____
_____

END OF SECTION

SECTION 01 32 26 – FORMS AND REPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor to provide all Forms and Reports as required by the Architect for Administrative Procedures and other related items necessary to document the Project as required by the Contract Documents, including but not limited to those forms provided under this specification section.

B. CalGREEN Forms:

1. Contractor shall provide all California Green Building Standards Code Certification Worksheets and other related items necessary to document the Project as required by the AHJ, including, but not limited to, those forms provided under this specification section.
    a. Obtain the latest documents from the California Building Standards Commission; revisions may have been made since the publication of this Project Manual.

C. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS
2. DIVISION 01 SPECIFICATION SECTIONS
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Forms and Reports as attached to this section when required by the Architect.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

A. Listing of Architect required Forms and Reports

1. 01 32 26.01-DAILY SUPERINTENDENT'S REPORT
2. 01 32 26.02-SUBCONTRACTOR'S DAILY REPORT
3. 01 32 26.03-SHOP DRAWING AND SUBMITTAL TRANSMITTAL
4. 01 32 26.04-REQUEST FOR INFORMATION (RFI)
5. 01 32 26.05-SUPPLEMENTAL INSTRUCTIONS (SI)
6. 01 32 26.06-REQUEST FOR PROPOSAL (RFP)
7. 01 32 26.07-CONSTRUCTION CHANGE DIRECTIVE (CCD)
8. 01 32 26.08-CHANGE ORDER REQUEST REVIEW (COR)
    a. (Review form provided by the Contractor is subject to review and comments by the Owner and Architect).
9. 01 32 26.09-CHANGE ORDER (CO)
10. 01 32 26.10-FRAGNET SUBMITTAL FORM
11. 01 32 26.11-APPLICATION FOR PAYMENT (AP)
12. 01 32 26.12-CONTRACTOR'S TESTING / INSPECTION REQUEST FORM
13. 01 32 26.13-CONTRACTOR'S "DEVIATION NOTICE" INSPECTION REPORT FORM

14. 01 32 26.14-CONTRACTOR'S FINAL INSPECTION REQUEST FORM
15. 01 32 26.15-CONTRACTOR'S PUNCHLIST INSPECTION REQUEST FORM
16. 01 32 26.16-CONTRACTOR'S PUNCHLIST
17. Periodic field reports issued by the Architect and Engineers.
18. Contractor's Punch List Response and Correction form is required for each Punch List Review report, citing the issuing Punch List Review format number(s).
19. Completed Contractor's Punch List and Final Inspection Reports issued by the Architect, Engineers and the Owner.
20. See the attached Forms and Reports suitable for reproduction by the Contractor or Subcontractor.

B. Listing of California Green Building Standards Code Certification Worksheets:
   1. WORKSHEET (WS-1) BASELINE WATER USE
   2. WORKSHEET (WS-2) WATER USE REDUCTION
   3. CONSTRUCTION WASTE MANAGEMENT (CWM) PLAN
   4. CONSTRUCTION WASTE MANAGEMENT (CWM) WORKSHEET
   5. CONSTRUCTION WASTE MANAGEMENT (CWM) ACKNOWLEDGMENT

END OF SECTION

GENERAL CONTRACTOR'S
DAILY SUPERINTENDENT'S REPORT

(JOB NO./REPORT NO.) (DATE/DAY)

(JOB NAME) WEATHER DESCRIPTION

(WORK SHIFT) / FROM / TO (PROJECT MANAGER/SUPERINTENDENT)

PM/	ENGR/	CARPENTERS			LABORERS		CEM FINISHERS			OPER ENGR			
SUPT	TK	FMAN	JRMAN	APP	FMAN	LAB	FMAN	JRMAN	APP	JRMAN	APP	OTHER	TOTAL

CONCRETE: CY TODAY:_____ LOCATION: _____ CY TO DATE: _____

WORK SUMMARY:

DELAYS / WORK RELEASED BY OWNER:

CHANGE ORDERS / EXTRA WORK ORDERS:

INSTRUCTIONS FROM ARCHITECT / OWNER:

MATERIALS / EQUIP. DELIVERED TO JOB:

INSPECTIONS / TESTS PERFORMED

SAFETY / ACCIDENTS:

MAJOR EQUIP. ON SITE:

BACKSIDE OF GENERAL CONTRACTOR'S REPORT

SUBCONTRACTORS ON JOB	NO. OF MEN	FOREMAN'S NAME	WORK DESCRIPTION / LOCATION

MAJOR EQUIPMENT ON SITE:

BACK CHARGES:

REMARKS:

SUBCONTRACTOR'S
DAILY REPORT

PROJECT: DATE:

SHIFT TIME FOREMAN: WEATHER:

WORK DESCRIPTION AND LOCATION:

SUB-SUBCONTRACTOR	CREW SIZE	CRAFT	WORK DESCRIPTION / LOCATION

DELAYS:

CHANGE ORDERS / EXTRA WORK ORDERS:

INSTRUCTIONS RECEIVED FROM GC:	TESTS / INSPECTIONS PERFORMED:
MATERAL / EQUIPMENT DELIVERIES:	MAJOR EQUIPMENT ON SITE:

SAFETY / ACCIDENTS:

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SHOP DRAWING AND SUBMITTAL TRANSMITTAL

DESCRIPTION: **SUBMITTAL NO.:**

SPEC SECTION:

ARCHITECT:
Darden Architects
6790 N. West Ave
Fresno, California 93711

PROJECT:

CONTRACTOR:

SUPPLIER:

Substitution: **Yes:** ☐ **DSA Approval Req'd**

DATE RECEIVED: **NO. RECEIVED:** **DATE RETURNED:**

Contractor Remarks:

Other Required Information: CPM Activity / Submittal Task No.:

Early Start (ES) Date: Late Finish (LF) Date:

WARRANTY: ☐ **O and M MANUALS** ☐ Early Finish (EF) Date: Scheduled Float Time: 0

DESIGN CONSULTANT'S REVIEW:

TRANSMITTED BY ARCHITECT TO: DATE RETURNED:

DATE SENT:

NO. SENT:

Consultants Remarks:

ACTION:

☐ NO EXCEPTION TAKEN RELATIVE TO DESIGN
☐ NO EXCEPTION TAKEN WITH MODIFICATION NOTED
☐ AMEND AS NOTED AND RESUBMIT
☐ REJECTED AND RESUBMIT
☐ SEE ATTACHED LETTER

ARCHITECT'S REVIEW:

Architects Remarks:

ACTION:

☐ NO EXCEPTION TAKEN RELATIVE TO DESIGN
☐ NO EXCEPTION TAKEN WITH MODIFICATION NOTED
☐ AMEND AS NOTED AND RESUBMIT
☐ REJECTED AND RESUBMIT

Approved Substitution ☐

COPIES TO:

DATE RETURNED:

Contractor: **Owner:** **Inspector:** **File:** **Other:**

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6790 N. West Avenue
Fresno, California 93711
Tel: 559.448.8051
Fax: 559.446.1765
www.dardenarchitects.com

REQUEST FOR INFORMATION

RFI No.:

To: **Darden Architects**
6790 N. West Ave
Fresno, California 93711

Date:

Respond By:

Attn:

Architect Project No.

DSA/HCAI Review Required **Yes** ☐ **No** ☐ **Apprd** ☐

Project:

INFORMATION REQUESTED:

Cost Impact: _____ Signature: _____

Schedule Impact: _____ Days Pages Attached: _____

Trade/Contractor: Schedule Task No/Item:

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.

If the Contractor considers that this supplemental instruction requires a change in the Contract Sum or Contract Time, the Contractor shall not proceed with this Work and shall promptly submit an itemized proposal to the Architect for doing this work. If your proposal is found to be satisfactory and in order, this supplemental instruction will be superseded by a Construction Change Directive.

Refered To: Refered Date: Return Date:

SUPPLEMENTAL INSTRUCTIONS:

Consultant : _____ Architect _____

Date: _____ Date _____

Copy: ☐ Owner ☐ Inspector ☐ Testing Lab ☐ Structural ☐ Mech. ☐ Elec ☐ File ☐ Other Pages Attached: _____

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www.dardenarchitects.com

SUPPLEMENTAL INSTRUCTIONS

PROJECT:

SUPPL. INST. NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACT DATE:

NOTICE TO PROCEED:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
HCAI No.:

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.

If the Contractor considers that this supplemental instruction requires a change in the Contract Sum or Contract Time, the Contractor shall not proceed with this Work and shall promptly submit an itemized proposal to the Architect for doing this work. If your proposal is found to be satisfactory and in order, this supplemental instruction will be superceded by a Construction Change Directive.

Description:

Trade/Contractor:

Schedule Task No/Item:

Attachments:

Darden Architects, Inc.

Issued By:

Architect

☐ **OWNER** ☐ **CONTRACTOR** ☐ **INSPECTOR** ☐ **TESTING LAB** ☐ **STRUCTURAL** ☐ **MECHANICAL** ☐ **ELECTRICAL** ☐ **OTHER**

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Fax: 559.446.1765
www.dardenarchitects.com

REQUEST FOR PROPOSAL

PROJECT:

REQUEST FOR PROPOSAL NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACT DATE:

NOTICE TO PROCEED:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
HCAI No.:

Please submit an itemized proposal for change in the Contract Sum and Contract Time for proposed modifications to the Contract Documents described herein. Submit proposal promptly or notify the Architect in writing of the date on which you anticipate submitting your proposal.

This is not a Change Order, Construction Change Directive, or a direction to proceed with the Work described in the proposed modifications.

Description:

Attachments

Darden Architects, Inc.

ISSUED BY:

Architect

☐ **OWNER** ☐ **CONTRACTOR** ☐ **ARCHITECT** ☐ **CONSULTANT** ☐ **INSPECTOR** ☐ **OTHER**

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CONSTRUCTION CHANGE DIRECTIVE

PROJECT:

DIRECTIVE NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACT DATE:

NOTICE TO PROCEED:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
HCAI No.:

You are hereby directed to make the following change(s) in this Contract:

CONTRACT ADJUSTMENT

1. The proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price is:

- ☐ Lump Sum
- ☐ Unit Price of
- ☐ As provided for in General Conditions and the Supplemental Conditions of the contract.
- ☐ As Follows:

2. The Contract Time is proposed to (be adjusted) . The proposed adjustment, if any, is increase of _____ days)

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Signature by the Contractor indicates the Contractor's agreement with the proposed adjustments in Contract Sum and Contract Time set forth in this Construction Change Directive.

ARCHITECT	OWNER	CONTRACTOR
Darden Architects		
6790 N. West Ave		
Fresno, California 93711		
By:	By:	By:
Date:	Date:	Date:

☐ **OWNER** ☐ **CONTRACTOR** ☐ **ARCHITECT** ☐ **CONSULTANT** ☐ **INSPECTOR** ☐ **OTHER**

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CHANGE ORDER REQUEST REVIEW

PROJECT:

CHANGE ORDER REQUEST NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
HCAI No.:

DESCRIPTION OF PROPOSED CHANGE:

Requested By:

Scope:

Necessary for:

DESIGN CONSULTANT'S REVIEW:

Date Sent:
Referred To:
Date Returned:

ACTION:

- ☐ NO EXCEPTION TAKEN RELATIVE TO COST
- ☐ NO EXCEPTION TAKEN RELATIVE TO TIME
- ☐ AMEND AS NOTED AND RESUBMIT
- ☐ REJECTED

Consultants Remarks

ARCHITECT'S REVIEW:

Date Returned:

ACTION:

- ☐ NO EXCEPTION TAKEN RELATIVE TO COST
- ☐ NO EXCEPTION TAKEN RELATIVE TO TIME
- ☐ AMEND AS NOTED AND RESUBMIT
- ☐ REJECTED

Architects Remarks:

Attachments:

REVIEWED:

Darden Architects
6790 N. West Ave
Fresno, California 93711

APPROVED:

Darden Architects : **Date :**

Owner : **Date :**

The Architect is hereby directed to instruct the Contractor to make the above changes in the Project and to include these changes in a subsequent Change Order:

☐ **OWNER** ☐ **CONTRACTOR** ☐ **INSPECTOR** ☐ **STRUCTURAL** ☐ **MECHANICAL** ☐ **ELECTRICAL** ☐ **OTHER**

CHANGE ORDER REQUEST NO.

Project Architect's Project No.:

CHANGE ORDER REQUEST- BREAKDOWN WORKSHEET

WORK DELETED:

Contractor				
Materials	$0.00			
Equipment	$0.00			
Labor	$0.00			
Material, Equipment, & Labor		$0.00		
TOTAL:				**$0.00**

ADDITIONAL WORK PERFORMED BY SUB-CONTRACTOR

Sub-Contractor				
Materials	$0.00			
Equipment	$0.00			
Labor	$0.00			
Material, Equipment, & Labor		$0.00		
Overhead		$0.00		
Profit		$0.00		
Sub Total:			$0.00	
Contractor				
Overhead			$0.00	
Profit			$0.00	
TOTAL:				**$0.00**

ADDITIONAL WORK PERFORMED BY CONTRACTOR

Contractor				
Materials	$0.00			
Equipment	$0.00			
Labor	$0.00			
Material, Equipment, & Labor		$0.00		
Overhead		$0.00		
Profit		$0.00		
TOTAL:				**$0.00**

TOTAL COST: $0.00

TOTAL COST:	$0.00
TOTAL DAYS:	0

ARCHITECTURAL ADMINISTRATIVE FEES:

Proposal Request Administration	$0.00
Construction Administration	$0.00
TOTAL:	$0.00
DSA Fees:	$0.00

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www.dardenarchitects.com

CHANGE ORDER

PROJECT:

CHANGE ORDER NO.:

DATE OF ISSUANCE:

OWNER:

CONTRACT DATE:

NOTICE TO PROCEED:

CONTRACTOR:

Architect Project No.:
DSA Appl. No.:
DSA File No.:
OPSC Appl. No.:
HCAI No.:

The Contract is changed as follows:

Description:

It is mutually agreed that the affixed signature to this Change Order is evidence that all compensation with respects to the changes defined herein have been satisfied with the execution of this document. Furthermore, no additional compensation either monetarily or via time extension to this contract will be sought in respect to this Change Order.

The Original Contract Sum and Contract Completion Date:		
Net change (Contract Sum and Contract Time) by previous Change Orders:		days
Contract Sum and Contract Completion Date prior to this Change Order:		
Contract Sum and Contract Time (increased or decreased) by this Change Order:		days
New Contract Sum and Contract Completion Date including this Change Order:		

CONTRACTOR	ARCHITECT	OWNER
	Darden Architects	
	6790 N. West Ave	
	Fresno, California 93711	
By:	By:	By:
Date:	Date:	Date:

☐ OWNER ☐ CONTRACTOR ☐ ARCHITECT ☐ CONSULTANT ☐ INSPECTOR ☐ OTHER

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FRAGNET SUBMITTAL FORM

Date: _____ Sheet _____ of _____

From: _____ Fragnet No.: _____

To: Darden Architects, Inc.

Description of Delay: By reference to attached schedule fragnet, the following delay occurred:

_____

_____

_____

Continued on Sheets _____ of _____

Time Extension Requested: _____ wds, _____ cds.

Time Requested for Activity: Time Requested for Project:

Related Documents: The following construction documents provide evidence of the delay event:

RFI Nos.: _____ SI Nos.: _____

CCD Nos: _____ RFP Nos.: _____

Daily Reports Dated: _____ and attached.

Project Correspondence Dated: _____ and attached.

Other Documentation: _____

Schedule-Related Information: By reference to the attached fragnet, provide the following:

Predecessor Activity to Fragnet:

Successor Activity to Fragnet:

Affected CPM Schedule Activities (list IDs and descriptions):

_____

_____

New CPM Schedule Activities (list IDs and descriptions):

_____

_____

END OF FORM

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APPLICATION FOR PAYMENT

To:
DARDEN ARCHITECTS, INC.
6790 N. West Avenue
Fresno, CA 93711

Project: _____

Bid Package No. _____

FROM _____
Prime Contractor

Address: _____

Phone: _____

Pay Application No.: _____

Application Date: _____

Period Ending: _____

Distribution to:
Owner: _____
Architect: _____
Contractor: _____
Const Mgr.: _____
Inspector: _____

CONTRACTOR'S APPLICATION FOR PAYMENT

CHANGE ORDER SUMMARY		
APPROVED CHANGE ORDERS:		
Change Order No.:	Approved Date:	Amount:
		$
		$
		$
		$
		$
		$
		$
		$
TOTALS		
Net change by Change Order		$

The undersigned Contractor certifies that in the best of his knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the contractor for work for which previous Certificates for Payment were issued and payment received from the Owner and that current payment show herein is now due.

Contractor:

_____ **DATE:** _____

The present status of the account for this Contract is as follows:

ORIGINAL CONTRACT SUM	$
Net Change by Change Orders	$
CONTRACT SUM TO DATE:	$
TOTAL COMPLETE & STORED TO DATE:	$
RETAINAGE:_____%:	$
TOTAL EARNED LESS RETAINAGE:	$
LESS STOP NOTICE(S):	$
LESS PREVIOUS PAYMENT:	$
CURRENT PAYMENT DUE:	$

This Certificate is not negotiable. This AMOUNT CERTIFIED is payable only to the Contractor named herein, issuance, payment and acceptance of payment, are without prejudice to any rights of the Owner or Contractor under this contract.

CONTRACTOR: _____ DATE: _____

CONSTRUCTION MANAGER: _____ DATE: _____

INSPECTOR: _____ DATE: _____

ARCHITECT: _____ DATE: _____

INTENTIONALLY LEFT BLANK

CONTRACTOR'S TESTING / INSPECTION REQUEST FORM

PROJECT: _____

DATE RECEIVED: _____ (by Inspector)

TIME RECEIVED: _____ (by Inspector)

BUILDING: _____

SITE/OFFSITE: _____

CONSTRUCTION PHASE (1, 2, 3, etc.): _____

SPECIFICATION SECTION (No.): _____

PLAN SHEET AND DETAIL: _____

SCOPE OF WORK: _____

(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____

(contractor name)

LOCATION (bldg., room, floor, wall, ceiling, etc.) _____

_____

_____

TYPE OF INSPECTION (concrete, framing, welding, masonry, electrical, etc.) _____

_____

_____

INSPECTION REQUESTED ON: _____ at _____ am/pm

(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the Testing / Inspection is Requested to Begin.

_____

PRINT NAME AND TITLE OF PERSON REQUESTING INSPECTION

_____

SIGNATURE OF PERSON REQUESTING INSPECTION

Note 2: Contractor Must Accompany Inspector on Inspection, if Requested.

PASSED: _____ FAILED: _____

Note 3: See Attached Sheet for Explanation if Inspection Failed. Re-inspection Required.

INSPECTOR SIGNATURE: _____ Date: _____

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CONTRACTOR'S "DEVIATION NOTICE" INSPECTION REQUEST FORM

PROJECT: _____

DATE RECEIVED: _____ (by Inspector)

TIME RECEIVED: _____ (by Inspector)

DEVIATION NOTICE(S) (No.): _____

BUILDING: _____

SITE/OFFSITE: _____

CONSTRUCTION PHASE (1, 2, 3, etc.): _____

SPECIFICATION SECTION (No.): _____

SCOPE OF WORK: _____

(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____

(contractor company name)

LOCATION(S) OF WORK FOR INSPECTION (be specific- bldg.(s), room(s), etc.)

_____

_____

INSPECTION REQUESTED ON: _____ at _____ am/pm

(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the "Deviation Notice" Inspection is Requested to Begin.

_____

PRINT NAME OF PERSON REQUESTING DEVIATION NOTICE INSPECTION

_____

SIGNATURE OF PERSON REQUESTING DEVIATION NOTICE INSPECTION

Note 2: Contractor Must Accompany Project Inspector on "Deviation Notice" Inspection, if Requested.

Note 3: See Attached "Deviation Notice" for Inspector's Comments and/or Date Completed.

PASSED: _____ FAILED: _____

PROJECT INSPECTOR SIGNATURE: _____

DATE: _____

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CONTRACTOR'S FINAL INSPECTION REQUEST FORM

PROJECT: _____

DATE RECEIVED: _____ (by Inspector)

TIME RECEIVED: _____ (by Inspector)

BUILDING: _____

SITE/OFFSITE: _____

CONSTRUCTION PHASE (1, 2, 3, etc.): _____

SPECIFICATION SECTION (No.): _____

SCOPE OF WORK: _____

(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____

(contractor company name)

INSPECTION REQUESTED ON: _____ at _____ am/pm

(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the Final Inspection is Requested to Begin. Contractor to be Notified by the Construction Manager in Regards to the Actual Date and Time of the Final Inspection.

_____

PRINT NAME AND TITLE OF PERSON REQUESTING FINAL INSPECTION

_____

SIGNATURE OF PERSON REQUESTING FINAL INSPECTION

Note 2: Contractor Must Accompany Project Inspector, Architect and/or Engineer(s) on Final Inspection, if Requested.

PASSED: _____ FAILED: _____

Note 3: If the Final Inspection Fails Re-Inspection is Required. See Attached Sheet for Comment(s).

PROJECT INSPECTOR SIGNATURE: _____

DATE: _____

PROJECT ARCHITECT SIGNATURE: _____

DATE: _____

INTENTIONALLY LEFT BLANK

CONTRACTOR'S PUNCHLIST INSPECTION REQUEST FORM

PROJECT: _____

DATE RECEIVED: _____ (by Inspector)

TIME RECEIVED: _____ (by Inspector)

BUILDING: _____

SITE/OFFSITE: _____

CONSTRUCTION PHASE (1, 2, 3, etc.): _____

SPECIFICATION SECTION (No.): _____

SCOPE OF WORK: _____

(concrete, electrical, etc.)

INSPECTION REQUESTED BY: _____

(contractor company name)

LOCATION(S) OF WORK FOR INSPECTION: (be specific- bldg.(s), room(s), etc.)

_____

_____

DESCRIPTION OF WORK TO BE INSPECTED: (item number(s) from punchlist)

_____

_____

INSPECTION REQUESTED ON: _____ at _____ am/pm

(date) (time)

Note 1: A Minimum Notice of 48 hours is Required to be Received by the Inspection Officer Prior to the Time the Punchlist Inspection is Requested to Begin.

_____

PRINT NAME OF PERSON REQUESTING PUNCHLIST INSPECTION

_____

SIGNATURE OF PERSON REQUESTING PUNCHLIST INSPECTION

Note 2: Contractor Must Accompany Project Inspector on Punchlist Inspection, if Requested. Items Must Have Already Been Signed Off by Contractor.

Note 3: Attached Sheet for Contractor's Signoff and/or Inspector's Comments and/or Date Completed for the Specific Punchlist Items Noted Above.

Note 4: This Inspection is NOT A FINAL INSPECTION but Only an Acknowledgement That a Particular Item(s) is/are completed.

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PROJECT: _____ - CONTRACTOR'S PUNCHLIST

CONTRACTOR NAME: _____ Page _____ of _____

ITEM NO.	DESCRIPTION	BUILDING & ROOM NO.	FLOOR	CEILING	WALLS N. S. E. W.	DATE OBSERVED	SIGNOFF/ COMMENTS

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SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely provide all required submittals and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Contractor's responsibilities:

1. The Contractor shall check, verify, and be responsible for all field measurements.
2. The Contractor shall submit a schedule indicating when the required shop drawings and submittals will be submitted to the Architect.
    a. Submit schedule within the amount of days as indicated in Specification Section - CONSTRUCTION SCHEDULES.
3. Submit copies as scheduled below, checked and approved by the Contractor for all submittals required for the work of the various trades. Deliver submittals promptly to avoid delays in delivery of materials or execution of the work.
    a. The Contractor (or Subcontractor) shall mark-up the submittals as to project specifics. If the specifications contains a schedule prepared by the Architect (i.e. paint symbols such as DW-1, M-1, CB-1, etc., or tile symbols such as CT-1, CT-2, or IWA, IWB, IWC, etc.), then the submittal will also contain those designations. Submittals without project specifics will be returned to the Contractor as not being properly prepared.
    b. The Contractor shall stamp the Submittals utilizing any language requested by the Owner in the General Conditions and the following minimum language:

"This submittal has been reviewed by (Name of Contractor) and approved with respect to the means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incidental thereto. The Contractor has reviewed and approved not only the field dimensions, but the construction criteria, and has also made written notation regarding any information in the Shop Drawings that does not conform to the Contract Documents. The Contractor has reviewed this submittal and coordinated with all other Shop Drawings received to date by the Contractor and this duty of coordination has not been delegated to subcontractors, material suppliers, the Architect, or the design consultants on this project. The Contractor shall also have indicated that it has not relied upon the dimensions shown on the drawings, specifications and schedules, and that the Contractor has double-checked all dimensions for accuracy and fit. (Name of Contractor) also warrants that this submittal complies with the Contract Documents and comprises no variation thereto."

By: _____ Contractor's Signature

_____Contractor's Typed Name

Date: _____

    c. Substitutions on shop drawings or in product submittals will not be considered without prior approval in accordance with Specification Section - SUBSTITUTION PROCEDURES. Submittals containing unacceptable items will be rejected.
    d. The Contractor shall make any corrections required by the Architect during the Architect's initial review, and re-submit the required corrected copies for final review and distribution.

B. Architect's responsibilities:

1. The Architect will make any desired corrections with reasonable promptness, and return the submittal to the Contractor.
2. The Architect's review of such drawings or schedules shall not relieve the Contractor of responsibility for deviations from the drawings or specifications, unless he has, in writing, called the Architect's attention to such deviations at the time of submission, and secured written acceptance.
    a. The Architect's review shall be for general conformance with the design concept for the project and general compliance with the information given in the Contract Documents.
    b. The Architect's review shall not be construed as an "approval," or to relieve the Contractor(s) and material suppliers of responsibility for errors or omissions in the submitted documents.
    c. Modifications or comments made on the submittals or shop drawings during this review do not relieve the Contractor from compliance with the requirements of the drawings and specifications.
    d. Acceptance of a specific item does not include acceptance of the assembly of which the item is a component.

C. The following list of items, definitions and required quantities is a minimum required for this project. Verify with FACILITY SERVICES SUBGROUP sections for additional quantities required within those divisions.
1. Product Data: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, other product information, color choices and/or manufacturer's catalog sheets shall be specially prepared for the Project (marked-up with project specifics) and shall be submitted in sequential sets for each category of work:
    a. Quantity:
        1) Unless otherwise indicated in the Contract Documents, provide Six (6) sets.
    b. Material Safety Data Sheets (MSDS): MSDS are not required, but it is recognized that applicable federal and state laws require the submission of these data sheets to an Owner. MSDS shall be turned over to the Owner (without review by the Architect or it's consultants) in compliance with federal and state laws.
2. Shop Drawings: Newly prepared information, drawn to accurate scale, consisting of drawings, diagrams, schedules, and other data specifically prepared for the Project by the Contractor, a Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Project. Do not reproduce Contract Documents or copy Standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
    a. Quantity: Provide One (1) reproducible original (vellum, sepia or mylar) and Three (3) opaque (blue-line or black-line xerographic) prints for each sheet or detail.
        1) The contractor shall receive the marked-up reproducibles and copy the required number of sets to the subcontractor, manufacturer's and/or material suppliers.
    b. Contractor's use of Architect's Electronic CAD Files.
        1) Upon written request by Contractor, copies of the Architect's electronic CAD files may be available for Contractor's use in connection with this Project.
            a) Contractor's written request shall be on the Architect's "Contractor's Document Usage Agreement for Requested Documents" and may include an additional Architect's Consultant's Agreements, outlining conditions for providing files.
            b) Contractor's request shall be limited to drawings directly applicable to the Shop Drawings the Contractor wishes to create for submittal.
            c) Contractor shall pay the Architect for work incurred for providing the requested files. Payment shall be submitted with the request.
        2) The Architect's electronic CAD files are limited to files that already exist and that not all files may be available at the Architect's and Architect's Consultant's discretion.
        3) The Architect's electronic CAD files are not part of the Contract Documents and have limitations to the accuracy, incorporating modifications, CAD system formats, CAD entity attributes and layering.

4) The Architect's electronic CAD files have restrictions on Contractor's use, transmittal and delivery of files.

3. Samples: Physical examples specially prepared for the Project (marked-up with project specifics) which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
   a. Quantity:
      1) Unless otherwise indicated in the Contract Documents, provide Four (4) sets.
   b. Color samples shall be submitted on 8-1/2" x 11" cards for all colors scheduling paint types specified utilizing the paint symbols designated by the Architect in the drawings and specifications.
   c. Manufactured devices or equipment items:
      1) Quantity: One (1) sample, returned to supplier and which, when approved, may be incorporated into the Project.
4. Quality Assurance/Control submittals: Consists of design data, test reports, certificates, manufacturers instructions, and /or manufacturer's field reports.
   a. Quantity:
      1) Unless otherwise indicated in the Contract Documents, provide Six (6) sets.
5. Closeout submittals: Maintenance data, operating manuals, project documents, engineering calculations, and/or warranties shall be submitted when required in the various specification sections:
   a. Quantity:
      1) Unless otherwise indicated in the Contract Documents, provide Two (2) sets.
6. Field Samples: Sample panels of in place construction, or selected area of completed substrates or work showing the anticipated compliance with specified characteristics in order to establish a standard of quality.
   a. Quantity:
      1) See specific specification section requirements.
7. Mockups: Full-sized erected assemblies, used for coordination purposes or for testing in a laboratory, or required for approval in a finish form before the actual Project construction begins.
   a. Quantity:
      1) See specific specification section requirements.

D. Substitution, Dispute or Claim Submittals:
   1. Any substitution, dispute or claim submittals relating to this contract, or any Contract breach, which are not disposed of by agreement shall be promptly submitted in accordance with the GENERAL CONDITIONS, as a claim to and decided by the Architect who shall issue a written decision on the dispute.
   2. Adequate supporting data shall include, but is not limited; a statement of the reasons for the asserted entitlement, the certified payroll, invoice for material and equipment rental, and an itemized breakdown of any adjustment sought.
   3. If no "SUBMISSION UNDER PENALTY OF PERJURY" clause is provided within the GENERAL CONDITIONS, then the Contractor shall certify, at the time of submission of a substitution, dispute or claim, as follows:

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SUBMISSION UNDER PENALTY OF PERJURY

I _____, being the _____(Must be an officer), declare under penalty of perjury under the laws of the State of California, and do personally certify and attest that: I have thoroughly reviewed the attached substitution, dispute or claim for additional compensation and/or extension of time, and know its contents, and said claim is made in good faith; the supporting data is truthful and accurate; that the amount required accurately reflects the contract adjustment for which the Contractor believes the Owner is liable; and further, that I am familiar with California Government Code Section 12650, et seq, pertaining to false claims, and further know and understand that submission of certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.

By: _____ Contractor's Signature

_____ Contractor's Typed Name

Date: _____

Submission of a substitution, dispute or claim, properly certified, with all required supporting documentation, and written rejection or denial or all or part of the claim by Owner, is a condition precedent to any action, proceeding, litigation, suit or demand for arbitration by Contractor.

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PART 2 - PRODUCTS
NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

A. The following schedule was prepared to assist the Contractor in knowing the required submittals for this project, but may not be complete. Specific submittal information as to what is required is contained within the individual specification sections and those individual sections shall govern in the event of a question.

B. SUBMITTAL SCHEDULE

1. 01 11 13 - SUMMARY OF WORK
   a. QUALITY ASSURANCE/ CONTROL SUBMITTALS
2. 01 25 00 - SUBSTITUTION PROCEDURES
   a. SUBSTITUTION REQUEST FORMS
3. 01 29 73 - SCHEDULE OF VALUES
   a. SCHEDULE OF VALUES
4. 01 32 16 - CONSTRUCTION SCHEDULES
   a. CONSTRUCTION SCHEDULE, SHOP DRAWING SUBMITTAL SCHEDULE, CRITICAL PATH SCHEDULES, FRAGNETS.
5. 01 32 26 - FORMS AND REPORTS
   a. AS REQUIRED BY THIS SPECIFICATION SECTION AND OTHER SPECIFICATION SECTIONS.
6. 01 33 00 - SUBMITTAL PROCEDURES
   a. SHOP DRAWING AND SUBMITTAL SCHEDULE, COLOR SAMPLES OF ALL FINISH MATERIALS FOR COLOR BOARD SELECTION.
7. 01 45 29 - TESTING LABORATORY SERVICES
   a. TESTING SCHEDULE, TEST REPORTS
8. 01 77 20 - PROJECT CLOSEOUT
   a. ANOTATED CONTRACTOR'S AND ARCHITECT'S PUNCH LIST. ALL OPERATIONAL DATA, ALL MAINTENANCE MANUALS, ALL EXTRA MATERIALS.
9. 01 78 36 - WARRANTIES
   a. ALL GUARANTEES AND WARRANTIES
10. 01 78 39 - PROJECT DOCUMENTS
    a. PROJECT "AS-BUILT" DOCUMENTS, PROJECT "RECORD" DOCUMENTS AND PROJECT "CERTIFICATION" DOCUMENTS.
11. 03 15 14 - DRILLED ANCHORS
    a. PRODUCT DATA, ICC EVALUATION SERVICE REPORTS, DSA APPROVAL LETTERS.
12. 03 20 00 - REINFORCEMENT
    a. SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
13. 03 30 00 - CAST-IN-PLACE CONCRETE
    a. PRODUCT DATA, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
14. 04 22 00 - CONCRETE MASONRY UNITS
    a. SAMPLES, COLOR SAMPLES, PRODUCT DATA CERTIFICATION.
15. 05 12 00 - STEEL AND FABRICATIONS

a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.

16. 06 10 00 - ROUGH CARPENTRY
    a. PRODUCT DATA, CERTIFIACTES OF COMPLIANCE, AND WARRANTIES.
17. 06 41 23 - MODULAR CASEWORK
    a. SHOP DRAWINGS, MANUFACTURER'S SPECIFICATIONS, COLOR SAMPLES, MOCK-UP, WI CERTIFICATION.
18. 07 21 00 - INSULATION
    a. PRODUCT DATA, INSTALLATION INSTRUCTIONS, CLOSEOUT SUBMITTALS.
19. 07 51 13 - BUILT-UP ROOFING
    a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
20. 07 60 00 - SHEET METAL
    a. SHOP DRAWINGS
21. 07 72 00 - ROOF ACCESSORIES
    a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES AND WARRANTIES.
22. 07 92 00 - SEALANTS
    a. PRODUCT DATA, COLORS AND WARRANTIES.
23. 08 11 00 - METAL DOORS AND FRAMES
    a. PRODUCT DATA AND SHOP DRAWINGS.
24. 08 15 13 - LAMINATE-FACED WOOD DOORS
    a. PRODUCT DATA AND SHOP DRAWINGS.
25. 08 41 00 - STOREFRONTS
    a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
26. 08 70 00 - HARDWARE
    a. HARDWARE SCHEDULE AND CERTIFICATES.
27. 08 80 00 - GLASS
    a. PRODUCT DATA, MATERIALS LIST, SAMPLES AND CERTIFICATES.
28. 09 22 16 - METAL FRAMING
    a. PRODUCT DATA (INCLUDING INSTALLATION METHODS) AND MATERIALS LIST.
29. 09 24 00 - CEMENT PLASTER
    a. PRODUCT DATA (INCLUDING INSTALLATION METHODS) AND MATERIALS LIST.
30. 09 29 00 - GYPSUM BOARD
    a. PRODUCT DATA, FASTENING SCHEDULE AND SAMPLES.
31. 09 30 00 - TILE
    a. PRODUCT DATA, COLORS, SAMPLES, CERTIFICATES, MAINTENANCE MATERIAL AND WARRANTIES.
32. 09 51 00 - ACOUSTICAL CEILINGS
    a. ACOUSTICAL TILE SAMPLES, SUSPENSION SYSTEM SAMPLES AND DSA APPROVED CEILING BRACING DRAWINGS.
33. 09 65 10 - RESILIENT BASE AND ACCESSORIES
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
34. 09 65 16 - RESILIENT SHEET
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
35. 09 65 19 - RESILIENT TILE
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.

36. 09 68 40 - CARPET
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
37. 09 72 00 - WALL COVERINGS
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
38. 09 91 00 - PAINTING
    a. PRODUCT DATA, MATERIALS LIST, COLORS, MAINTENANCE INFORMATION AND WARRANTIES.
39. 10 05 00 - MISCELLANEOUS SPECIALTIES
    a. PRODUCT DATA, COLORS AND SAMPLES (WHERE APPLICABLE) FOR ALL ITEMS.
40. 10 11 00 - VISUAL DISPLAY BOARDS
    a. PRODUCT DATA AND SAMPLE COLORS.
41. 10 14 00 - IDENTIFYING DEVICES
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
42. 10 14 53 - ROAD AND PARKING SIGNAGE
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
43. 10 21 13 - TOILET PARTITIONS
    a. PRODUCT DATA, SHOP DRAWINGS, CERTIFICATES AND COLORS.
44. 10 26 00 - WALL AND CORNER GUARDS
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
45. 10 28 13 - TOILET ACCESSORIES
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
46. 10 44 00 - FIRE PROTECTION SPECIALTIES
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
47. 11 66 00 - ATHLETIC EQUIPMENT
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
48. 11 68 00 - PLAYFIELD EQUIPMENT
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
49. DIV 21 - FIRE SUPPRESSION SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
50. DIV. 22 - PLUMBING SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
51. DIV. 23 -HEATING, VENTILATING AND AIR CONDITIONING SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
52. DIV. 25- INTEGRATED AUTOMATION SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
53. DIV. 26- ELECTRICAL SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
54. DIV. 27 -COMMUNICATIONS SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.

55. DIV. 28- ELECTRONIC SAFETY AND SECURITY SECTIONS
    a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
56. 31 20 00 - EARTHWORK
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES, AND DRAWINGS SHOWING KNOWLEDGE OF THE EXTENT OF ENGINEERED PADS.
57. 32 12 00- PAVEMENT
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.
58. 32 80 00- LANDSCAPE IRRIGATION
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.
59. 33 40 00- STORM DRAINAGE
    a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES.

END OF SECTION

SECTION 01 35 16 – ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Coordinate the work of trades and schedule elements of alterations and renovation work by procedures and methods to expedite completion of the work.

C. In addition to demolition specifically shown, cut, move or remove items as necessary to provide access or to allow alterations and new work to proceed. Include such items as:

1. Repair or removal of hazardous or unsanitary conditions.
2. Removal of abandoned items and items serving no useful purpose, such as abandoned piping, conduit and wiring.
3. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals and deteriorated concrete.
4. Cleaning of surfaces, and removal of surface finishes as needed to install new work and finishes.

D. Patch, repair and refinish existing items to remain, to the specified condition for each material, with a smooth and clean transition to adjacent new items of construction.

E. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 02 41 19 SELECTIVE DEMOLITION
4. 31 11 00 SITE CLEARING
5. 04 22 00 CONCRETE MASONRY UNITS
6. 08 11 00 METAL DOORS AND FRAMES
7. 09 24 00 CEMENT PLASTER
8. 09 29 00 GYPSUM BOARD
9. 09 50 00 ACOUSTICAL CEILINGS
10. 09 91 00 PAINTING
11. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

PART 2 - PRODUCTS

2.1 MATERIALS (Products for Patching, Extending and Matching):

A. Provide same products or types of construction as that in existing structure as needed to patch, extend or match existing.

B. The Contract Documents will not typically define products or standards of workmanship present in existing construction; determine products by inspection and necessary testing, and determine quality of workmanship by using existing as a sample for comparison.

C. The presence of a product, finish, or type of construction requires that patching, extending or matching shall be performed as necessary to make work complete and consistent with identical standards of quality.

PART 3 - EXECUTION

3.1 REPAIR / RESTORATION

A. Patch and extend existing construction using skilled workers capable of matching existing quality of workmanship. Quality of patched or extended work shall be not less than that specified for new work.

B. Damaged Surfaces:

1. Patch and replace portions of existing finished surfaces that are found to be damaged, lifted, discolored, or show other imperfections, with matching material.
    a. Provide adequate support of substrate prior to patching the finish.
    b. Refinish patched portions of painted or coated surfaces in a manner to produce uniform color and texture over the entire surface.
    c. When existing surface finish cannot be matched, refinish entire surface to nearest intersections.

C. Transition from existing to new work:

1. When new work abuts or finishes flush with existing work, make a smooth and clean transition. Patched work shall match existing adjacent work in texture and appearance so that the patch of transition is invisible at a distance of five feet.
2. When finished surfaces are cut in such a way that a smooth and clean transition with the new work is not possible, notify the Architect. Terminate existing surface in a neat manner along a straight line at a natural line of division, and provide trim appropriate to finished surface, or as otherwise directed by the Architect.

3.2 ADJUSTING

A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

B. Where partitions are removed, patch floors, walls, and ceilings with finish materials to match existing.

1. Where removal of partitions results in adjacent spaces becoming one, re-work floors and ceilings to provide smooth and clean planes without breaks, steps, or bulkheads.
2. Where extreme change of plane of one inch or more occurs, request instruction from the Architect as to method of making transition.

C. Trim and refinish existing doors as necessary to clear new floor finishes.

3.3 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
2. Clean any soiled surfaces immediately.
3. Finish shall be clean and ready for the application of any additional finishes.

B. Perform periodic and final cleaning as specified in Specification Section - PROJECT CLOSEOUT.

1. Clean Owner-occupied areas daily.
2. Clean spillage, over spray, and heavy collection of dust in Owner-occupied areas immediately.

C. At completion of work of each trade, clean area and make surfaces ready for work of successive trades.

D. At completion of alteration work in each area, provide final cleaning and return space to a condition suitable for use by the Owner.

E. Contractor shall remove all materials and items as indicated on drawings or otherwise required. Remove all trash or debris as it accumulates and legally dispose of it off site at no additional cost to the Owner.

3.4 PROTECTION

A. Protection from weather:
   1. Protect newly installed work from freezing for 24 hours after erection, installation or application.

B. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
   2. Immediately after cleaning, neatly apply four (4) mil thick, minimum, polyethylene film over finished surfaces at traffic areas. Fasten film firmly to surfaces without visually marring those surfaces.

C. Assign the work of moving, removal, cutting and patching, to trades qualified to perform the work in a manner to minimize the possibility of damage to each type of work, and provide means of returning surfaces to appearance of new work.

D. Perform cutting and removal work with minimal disruption and manner to avoid damage to adjacent work.

E. Cut finish surfaces such as masonry, tile, plaster or metals, by methods which terminate surfaces in a straight line at a natural point of division.

F. Perform cutting and patching as specified in Specification Section - CUTTING AND PATCHING.

G. Protect existing finishes, equipment, and adjacent construction from damage.
   1. Protect existing and new work from weather and extremes of temperature.
   2. Maintain existing interior work above 60 degrees F.
   3. Provide weather protection, waterproofing, heat and humidity control as needed to prevent damage to remaining work and to new work.

3.5 SCHEDULES

A. Schedule work in the sequences specified in Specification Section - SUMMARY OF WORK, if applicable.

END OF SECTION

SECTION 01 41 00 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Section 4-317 (c), Part 1, Title 24, CCR, requires the following:

1. "The intent of these drawings and specifications is that the work of the alteration, rehabilitation or reconstruction is to be in accordance with Title 24, California Code of Regulations. Should any existing conditions such as deterioration of non-complying construction be discovered which is not covered by 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."

C. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. References to standards, codes, specifications, recommendations and regulations, refer to the latest edition or printing in effect at the date of issue shown in the Documents unless another date is implied by the suffix number of the Standards.

B. Applicable portions of the Standards listed that are not in conflict with the Contract Documents shall be construed as specification for this work.

C. General Standards:

1. AFPA: American Forest and Paper Association
2. ANSI: American National Standards Institute
3. ASTM: American Society for Testing and Materials
4. CAL/OSHA: California Occupational Safety and Health Administration
    a. State of California Construction Safety Orders
5. CARB: California Air Resources Board
6. CS: Commercial Standards of the US Department of Commerce
7. EPA: Environmental Protection Agency
8. FMG: Factory Mutual Group
9. NIBS: National Institute of Building Sciences
10. NIST: National Institute of Standards and Technology
11. NFPA: National Fire Protection Association
12. OSHA: Occupational Safety and Health Administration
    a. Federal Construction Safety Orders
13. PS: Product Standards of the US Department of Commerce
14. SS-CDOT: "Standard Specification":
    a. State of California Department of Transportation (CalTrans)
15. UL: Underwriters Laboratory Incorporated
16. WH: Warnock Hersey

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Quality Assurance/Control Submittals:
   1. Certificates:
      a. Submit three (3) copies of certificates written on the Contractor's Letterhead indicating that the required codes shall be present at the Job Site.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. All codes, laws, ordinances, rules, regulations, orders and other legal requirements of City, County, State, Federal and other public authorities which bear on performances of Work shall be applicable to Project. Latest editions shall be applicable unless specified otherwise.
   2. Relationship between Applicable Codes and Contract Documents. The Contract Documents have been developed with the intent to conform to the applicable codes. Nothing within the Contract Documents shall be construed to permit Work not conforming to the applicable codes.

B. Major Governing Codes And Regulations:
   1. General: All work shall comply with the requirements of the following codes and regulations. Special reference in other Sections of the Specifications to a specific code will be by use of the abbreviation given in front of the Code.
      a. Freestanding equipment (if applicable) shall be provided and installed in accordance with the seismic requirements where the Project is located.
   2. NOTE: * -Indicates that a copy of these codes shall be at the job site at all times.
   3. AUTHORITY HAVING JURISDICTION:
      a. AHJ: Authority Having Jurisdiction
   4. FEDERAL LAW:
      a. ADA: Americans with Disabilities Act
   5. CALIFORNIA CODE OF REGULATIONS (Previously known as the California Administrative Codes)
      a. CCR-T5: California Code of Regulations, Title 5-Education.
      b. CCR-T8: California Code of Regulations, Title 8-Industrial Safety
         1) Contains the California Elevator Safety Code.
      c. CCR-T19: California Code of Regulations, Title 19-Public Safety.
      d. CCR-T21: California Code of Regulations, Title 21-Public Works.
      e. *CCR-T24: California Code of Regulations, Title 24, Part 1-California Administrative Code 2025.
   6. CALIFORNIA BUILDING, ELECTRICAL, MECHANICAL, PLUMBING, ENERGY, FIRE, and REFERENCED CODES
      a. *CBC: California Building Code 2022 California Code of Regulations, Title 24-Part 2, Volumes 1 and 2, CCR-T24, based on the 2021 edition of the IBC (International Building Code), with the latest California State Amendments.
      b. *CEC: California Electrical Code 2022, California Code of Regulations, Title 24-Part 3, CCR-T24, based on the 2020 edition of the NEC (National Electrical Code), with the latest California State Amendments.
      c. *CMC: California Mechanical Code 2022, California Code of Regulations, Title 24, Part 4, CCR-T24, based on the 2021 edition of the UMC (Uniform Mechanical Code) by IAPMO, with the latest California State Amendments.
      d. *CPC: California Plumbing Code 2022, California Code of Regulations, Title 24, Part 5, CCR-T24, based on the 2021 edition of the UPC (Uniform Plumbing Code) by IAPMO, with the latest California State Amendments.
      e. *CEnC: California Energy Code 2022, California Code of Regulations, Title 24, Part 6, CCR-T24, and the latest California State Amendments.
      f. *CFC: California Fire Code 2022, California Code of Regulations, Title 24, Part 9, CCR-T24, based on the 2021 edition of the IFC (International Fire Code), with the latest California State Amendments.

1) In addition to all other Chapters in the CFC to be followed, attention is specifically called out to comply with Chapter 33 - "Fire Safety During Construction and Demolition".

g. CEBC: California Existing Building Code 2022, California Code of Regulations, Title 24, Part 10, CCR-T24.

h. CGBSC: California Green Building Standards Code 2022, California Code of Regulations, Title 24-Part 11, CCR-T24 (CALGreen).

i. CRSC: California Referenced Standard Code 2022, Title 24, Part 12, CCR-T24, with the latest California State Amendments.

7. DSA: DIVISION OF THE STATE ARCHITECT:

a. DSA: Regulations of the Division of the State Architect of the State of California:

1) ACS: Access Compliance Section
2) SSS: Structural Safety Section
3) FLS: Fire and Life Safety Section
4) IR: Interpretation of Regulations.

8. OTHER STATE AGENCIES:

a. AQMCD: Air Quality Management Control District in the area where the project is located.

b. RWQCB: Regional Water Quality Control Board in the area where the project is located.

C. Governing Authority:

1. DSA: Division of the State Architect.

a. The provisions of the State of California, Statutes of 1933, Chapter 59, Safety of Construction of Public School Buildings Act, and the latest regulation based thereon, of the Division of the State Architect of the State of California, shall be the governing authority and shall take precedence over other applicable codes.

b. The following shall be stamped and signed by the A/E on Record or Delegated Design Professional per CBC, Part 1, Section 4-317 (h), and the following:

1) Addenda or Bulletins per Sec. 4-338(b): All addenda or bulletins shall be signed and approved by the Division of State Architect.
2) Construction Changes per Sec. 4-338(c): All Construction Changes related to structural items, fire safety issues, life safety issues and accessibility compliance issues shall be reviewed and approved by the appropriate Division of the State Architect.
3) Substitutions (per DSA) shall be treated like Addenda, or Construction Changes per Sec. 4-338(c), and IR A-6: All substitution requests and substitutions related to structural items, fire safety issues, life safety issues and accessibility compliance issues shall be reviewed and approved by the appropriate Division of the State Architect prior to fabrication and installation.

PART 2 - PRODUCTS
NOT APPLICABLE

PART 3 - EXECUTION
NOT APPLICABLE

END OF SECTION

SECTION 01 42 00 – REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   1. The abbreviations, symbols and work meanings not defined in the Contract Documents are in accordance with building industry usage and convention. Questions which arise as to "meaning," or intent shall be referred to the Architect prior to bidding for interpretation.
   2. Refer to drawings for additional abbreviations and symbols.
   3. Refer to GENERAL and SPECIAL or SUPPLEMENTAL CONDITIONS and specific specification Sections for additional definitions.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. EXECUTE: Perform what is required to install, apply, erect and otherwise incorporate products in to this Project.

B. FURNISH: Supply products required, deliver to Project, unload, store and install as required in location as directed by Contractor, Owner or Architect.

C. GUARANTEE: An assurance by the seller or installer that products or Work are as represented or will be as promised in compliance with Specifications. Synonymous and interchangeable with WARRANTY.

D. INSTALL: Incorporate into this Project.

E. PRODUCTS: The material, equipment, fixtures and other physical substances required to execute the Project.

F. PROVIDE: Furnish and Install into this Project.

G. WARRANTY: An assurance by the seller or installer that products or Work are as represented or will be as promised in compliance with Specifications. Synonymous and interchangeable with GUARANTEE.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

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SECTION 01 45 23 – TESTING AND INSPECTION SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. One Project Inspector (Owner's Inspector), including Special and/or Assistant Inspector(s) (minimum Class 3 Rating), as required, will be employed by the Owner in accordance with the requirements of CCR-Title 24, Part 1, CALIFORNIA ADMINISTRATIVE CODE, and the latest amendments, and will be assigned to the Project.
      a. Duties of a Project Inspector are specifically defined in CCR-Title 24, Part 1, and the latest amendments.
      b. Special Inspections (not within the Project Inspector's abilities) shall be performed by the Testing Laboratory or other Special Inspector as approved by the Owner and DSA.
         1) All Special Inspections shall be approved by DSA in accordance with CCR-T24, Part 1, Chapter 4, Group 1, Article 5, Section 4-335.1.
   2. The Project Inspector shall be employed by the Owner and approved by the Architect, Structural Engineer, and DSA.
      a. See the Title Page of this Project Manual for the name of this Project.
      b. Payment of the Project Inspector will be by the Owner.
   3. Provide all access, facilities and information required by the Project Inspector for the Project.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Responsibilities of the Project Inspector:
   1. The Project Inspector will be required to provide inspection of the Work (including "Continuous Inspection") as required in CCR-T24, Part 1:
      a. Educational Work: Chapter 4, Group 1, Article 6, 4-342 (b).
   2. The Project Inspector will report to the Owner, the Architect and DSA as required during the progress of the Work.
   3. The Project Inspector shall review all Pay Requests prior to submittal to the Architect.

B. Responsibilities of the Contractor:
   1. Written Statement of Responsibility to the Owner and the Authority Having Jurisdiction (DSA) per CBC Chapter 17A:
      a. Provide a written Statement of Responsibility regarding the Contractor's understanding of the special inspection requirements and identifying individuals in their firm responsible for exercising control over the conformance to the construction documents.
   2. Provide the Project Inspector free access to any and all parts of the Project at all times.
   3. Provide the Project Inspector information necessary to keep him fully informed with respect to the progress, manner and character of Work.
   4. Perform no Work in absence of the Project Inspector unless alternate arrangements have been made in advance and agreed to by the Owner, the Architect and DSA.
   5. The Owner's "Inspection of Work" by the Project Inspector shall not relieve the Contractor from any conditions of this Contract.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Quality Assurance/Control Submittals:
   1. Written Statement of Responsibility to the Owner and the Authority Having Jurisdiction per CBC Chapter 17A.
   2. Project Inspector's Field Reports:
      a. Submit four (4) copies of reports.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 01 45 29 – TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. The Owner's Testing Laboratory shall be employed by the Owner and approved by the Architect, Structural Engineer, and DSA.
   1. Payment of the Owner's Testing Laboratory will be by the Owner.
   2. The Owner shall pay for all initial testing indicated as paid for by Owner except as specified otherwise or in the schedule at the end of this section.
      a. Cost of re-testing (due to initial failures) shall be back-charged to the Contractor, and those excess costs will be deducted from the Contract Price.
      b. Cost of testing (due to shop fabrication or in-plant testing out of state and beyond a 75-mile radius of the Project Site) shall be back-charged to the Contractor, and those excess costs will be deducted from the Contract Price.

B. Provide all access, facilities and information required for the testing of the various portions of the Work as required by Regulatory Agencies, Planning, Agencies, Building Agencies, and other Governmental Inspectors, the Contract Documents and the Owner.

C. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Responsibility of the Testing Laboratory:
   1. Taking all specimens.
   2. Performing Tests.
      a. The Testing Laboratory's duties shall include all tests required by the DSA 103 Form prepared at the time of DSA Approvals, and any other testing as determined by authorities or the Project Inspector during the course of the work.
      b. Special Inspections (not within the Project Inspector's abilities) shall be performed by the Testing Laboratory or other Special Inspector as approved by the Owner and DSA.
         1) All Special Inspections shall be approved by DSA in accordance with CCR-T24, Part 1, Chapter 4, Group 1, Article 5, Section 4-335.
   3. Writing Test Reports
   4. Review of "Continuous Inspection" reports by the Project Inspector.
      a. Portions of the Work requiring "Continuous Inspection" shall be performed by the Project Inspector (if qualified) and all reports will be reviewed by the Testing Laboratory.
   5. Distribute Test Reports to the Owner, Architect, applicable Engineer, Contractor and to DSA.

B. Responsibilities of the Contractor:
   1. Contractor shall provide a Testing Schedule that is in accordance with the following:
      a. Format of the Testing Schedule shall be in accordance with Specification Section – CONSTRUCTION SCHEDULES.
      b. Cooperates with the Testing Laboratory's schedule of required testing.
      c. Contractor shall coordinate Construction Schedule and Testing Schedule.
         1) Format of testing schedule in accordance with Specification Section – CONSTRUCTION SCHEDULES.
   2. Cooperation with testing laboratory:
      a. Provide access to Work being tested.
      b. Provide test samples as selected by testing laboratory.

c. Schedule Work so that there shall be no excessive inspection time.
   1) At times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the inspector's time shall be used to full advantage.
   2) If inspection costs become excessive because of poor shop or construction procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price.
d. Inspections and tests required by regulatory agencies shall be the responsibility of and shall be paid for by the Owner unless specified otherwise.
e. Inspections and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.
f. Test Reports:
   1) Distribute test reports and related instruction to insure all required re-testing and/or replacement of materials.
g. Payment of Testing:
   1) All testing shall be paid for by the Owner.

3. Contractor shall be back-charged for re-testing, excessive distance from the Project Site, or extra testing required because of initial failures.

1.3 REFERENCE STANDARDS

A. ASTM: American Society for Testing and Materials
   1. ASTM E329 Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction (Standard Specification for)

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
B. Quality Assurance/Control Submittals:
   1. Test Reports:
      a. Submit four (4) copies of testing laboratory's report.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Testing Laboratory Qualifications:
      a. In accordance with the latest Edition of ASTM E329.
B. Regulatory Requirements and Reference Standards:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. In accordance with regulatory agencies and appropriate ASTM Standards.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

A. Testing Schedule at the end of this section should be used as a guide only and it is not considered a complete list. Refer to regulatory agency requirements and specific specification section for complete testing requirements.
B. TESTING SCHEDULE
   1. 03 15 14 - DRILLED ANCHORS
      a. Tension Tests.
         1) Paid by Owner.

2. 03 20 00 - REINFORCEMENT
   a. Rebar Material per ACI 318, CBC TABLE 1705A.2.1, CBC Sections 1903A.1, 1905A, and 1910A.
      1) Paid by Owner
   b. Continuous Inspection of Welds per ACI 318, CBC TABLE 1705A.2.1, CBC Sections 1903A.8, 1905A, and 1910A.
      1) Paid by Owner
3. 03 30 00 - CAST-IN-PLACE CONCRETE
   a. Cement Material per ACI 318, and CBC Sections 1903A, 1905A, and 1910A.
      1) Paid by Owner
   b. Aggregate Material per ACI 318.
      1) Paid by Owner
   c. Concrete Mix per ACI 318. CBC Sections 1903A and 1910A.
      1) Paid by Owner
   d. Concrete Strength Tests per ACI 318.
      1) Paid by Owner
   e. Concrete Compression Tests per ACI 318.
      1) Paid by Owner
4. 04 22 00 - CONCRETE MASONRY UNITS
   a. Grout Tests/Mortar Tests per CBC Section 2105A.3.
      1) Paid by Owner
   b. Continuous Inspection of Laying Block and Block Cores per THE MASONRY SOCIETY - TMS 402 and TMS 602, as set forth in Tables 3 and 4, Level 3 requirements and Chapter 21A. Testing shall be in accordance of CBC Section 2105A.
      1) Paid by Owner
   c. Concrete Masonry Unit Tests per CBC Section 2105A.6.
      1) Paid by Owner
5. 05 12 00 - STEEL AND FABRICATIONS
   a. Steel Material per CBC Section 1705A.2.
      1) Paid by Owner
   b. High Strength Bolts and installation per CBC Section 1705A, and CBC Section 1705A.2.6.
      1) Paid by Owner
   c. Inspection of Shop and Field Welding per CBC Section 1705A, and CBC Section 1705A.2.5.
      1) Paid by Owner
6. 05 30 00 - METAL DECK
   a. Steel Material per CBC Section 1705A, and CBC Section 1705A.2.2.
      1) Paid by Owner
   b. Inspection of Shop and Field Welds per CBC Section 1705A, and Table 1705A.2.1.
      1) Paid by Owner
7. 06 17 33 - WOOD JOISTS
   a. Continuous Plant Inspection for open web trusses per CBC Section 1705A.5.5.
      1) Paid by Owner
8. 06 18 00 - GLUE-LAMINATED CONSTRUCTION
   a. Continuous Plant Inspection per CBC Sections 1705A.5.4, and 1705A.10.
      1) Paid by Owner

9. 09 22 16 - METAL FRAMING
    a. Metal Stud Material.
        1) Paid by Owner
    b. Metal Stud Welding.
        1) Paid by Owner
10. 09 51 00 - ACOUSTICAL CEILINGS
    a. Main and cross runners, intersection connectors and expansion devices
        1) Paid by Contractor
11. DIV. 22 - PLUMBING
    a. Non-Leaking System
        1) Paid by Contractor
    b. Bacteriological Purity
        1) Paid by Contractor
12. DIV. 23 - HEATING, VENTILATING AND AIR CONDITIONING
    a. Equipment Operation
        1) Paid by Contractor
    b. System Energy Balance
        1) Paid by Contractor
    c. Non-Leaking Hydronic System.
        1) Paid by Contractor
13. DIV. 26 - SERVICE AND DISTRIBUTION
    a. Equipment Operation
        1) Paid by Contractor
    b. Protective Systems
        1) Paid by Contractor
14. DIV. 26 - LIGHTING
    a. Equipment Operation
        1) Paid by Contractor
15. DIV. 27 - MASTER CLOCK AND PUBLIC ADDRESS SYSTEM
    a. Equipment Operation
        1) Paid by Contractor
16. DIV. 28 - FIRE SPRINKLER SYSTEM
    a. All tests required by NFPA #13.
        1) Paid by Contractor
17. DIV. 28 - WET CHEMICAL FIRE SUPPRESSION SYSTEM
    a. All tests required by NFPA #17A.
        1) Paid by Contractor
18. 31 20 00 - EARTHWORK
    a. Compaction Test
        1) Paid by Owner
    b. Inspection of Excavations and Fills per CBC Table 1705A.6.
        1) Paid by Owner
    c. Department of Toxic Substances Control (DTSC) Independent Testing of Imported soil
        1) Paid by Contractor

C. Division of the State Architect "Statement of Structural Tests and Special "Inspections":

1. In addition to the TESTING SCHEDULE cited above, and elsewhere within the documents, DSA requires the Contractor to schedule and manage the following tests to be performed and reported as required for this Project.
2. Failure to schedule these tests is grounds for reduction in Monthly Payment Request authorization, and may delay distribution of the Final Payment.
3. Refer to the approved DSA 103-Listing of Structural Tests and Special Inspections Form.

END OF SECTION

SECTION 01 50 00 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Temporary Utilities, Support Facilities, and Protection Facilities materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

A. Per SUBMITTAL PROCEDURES.

B. Shop Drawings:

1. Project Sign.

C. Site Safety Plan prior to initial filing of Construction Start Notice/Inspection Card Request.

D. Temporary Project Enclosure Plan.

E. Dust Prevention and Control Plan.

1. Approved application from APCD.

F. Traffic Control Plan.

1. Approved application from local City or County Engineer for Traffic Control.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Per Specification Section - REGULATORY REQUIREMENTS.
2. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
3. CAL/OSHA California Division of Occupational Safety and Health Administration
4. EPA Environmental Protection Agency

1.4 REQUIRED PLAN DOCUMENTS

A. Site Safety Plan:

1. Contractor shall be responsible for the development, implementation, and maintenance of a written plan establishing a site safety plan at the project site applicable throughout all phases of the construction, repair, alteration, or demolition work.
2. It is the Contractor's responsibility to contact local Fire Authority to discuss the plan.
   a. A copy of the report should be made available to the Project Inspector and local Fire Authority.
   b. Plan will be turned over to the Owner and AHJ in compliance with rules and regulations, but will not be reviewed.
3. Regulatory References:
   a. DSA BU 24-05 Bulletin: Fire Safety During Construction and Demolition.
   b. CFC Chapter 33, Section 3308 and sub-sections.
4. Plan shall address at a minimum:
   a. Project Phases.

1) Describe each phase of the construction, repair, alteration, or demolition work.

b. Site Security Provisions.
c. Site Safety Director.
   1) Designate responsible program superintendent per CFC 3308.2.
   2) Include name and contact information.
d. Training Documentation.
   1) Document training of site safety director and fire watch personnel.
e. Emergency Reporting Procedures.
f. Fire Department Vehicle Access Routes.
g. Locations of fire protection equipment.
   1) Include portable fire extinguishers, standpipes, fire department connections and fire hydrants.
h. Smoking and Cooking Policies.
   1) Include designated area to be used where approved, and signage locations in accordance with CFC Section 3305.8.
i. Temporary Heating Equipment.
   1) Location and safety considerations.
j. Hot Work Operations.
k. Control Plan for Combustible Waste.
l. Control Plan for Flammable and Combustible Materials.
   1) Locations and methods for storage and use of flammable and combustible liquids and other hazardous materials.
m. Renovation Work Procedures.
   1) Procedure for impairment of fire protection systems.
   2) Procedure for temporary covering of fire protection devices.
n. Procedure for Changes.

B. Temporary Project Enclosure Plan:
   1. Prior to commencing the Work, prepare a Temporary Project Enclosure Plan indicating the protection of people, animals, and partial and fully completed work until occupancy by the Owner.
   2. Identify temporary egress from existing occupied facilities and as required by authorities having jurisdiction.
   3. The Temporary Project Enclosure Plan shall include, but not be limited to, the following:
      a. Contractor’s name and project identification information.
      b. Indicate the duration of the proposed measures based on the completion of the work as a whole and if any phases of work are identified.
      c. Indicate proposed temporary fencing and potential exit and entry paths.
         1) Show gate and door locations and indicate who has access.
      d. Indicate proposed temporary wall location(s) and potential exit and entry paths.
         1) Show door location(s) and indicate who has access.
      e. Indicate type of material used for temporary fencing, walls, gates, and doors.
      f. Indicate proposed temporary roads and paved areas.
      g. Indicate proposed temporary offices and storage areas.

C. Dust Prevention and Control Plan:
   1. Prior to commencing the Work, prepare a Dust Prevention and Control Plan and obtain review and approval of the Air Pollution Control District (APCD) in the area where the project is located.
      a. Prepare application and file with appropriate fees to APCD upon completion of Dust Prevention and Control Plan.

2. The Dust Prevention and Control Plan shall specify the methods of control that will be utilized, demonstrate the availability of needed equipment and personnel, and identify a responsible individual who, if needed, can authorize implementation of additional measures.
3. All construction shall comply with applicable elements of the APCD's regulations.
4. The Dust Prevention and Control Plan shall include, but not be limited to, the following:
    a. Contractor's name and project identification information.
    b. Procedures and measures to be implemented, but not be limited to:
        1) All material excavated or graded shall be sufficiently watered to prevent excessive amounts of dust.
        2) During periods of high winds, all clearing, grading, earth moving, or excavation shall cease when dust control measures are unable to avoid visible plumes.
        3) All dust producing material transported off site shall be either sufficiently watered or securely covered to prevent excessive amounts of dust.
        4) The area disturbed by clearing, earth moving, or excavation activities shall be minimized at all times.
        5) All watering of areas shall be only to the extent required to keep the soil particles in a moist condition and not to the extent that erosion of surface soil occurs.
        6) To control general fugitive dust, on-site vehicle speed shall be limited to 15 mph.
        7) All areas with vehicle traffic shall be watered periodically for stabilization of dust emissions.
        8) Periodically streets adjacent to the project site shall be cleaned as required to remove silts which may have accumulated from construction activities.

D. Traffic Control Plan:
1. Prior to commencing the Work, prepare a Traffic Control Plan and obtain approval of the local City or County Engineer in the area where the project is located.
    a. Prepare application and file with appropriate fees to the local City or County Engineer upon completion of Traffic Control Plan.
2. The Traffic Control Plan shall include information on construction timing and phasing and proposed methods of alleviating potential hazardous and/or inconvenient conditions. Such methods can include, but are not limited to, the use of flagmen, barricades, signs, warning lights, detours, phased lane closures, coordination with adjacent property owners, and coordination with law enforcement, fire protection and other emergency service agencies.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:
1. Heating and Cooling:
    a. Provide temporary heating and cooling required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed, and is maintained prior, during and after the installation in accordance with the exterior or interior building materials temperature and humidity guidelines.
        1) Do not use heating units that contribute moisture to the enclosed spaces under construction.
2. Ventilation and Humidity Control:
    a. Provide temporary ventilation required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
        1) Exterior Moisture Control:
            a) Perform the installation of all exterior building cladding only after the substrate to which they are being applied is dry and ready to receive them. Do not apply any

cladding if it will trap moisture inside a wall or roof cavity (i.e. insulation that has become wet for whatever reasons).

2) Interior Moisture Control:

a) Perform the installation of all interior moisture sensitive building materials only after the building or space is acclimated to the final environmental conditions under which the building is to be operated in accordance within the Owner's humidity control guidelines.

b. Maintain a consistent humidity in accordance with the guidelines for those materials in the space at least seven (7) days prior to installation of any moisture sensitive materials (i.e. Veneer Plaster, Gypsum Board, Ceiling Tiles, Wood Sensitive Floors, other Flooring sensitive to moisture levels, Interior Painting, etc.).

c. Maintain the same levels or temperature and humidity during the installation of those materials, and after the installation of those materials until the building's own mechanical systems can be turned on to maintain the facility within the Owner's temperature and humidity control guidelines.

d. Replace any materials that have become wet and damaged due to the Contractor not properly protecting installed building materials at no additional cost to the Owner.

3. Dust control:

a. Perform work in a manner as to minimize the spread of dust and flying particles.

b. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.

c. Temporarily cover mechanical equipment and ductwork openings to prevent the entry of construction dust and debris.

4. Burning: No burning will be allowed on-site.

5. Noise Control:

a. Stationary noise sources shall be of a low-noise emission design, consistent with the best available noise reduction technology.

b. The hours of operation of noise-generating equipment shall be restricted to 6:00 a.m. to 7:00 p.m. Monday through Friday, and to 8:00 a.m. to 6:00 p.m. on Saturday and Sunday.

c. Mufflers shall be required on all gas and diesel-powered equipment.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

2. Cultural Resources:

a. The Contractor is advised of the possibility that cultural resources may be discovered during project activities.

b. If any cultural or paleontological materials are uncovered during project activities, work in the area or any area reasonably suspected to overlie adjacent remains shall be stopped and the Architect advised of the discovery. The Architect will notify the appropriate agency and the work shall remain stopped until professional cultural resources evaluation and/or data recovery excavation can be planned and implemented. Appropriate measures to protect remains from accidents, looting, and vandalism shall be implemented immediately on discovery.

c. If human remains are discovered, the work in the area or any area reasonably suspected to overlie adjacent remains shall be stopped and the County Coroner and the Architect shall be notified immediately. Appropriate measures to protect remains from accidents, looting, and vandalism shall be implemented immediately on discovery. The work shall remain stopped until professional cultural resources evaluation and/or recovery excavation can be planned and implemented.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Fire Protection During Construction:
   1. Provide Temporary Fire Protection per CFC Chapter 33 during demolition and construction.

B. Field Offices:
   1. Contractor's Field Office: 200 square feet.
      a. Size: Nominal 8 feet wide minimum, approximately 200 square feet minimum.
      b. Equipment:
         1) 2A:10B:C Surface Mounted Fire Extinguisher.
         2) Table for review of Drawings.
         3) Files, rack and shelves as required to store Contract Drawings and Project Record Drawings in a neat, orderly manner.
         4) One copy of each code listed in Specification Section - REGULATORY REQUIREMENTS.
         5) Telephone.
         6) Internet Connection.
         7) Plain Paper Copier / FAX Machine.
      c. Facilities:
         1) Adequate light and power.
         2) Adequate heating, ventilation and air conditioning.
      d. Control and Access:
         1) Door shall be lockable and key shall be supplied to Architect and access shall be limited to Owner, Architect, Inspector and Contractor.
      e. All of the above items shall be subject to Architect's approval.
   2. Project Inspector's Field Office: 96 square feet.
      a. Size: Nominal 8 feet wide minimum, approximately 96 square feet minimum.
      b. Equipment:
         1) 2A:10B:C Surface Mounted Fire Extinguisher.
         2) Table for review of Drawings.
         3) Files, rack and shelves as required to store Contract Drawings and Project Record Drawings in a neat, orderly manner.
         4) Space for one copy of each code listed in Specification Section - REGULATORY REQUIREMENTS.
         5) Telephone.
         6) Internet Connection.
         7) Plain Paper Copier / FAX Machine.
      c. Facilities:
         1) Adequate light and power.
         2) Adequate heating, ventilation and air conditioning.
      d. Control and Access:
         1) Door shall be lockable and key shall be supplied to Architect and access shall be limited to Owner, Architect, Inspector and Contractor.
      e. All of the above items shall be subject to Architect's approval.

C. Project Sign:
   1. The Contractor shall furnish and erect at location as directed by the Architect one sign board approximately 4 feet x 8 feet, fabricated of 3/4 inch exterior grade plywood with a sturdy frame attached to 4 inch x 4 inch x 14 foot redwood posts set 4 feet in the ground minimum, and substantially braced.
   2. The sign to be painted on signboard shall be of design in 4 colors as directed by the Architect.
   3. Lettering shall be of style shown, neatly executed by a skilled sign painter.

4. The information to be lettered on sign shall be as furnished by the Architect.
    a. Sign will include the names of the Contractor(s), Owner, Architect, and the project designation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
    1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
    2. Execution of work under this specification section shall constitute acceptance of existing conditions.
    3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the work under this section.

3.2 PREPARATION

A. Coordination:
    1. Before proceeding, verify plans match existing conditions.
    2. Coordinate work under this specification with work specified under other sections to ensure proper and adequate interface of work.
B. Protection:
    1. The Contractor shall verify and protect existing landscaping, asphalt area, concrete walkways, and other site improvements to remain on the site before proceeding with the Work.
    2. Prior to starting Work, hose bibbs, utility lines, etc., to be abandoned and removed within the construction area shall be stubbed off outside the limits of construction.
    3. Verify and protect utilities to remain within the construction area and provide special construction for their protection.

3.3 IMPLEMENTATION

A. General:
    1. Perform Work and provide and maintain Temporary Utilities and Temporary Facilities in accordance with the requirements of all regulatory authorities having jurisdiction.
    2. Contractors shall cooperate with other contractors and the Owner in the use of the site, Temporary Utilities, Temporary Facilities and shall adjust their operations to maintain harmonious relations and uninterrupted progress of the Work.
    3. The Contractor shall assume all responsibility for the provision and maintenance of these Temporary Utilities and Temporary Facilities and for the provisions of public safety where the operations under this Contract interface with public areas.
    4. Relocate and modify Temporary Utilities and Temporary Facilities, as required by progress of the Work.
    5. Remove Temporary Utilities and Temporary Facilities upon completion of the Project.
    6. Temporary Utilities and Temporary Facilities are to be provided and maintained from commencement of Work until final acceptance.
        a. The Contractor shall pay all charges required of him for the duration of the project, including a **1**month period following the date of the Notice of Substantial Completion.
B. Temporary Utilities:
    1. Install temporary service or connect to existing service.
        a. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
            1) Minimum forty-eight (48) hours prior notice to any interruption.
    2. Sewers:
        a. Provide temporary service to remove effluent lawfully.

3. Storm Drainage:
    a. Provide temporary service as necessary to remove storm water. Work shall be performed in accordance with the requirements of the Storm Water Pollution Prevention Plan (SWPPP), if any. If no SWPPP is required, then follow local authorities having jurisdiction requirements.
4. Water:
    a. The Owner will pay for all water supply for all purposes of construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
5. Electrical:
    a. The Owner will pay and the Contractor shall provide for all electrical facilities and services for all purposes of power and lighting for construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.
        1) The Contractor shall pay for cost of electrical energy required in connection with the testing of such equipment as generators, transformers, power machinery, and similar equipment installed in the work.
    b. The Contractor will provide electrical energy to all subcontractors as required on or about the premises.
    c. The Contractor will provide power outlets having adequate electrical characteristics and lighting of adequate intensity for the use of other contractors within reasonable distances from their needs and within a reasonable period of time after the other contractors have requested them.
6. Telephone:
    a. The Contractor shall provide and pay for all telephone service and telephone equipment in the Field Offices until completion of the Work.
        1) Provide an additional dedicated phone line for modem/network connection in the Project Inspector's Field Office for use by the Architect's representative.
7. Heating:
    a. Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity.
    b. Select UL or FM approved equipment that will not have a harmful effect on completed installations or elements being installed.
        1) Except where use of the permanent heating system is authorized, provide temporary units that do not introduce moisture into the newly constructed building spaces.
        2) Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
    c. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

C. Temporary Facilities:
1. Support Facilities:
    a. Offices and Storage:
        1) Provide temporary offices and storage facilities located within the construction area.
        2) Protect materials, construction work and their operations from weather, vandalism, and theft.
    b. Sanitary Facilities:
        1) Provide adequate, self-contained toilets as required for all persons employed on the Project.
        2) In no case shall the permanent plumbing fixtures of the Project be used for this purpose.
    c. Temporary Roads and Paved Areas:

1) Construct and maintain temporary roads and paved areas adequate for construction operations and fire protection during construction.

d. Traffic Controls:

1) Implement procedures and measures outlined in the local jurisdiction's approved Traffic Control Plan.
2) Maintain access for fire-fighting equipment and access to fire hydrants.
3) Conduct work and comply with applicable building codes and regulations regarding the use of public streets and sidewalks and the proper barricading and lighting of public thoroughfares surrounding the construction activities.
4) Provide and maintain access as required to perform work.
5) Repair all damage as a result of work performed on the project to adjacent roads, streets, drives and walks. Restore to condition as good as existed at commencement of the Work.

e. Project Sign:

1) Install project sign as submitted and approved.
2) No other signs will be allowed on the project.

2. Protection Facilities:

a. Existing Facilities:

1) Protect existing vegetation, equipment, structures, utilities, and other improvements at project site and on adjacent properties, except those indicated to be removed or altered. Damage occurring during the course of construction shall be repaired to condition at the start of the Work.

b. Environmental:

1) Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

c. Project Enclosure:

1) Implement procedures and measures outlined in Temporary Project Enclosure Plan.
2) Project enclosure shall protect materials, construction work, and operations from vandalism, theft, and to exclude the intrusion of the public into the construction area.
3) Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.
4) Maintain security by limiting number of keys and restricting distribution to authorized personnel.

3.4 CLEANING

A. Clean in accordance with Specification Section – PROJECT CLOSEOUT.

1. At all times, keep the premises free from accumulations of waste materials or rubbish caused by employees or the Work.
2. Clean all soiled surfaces to remain immediately.
3. At the completion of the Work, remove all rubbish from and about the building and all tools, scaffolding, and surplus materials and shall leave the Work "broom clean" or its equivalent.

END OF SECTION

SECTION 01 57 00 – FUGITIVE DUST CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Provide all material, labor, fees, and services necessary to comply with the San Joaquin Valley Air Pollution Control District (SJVAPCD) Regulation VIII for dust control requirements.
   2. Contractor will determine the total disturbed surface area and the estimated bulk material moving volumes anticipated for the Project to determine if a Construction Notification or Dust Control Plan is required. Contractor shall prepare and submit a Construction Notification or Dust Control Plan to the SJVAPCD based on these expected Project conditions/activities.
   3. Non-residential Projects that will include five acres or more of disturbed surface area and/or will be moving, depositing, or relocating more than 2,500 cubic yards of bulk material on at least three days of the project are required to submit a Dust Control Plan to the SJVAPCD and receive approval prior to commencing earth moving activities.
   4. Non-residential projects that will include less five acres of disturbed surface area must submit a Construction Notification at least 48 hours prior to commencement of any earthmoving activities. No approval or response from the SJVAPCD is required.
   5. Contractor shall be solely responsible for payment of any fees or fines related to violations of SJVAPCD Regulation VIII from Project activities/conditions.
   6. All Contract requirements in Division 00 and 01 specifications.

B. This Section does not include:
   1. None.

C. Acronyms:
   1. SJVAPCD San Joaquin Valley Air Pollution Control District

1.2 REFERENCES

A. SJVAPCD Compliance Assistance Web Page on Dust Control:
   1. https://ww2.valleyair.org/compliance/dust-control/

B. SJVAPCD Regulation VIII
   1. https://ww2.valleyair.org/rules-and-planning/current-district-rules-and-regulations/regulation-viii-fugitive-pm10-prohibitions/

1.3 RELATED SECTIONS

A. Section 31 11 00 – Site Clearing

B. Section 31 20 00 – Earthwork

C. Section 01 57 23 – Stormwater Pollution Prevention Plan

1.4 SUBMITTALS

A. If applicable, Contractor shall submit to the SJVAPCD the Project Dust Control Plan at least 30 days prior to commencing earth moving activities.
B. If applicable, Contractor shall submit to the SJVAPCD the Project Construction Notification at least 48 hours prior to commencing earth moving activities.
C. Contractor shall submit to Owner the Project Dust Control Plan approved by the SJVAPCD or documentation of submission of a Construction Notification to SJVAPCD prior to commencing earth moving activities.

1.5 REQUIREMENTS

A. Comply with all requirements of SJVAPCD Regulation VIII throughout the life of this contract.

B. The Contractor shall be fully aware of the requirements of SJVAPCD Regulation VIII, the requirements of these specifications for preparing, implementing, maintaining, and enforcing the provisions of SJVAPCD Regulation VIII, and the impact that Regulation VIII will have on the operation, prosecution and cost of the work. A submittal of a bid on this project will be considered as prima facie evidence that the Contractor fully comprehends these requirements and impacts and has fully allowed for their effect on this project, both in time and cost. Failure to comply with SJVAPCD Regulation VIII is a violation of local regulations. Contractor hereby agrees to indemnify, defend and hold harmless Owner, its officers, agents, and employees from and against any and all claims, demands, losses or liabilities of any kind or nature which Owner, its officers, agents, and employees may sustain or incur for noncompliance with the Regulation VIII arising out of or in connection with the Project, except for liability resulting from the negligence or willful misconduct of Owner, its officers, agents or employees. Owner may seek damages from Contractor for delay in completing the Project in accordance herewith, including damage caused by Contractor’s failure to comply with Regulation VIII requirements.

1.6 QUALITY ASSURANCE

A. None.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Dust Management Practices (DMPs):
1. The Contractor is responsible for the providing and furnishing all DMPs, products, and practices necessary to comply with Regulation VIII. All materials and DMPs shall follow the requirements outlined in Regulation VIII, Rule 8021.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Dust Control Training Class Certificate:
1. At least one key individual representing the Contractor who prepares a Dust Control Plan must complete a Dust Control Training Class conducted by the SJVAPCD.

2. At least one key individual representing the Contractor who is tasked to implement the Dust Control Plan must complete a Dust Control Training Class conducted by the SJVAPCD.

3.2 CLEANING AND REMOVAL

A. All temporary DMPs shall be completely removed from the Project Site upon completion of construction.

3.3 RECORD KEEPING

A. If a Dust Control Plan applies to the Project, Contractor shall maintain records in accordance with the recordkeeping requirements of Regulation VIII, Rule 8011.

3.4 PAYMENT

A. Full compensation for all costs involved in preparing, submitting, implementing, and monitoring the implementation of Regulation VIII for this project, including training, performing corrective measures, providing all labor, materials, resources to maintain the site, and all required records for a Dust Control Plan (if applicable), and being full liable for all failures to fulfill the intent and requirements of the Regulation VIII set forth by the SJVAPCD, shall be included in the cost bid for the various items of work and no additional payment will be made therefor.

END OF SECTION

SECTION 01 57 23 – STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Provide all material, labor, and services necessary to: comply with the State of California Construction General Permit Order 2022-0057-DWQ (CGP); implement the Project Storm Water Pollution Prevention Plan (SWPPP); and install and maintain appropriate Best Management Practices (BMP) according to the SWPPP and California Stormwater Quality Association (CASQA) Construction BMP Handbook.
2. Retain a certified Qualified SWPPP Practitioner (QSP) to implement all Construction Site Monitoring Program (CSMP) elements of the SWPPP, or delegate appropriate roles to the trained Contractor.
3. Complete and maintain all inspections, sampling, weather monitoring, and recordkeeping required by the CGP, commensurate with a Risk Level 1 SWPPP.
4. Ensure that all conditions are met for SWPPP termination including, but not limited to: fully stabilizing all disturbed areas of the site; removing temporary BMPs, construction materials, and equipment; cleaning the site of any storm water pollutants within 90-days of completing outdoor construction activities; and notifying Owner and QSD of acceptable termination conditions.
5. If Contractor will dewater the site via pump or siphon that will result in discharge outside of the Owner's property, Contractor is required to submit a Notice of Intent (NOI) under the California Regional Water Quality Control Board (CRWQCB), Central Valley Region, Order R5-2022-0006-02/NPDES CAG995002 for Waste Discharge Requirements for Limited Threat Discharges to Surface Waters (Limited Threat General Order) and receive an approved Notice of Applicability (NOA) from the Executive Office. Contractor shall be solely responsible for fees, implementation, compliance, termination, and fines related to the Limited Threat General Order.
6. All Contract requirements in Division 00 and 01 specifications.

B. This Section does not include:
1. The Owner shall retain a Qualified SWPPP Developer (QSD) to prepare the SWPPP document.
2. The Owner shall submit the Notice of Intent (NOI), SWPPP, Changes of Information (COI), and Annual Reports, Notice of Termination (NOT) to the SWRCB on SMARTS.
3. The Owner shall complete all required QSD inspections.
4. The Owner shall pay the NOI application fee and annual renewal fees.
5. The Owner shall maintain the role of LRP and all responsibilities associated, except where those responsibilities are assigned to the Contractor within these specifications.
6. The Owner shall complete online digital certification of online reporting on SMARTS
7. After the Contractor has met all conditions for SWPPP termination, Owner shall complete the NOT and obtain approval from SWRCB. If the NOT is returned by SWRCB due to unacceptable site conditions, Contractor shall implement any redresses specified by the SWRCB.
8. Owner shall ensure that the Project design has incorporated all post-construction

requirements specified by the CGP, MS4 permittee, and local agency stormwater regulations.

C. Acronyms:

1.	BMP	Best Management Practices
2.	CGP	Construction General Permit
3.	CSMP	Construction Site Monitoring Program
4.	CASQA	California Stormwater Quality Association
5.	EPA	Environmental Protection Agency
6.	ELAP	Environmental Laboratory Accreditation Program
7.	NOA	Notice of Applicability
8.	NOI	Notice of Intent
9.	NOT	Notice of Termination
10.	COI	Change of Information
11.	MS4	Municipal Separate Storm Sewer System
12.	NPDES	National Pollution Discharge Elimination System
13.	QSD	Qualified SWPPP Developer
14.	QSP	Qualified SWPPP Practitioner
15.	LRP	Legally Responsible Person
16.	PRD	Permit Registration Documents
17.	COM	City of Merced
18.	SMARTS	Stormwater Multiple Application and Report Tracking System
19.	SWPPP	Storm Water Pollution Prevention Plan
20.	SWRCB	State Water Resources Control Board
21.	RWQCB	Regional Water Quality Control Board

1.2 REFERENCES

A. Construction General Permit:
1. 2022-0057-DWQ Construction General Permit
2. https://www.waterboards.ca.gov/water_issues/programs/stormwater/construction/general_permit_reissuance.html

B. Project SWPPP Document
1. Available on SMARTS once approved by SWRCB
2. Available by request from the Owner.

C. CASQA Construction BMP Handbook:
1. https://www.casqa.org/resources/bmp-handbooks
2. Appendix G of the Project SWPPP.

D. Order R5-2022-0006-02/NPDES CAG995002 for Waste Discharge Requirements for Limited Threat Discharges to Surface Waters (Limited Threat General Order)
1. https://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2022-0006-02.pdf

1.3 RELATED SECTIONS

A. Section 31 11 00 – Site Clearing

B. Section 31 20 00 – Earthwork

C. Section 33 40 00 – Storm Drainage

D. Section 01 57 00 – Fugitive Dust Control

1.4 SUBMITTALS

A. All submittals shall be in accordance with the submittal requirements of these specifications.

B. The Contractor shall provide, to the Owner and QSD, the name, certification number, and contact information of their retained QSP within 30 days of starting construction.

C. The Contractor shall provide to the Owner and QSD, completed training records of QSP delegation to the Contractor within 30 days of starting construction.

D. The Contractor shall submit to the Owner and QSD the proposed product to be used at the site as soil binder or tackifier for the purposes of erosion control for approval.

E. The Contractor, QSP, or QSP Delegates shall submit to the Owner and QSD analytical laboratory results from stormwater sampling to the Owner and QSD within 48 hours of receiving analytical results from the laboratory.

F. Prior to conducting dewatering operations at any portion of the site via pump or siphon that will result in dewatering water discharge out of the Owner's property, Contractor shall submit a Notice of Intent (NOI) for the Limited Threat General Order to the RWQCB (Central Valley Region) and receive an approved Notice of Applicability (NOA). Contractor is prohibited from conducting dewatering operations until an approved NOA is received. Contractor shall submit their approved NOA to the Owner and QSD prior to beginning dewatering operations.

G. The Contractor shall provide, to Owner and QSD, documentation of implementing all SWPPP requirements, for each Annual Report, within 30 calendar days of the end of each reporting period (reporting period is July 1 through June 30 of each year), or upon requesting to terminate the Project SWPPP.

H. Upon request from the Owner or Owner's agents, Contractor shall provide all documentation that is required throughout construction including, but not limited to, CSMP records, sampling records, non-stormwater spill and discharge events, rain logs, QSP-signed inspection reports for delegated reports, and completed QSP delegation training records.

1.5 REQUIREMENTS

A. General:
   1. Contractor is responsible for understanding and carrying out all provisions of the SWPPP, CGP, and any requirements from local agencies (except as excluded above in 1.1.B., where Owner responsibilities are specified).
   2. The requirements of the CGP, SWPPP, MS4 permittee, and any other local regulations related to stormwater pollution prevention shall be reviewed by Contractor, prior to initiating any ground disturbance or other activities that could

lead to stormwater pollution, for a full understanding of the intent, objectives, and implementation.

3. Contractor responsibilities begin immediately upon execution of the contract containing these specifications and continue until the SWPPP has been terminated with SWRCB.
4. Specific requirements include, but are not limited to:
   a. Daily weather monitoring and record keeping to identify upcoming storm events and required qualifying precipitation event-related inspections.
   b. Installation of an on-site rain gauge and daily rain gauge reading recording.
   c. Installation, implementation, and maintenance of BMPs, and prevention of prohibited activities and unauthorized non-stormwater discharges.
   d. Conducting and reporting to the QSD all non-visible pollutant release sampling and dewatering sampling.
   e. Ensure that all subcontractors and agents are trained to understand and implement their relevant responsibilities under the CGP, SWPPP, and these specifications.
   f. Pay any penalties, fines, and corrective action costs resulting from failure to comply with SWPPP, CGP, and local agency requirements, and hold the Owner/LRP harmless from any such failures.
   g. Ensure that all conditions are met for SWPPP termination including, but not limited to: fully stabilizing all disturbed areas of the site; removing temporary BMPs, construction materials, and equipment; cleaning the site of any storm water pollutants; and notifying Owner and QSD of acceptable termination conditions.
5. The SWPPP is an aid to the Contractor in complying with the CGP. CGP requirements shall take precedence over anything contained in the SWPPP, Contractor shall notify the Owner and QSD of any conflicts between the SWPPP and CGP, and no such conflicts shall relieve the Contractor of any responsibilities for execution of these specifications.
6. See the approved SWPPP for the determined Project risk level. The requirements associated with the project's risk level shall be found in the SWPPP.

B. Retaining a Qualified SWPPP Practitioner (QSP)
1. The Contractor shall retain a certified QSP who will have responsibility and oversight for the implementation of the CSMP elements of the SWPPP and CGP.
2. Contractor shall maintain documentation in the on-site SWPPP and digitally that proves a certified QSP conducted oversight of all SWPPP and CGP compliance activities including, but not limited to:
   a. CSMP inspections, training, weather forecast monitoring and recordkeeping, on-site rain gauge records, non-visible pollutant discharge sampling, and recordkeeping. The responsibilities of the Contractor's QSP are explained in Part 3, Section 3.1 of these SWPPP specifications.

C. Non-visible pollutant discharge sampling:
1. The Contractor's QSP shall train Contractor staff members on non-visible pollutant observation and sampling procedures of the CGP and Section 7 of the Project SWPPP. The QSP and QSP trained delegates shall conduct non-visible sampling when required by site observations and activities according to the CGP.
2. The Contractor shall be prepared with a pH field meter and calibration fluid and clean non-visible pollutant sample bottles and preservatives based on the current non-visible pollutants on-site, as identified in Section 7 of the Project SWPPP.

3. The Contractor shall be prepared to preserve stormwater samples on ice to 4° Celsius immediately after taking stormwater samples and until being driven, picked-up, or shipped to an ELAP certified laboratory.
4. The Contractor shall pay for all costs related to non-visible pollutant sampling and laboratory analysis.
5. A QSP-trained and delegated Contractor staff member or the QSP shall:
    a. Always be available on-site within one hour during site operation hours to conduct non-visible pollutant discharge sampling as required by the CGP.
    b. Complete the non-visible pollutant sampling procedures identified in Section 7 of the Project SWPPP and according to the CGP immediately after the discovery of exposure of non-visible pollutants to stormwater that have a potential to discharge off-site.
    c. Take non-visible pollutant samples of effluent from waste dumpsters left uncovered during rainfall during site operation hours that have a potential to discharge off-site.
    d. Take non-visible pollutant samples of runnoff from demolished building materials left uncovered during rainfall during site operation hours that have a potential to discharge off-site.
6. The Contractor or QSP shall report analytical laboratory results from stormwater sampling to the Owner and QSD within 48 hours of receiving analytical results from the laboratory.

D. Dewatering permitting and compliance with Limited Threat General Order
1. Contractor is not necessarily required to submit a NOI with the Limited Threat General Order and receive an approved NOA. If Contractor can avoid dewatering operations, dewater areas of the site without resulting in discharge outside of the Owner's property, or have dewatering water pumped into a wastewater disposal truck for authorized disposal, coverage under the Limited Threat General Order is not required.
2. Prior to conducting dewatering operations at any portion of the site via pump or siphon that will result in dewatering water discharge out of the Owner's property, Contractor shall submit a NOI for the Limited Threat General Order to the RWQCB (Central Valley Region) and receive an approved NOA. Contractor is prohibited from conducting dewatering operations until an approved NOA is received. Contractor shall comply with all requirements of the approved NOA related to dewatering discharges.
3. Contractor shall be solely responsible for fees, implementation, compliance, NOI termination, and fines related to the Limited Threat General Order.

E. The Contractor shall be responsible for achieving Final Stabilization, as defined by the CGP, for all areas disturbed by Project construction activities in order to terminate the SWPPP within 90-days of completing construction activities, including areas without landscaping plans.
1. The Contractor shall re-establish any existing vegetation disturbed by the Project with the same vegetation type as was disturbed.
2. The Contractor shall achieve Final Stabilization for all graded areas with no landscaping plan and disturbed pre-existing non-landscaped vegetation disturbed by the Project with either non-vegetative stabilization as defined by the CASQA Construction BMP Handbook or by use of seeding/hydroseeding with a native erosion control seed mix.

F. The Contractor shall be fully aware of the requirements for the full execution of the SWPPP; the requirements of these specifications for implementing, maintaining, and enforcing the provisions of the SWPPP; and the impact that the SWPPP will have on the operation, prosecution and cost of the work. A submittal of a bid on this project will be considered as prima facie evidence that the Contractor fully comprehends these requirements and impacts and has fully allowed for their effect on this project, both in time and cost. Failure to comply with the CGP is a violation of federal and state law. Contractor hereby agrees to indemnify, defend and hold harmless Owner, its officers, agents, and employees from and against any and all claims, demands, losses or liabilities of any kind or nature which Owner, its officers, agents, and employees may sustain or incur for noncompliance with the Permit arising out of or in connection with the Project, except for liability resulting from the negligence or willful misconduct of Owner, its officers, agents or employees. Owner may seek damages from Contractor for delay in completing the Project in accordance herewith, including damage caused by Contractor's failure to comply with Permit requirements.

1.6 QUALITY ASSURANCE

A. Certified SWPPP Professionals:
   1. Qualified SWPPP Developer (QSD)
      a. The Owner shall retain a certified QSD.
      b. The QSD's name, certification number, and contact information shall be listed within the SWPPP document.
   2. Qualified SWPPP Practitioner (QSP)
      a. The Contractor shall retain a certified QSP.
      b. The QSP's name, certification number, and contact information shall be provided to the Project QSD and in the on-site SWPPP.

B. Regulatory Requirements:
   1. Contractor shall comply with the lawful requirements of any applicable municipality, county, drainage district, municipal storm water management program and other local agencies regarding discharges of storm water to separate storm drain system or other watercourses under their jurisdiction, including but not limited to the following:
      a. EPA Environmental Protection Agency.
      b. COM City of Merced
      c. SWRCB State Water Resources Control Board.
      d. RWQCB Regional Water Quality Control Board.
   2. All stormwater compliance shall be in accordance with local regulations:
      a. County of Merced.
      b. City of Merced.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Best Management Practices (BMPs):
   1. The Contractor is responsible for the providing and furnishing all BMPs, products, and practices necessary to comply with the SWPPP and CGP. All materials and BMPs shall follow the CASQA Construction BMP Handbook and installed as described within the fact sheets, unless otherwise instructed by a qualified

professional.

2. The Contractor must provide, implement, and carry out all BMPs required to comply with the CGP, regardless of the BMPs contained in the SWPPP, and shall notify Owner and QSD of any conflicts between the SWPPP and CGP.
3. The Contractor shall comply with the erosion control BMP requirements of the CGP, stating that BMPs must be initialized immediately to temporarily stabilize an area disturbed by construction where construction activities will not be resumed within 14 days (CGP Appendix D Section II.D.f).
4. Prior to substantially altering BMPs recommended in the SWPPP, Contractor shall notify the Owner and QSD for review of the alternative BMPs and to obtain instructions for documenting the changes.
5. Contractor shall consult with the QSP to ensure all BMPs are appropriate, feasible, effective, and correctly implemented.
6. Any materials required for compliance with the Limited Threat General Order and the approved Project NOA, if applicable.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Monitoring by the Contractor's QSP:
   1. Implement the CSMP and document all records in the SWPPP as required by the CGP, including, but not limited to: weekly, pre-storm, during-storm, post-storm, and quarterly inspections, daily weather monitoring, training of responsible contractor and subcontractor personell, and incidental non-visible pollutant discharge sampling.
      a. CSMP inspection reports:
         1) The QSP or QSP trained delegates shall include photographs showing all disturbed areas, BMPs, BMP deficiencies, material storage locations, stormwater containment areas, and active construction areas. All photographs shall include comments noting any BMP corrective actions and completed corrective actions.
         2) The QSP or QSP trained delegates shall document in their CSMP Inspection reports when all outdoor construction activities have ceased.
      b. QSP Training Records:
         1) The QSP or QSP trained delegates shall administer and document training of contractor and subcontractor staff responsible for BMP implementation, instillation, and maintenance and document it in the SWPPP.
         2) If QSP delegates any weekly/during storm inspections and/or non-visible pollutant discharge sampling requirements to Contractor personnel, QSP shall provide and document training to those personnel.
            a) If CSMP inspection have been delegated, the QSP shall review and sign all documentation completed by the trained QSP delegate.
      c. Weather Monitoring:
         1) The QSP or QSP trained delegates shall save records of daily weather monitoring of the nearest NOAA weather station.
         2) The QSP or QSP trained delegates shall record the daily on-site rain gauge reading and retain the records for the duration of the Project.
      d. Incidental Non-Visible Pollutant Discharge Sampling:
         1) The QSP or QSP trained delegates shall perform any stormwater and

non-stormwater sampling, as required by the CGP. If any samples are sent offsite for laboratory analysis, QSP will identify a designated ELAP-certified laboratory and coordinate sample procurement, transportation, analysis, and recordkeeping. If QSP delegates any of these duties to Contractor personnel, QSP shall provide training and document the training in the SWPPP. QSP shall upload sampling results to SMARTS.

e. The QSP shall consult with the Contractor to understand the construction schedule and identify site areas where erosion control BMPs must be initialized immediately to temporarily stabilize an area disturbed by construction where construction activities will not be resumed within 14 days in accordance with CGP Appendix D Section II.D.f.

2. New CSMP records outlined above in Part 3, Section 3.1.A shall be provided by the QSP to the QSD and Owner on a bi-monthly basis while the SWPPP NOI is active. New CSMP records shall be sent in the first week of odd numbered months.
3. The QSP shall identify required amendments to the SWPPP based on construction activity and notify the QSD and Owner.
4. The QSP shall identify when the site area has achieved “final stabilization” per the CGP definition, and inform the QSD and Owner.
5. The Contractor’s QSP shall advise the Contractor on achieving final stabilization of all areas disturbed by the Project within 90-days of outdoor construction activities ceasing. The Contractor shall be responsible for achieving final stabilization, as defined by the CGP, for all areas disturbed by Project activities, including areas without landscaping plans.
6. For the full monitoring requirements refer to the SWPPP and CGP.

B. Monitoring by Owner
1. The Owner has the right to monitor and oversee the Contractor’s implementation and maintenance of the BMPs and SWPPP.
2. Should the Owner determine that the Contractor’s efforts fail to meet the requirements of the CGP and the SWPPP, the Owner reserves the right to employ any and/or all of the following actions:
   a. Notify the SWRCB of the perceived failure of the Contractor to comply with the CGP and SWPPP.
   b. Withhold an amount of money from the Contractor’s Payment Request, equal to the Owner’s estimate of the value of the work required to implement and maintain the required BMPs, as well as provide the required inspection, training, and testing forms.
   c. If the SWPPP is not terminated within 90-days of outdoor construction activities ceasing, withhold monies due the Contractor under this Contract, in an amount sufficient to complete the work, pay any additional fees due the State, and close out the SWPPP in compliance with the General Permit.

C. Availability and access to the SWPPP:
1. As required by the SWPPP and CGP, the Contractor shall keep a minimum of one copy of the SWPPP, addenda, all PRDS, all inspection reports and all SWPPP records in the following locations:
   a. Contractor’s Project Site Field Office.
   b. Contractor’s General Business Office.
2. The SWPPP shall be made available for public inspection at any time during normal business hours.
3. All SWPPP records shall be made available to the Owner and their agents when requested.

3.2 CLEANING AND REMOVAL

A. Removal of BMPs
   1. All temporary BMPs shall be completely removed from the Project Site prior to filing of the NOT.
   2. The removal of any and all BMPs shall be coordinated and approved by the Contractor's QSP.
   3. All permanent BMPs shall remain on the Project Site, unless directed otherwise by Owner. The Owner will be responsible for ongoing inspection and maintenance after final acceptance.

B. Under written agreement and with the approval of the Owner, the Contractor may assign maintenance and removal responsibilities of the project BMPs to a subsequent Contractor for later work phases at the Project Site.

3.3 RECORD KEEPING

A. Paper and electronic records of all CSMP inspections, testing, training reports, all PRDs, inspection records, site photos, and all other SWPPP related records, shall be retained for a period of at least three years after the close of construction. These records shall be available at the project site until construction is completed.

3.4 PAYMENT

A. Full compensation for all costs involved in implementing, and monitoring the implementation of the SWPPP for this project, including inspections, sampling, testing, and training, performing corrective measures as required to better implement the SWPPP, providing all labor, materials, and resources to maintain the SWPPP and all required records of the SWPPP, and being full liable for all failures to fulfill the intent and requirements of the CGP set forth by the SWRCB, shall be included in the cost bid for the various items of work and no additional payment will be made therefor.

B. If applicable, Full compensation for all costs involved in implementing, and monitoring the implementation of the Limited Threat General Order for this project, including inspections, sampling, testing, and training, performing corrective measures, providing all labor, materials, and resources and being full liable for all failures to fulfill the intent and requirements of the Limited Threat General Order set forth by the RWQCB, shall be included in the cost bid for the various items of work and no additional payment will be made therefor.

END OF SECTION

SECTION 01 64 00 – OWNER-FURNISHED ITEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all materials, labor, equipment, and services necessary to prepare for installation for those items, noted or scheduled within the Contract Documents, indicated as follows:
   1. CFCI - Contractor Furnished, Contractor Installed
   2. OFCI - Owner Furnished, Contractor Installed
   3. OFOI - Owner Furnished, Owner Installed
   4. OFVI - Owner Furnished, Vendor Installed

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. CFCI: CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
   1. When and if the indication "CFCI" is noted on the drawings or listed in the specifications, such items are shown or listed for information and will be furnished by and installed by the Contractor. Such a designation is listed only for clarity, in order to set the item(s) apart from the OFCI, OFOI, and OFVI related item(s).
   2. All item(s) shown or listed in the drawings and specifications without any indication are in the Contract and are part of the Work unless specifically noted otherwise.

B. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED
   1. When and if the indication "OFCI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for information and will be furnished by Owner and installed by the Contractor. The Contractor shall coordinate and verify all dimensions and details necessary for the proper installation.

C. OFOI: OWNER FURNISHED, OWNER INSTALLED
   1. When and if the indication "OFOI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for the purpose of general information and will be furnished and installed by Owner. The Contractor shall coordinate and verify all dimensions and details necessary for proper installation.

D. OFVI: OWNER FURNISHED, VENDOR INSTALLED
   1. When and if the indication "OFVI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for information and will be furnished by the Owner and installed by the Vendor. The Contractor shall coordinate and facilitate all work to be completed by the Vendors.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Coordination Drawings:
   1. Submit installer's coordination drawings or other documents indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
   2. The Owner will provide Product Data, Shop Drawings, Piping and Wiring Diagrams, Catalog Data Sheets for any items provided under this Specification Section.

C. Closeout Submittals in accordance with Specification Sections in Division One:

1. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA). Regulatory changes may affect the formulation, availability, or use of the specified coatings. Confirm availability of coatings to be used prior to use, and notify the Architect of any recent changes in the Local California Air District Standards where the Project is located, that may have occurred after the preparation of this specification section.

B. Meetings:
   1. Progress Meetings: Scheduled by the Contractor for the proper performance of the work.
      a. Minimum agenda shall be to review the work progress; discuss field observations, problems, and decisions; identification of any potential problems which may impede planned progress; corrective measures to regain projected schedules; and maintenance of quality and work standards in accordance with manufacturer's warranty requirements.
   2. Final Inspection: Scheduled by the Contractor upon proper completion of the work.
      a. Minimum agenda shall be a walkover inspection to identify problems which may impede the issuance of any warranties or guarantees, and discussion of maintaining the work until substantial completion notice for the project is filed.
   3. Participants (or designated representative of) invited to attend each of the above meetings shall be as follows:
      a. Contractor.
      b. Owner.
      c. Architect.
      d. Installer.
      e. Material Manufacturer(s).
      f. Subcontractors, as appropriate (including any accessory subcontractors).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted. Contractor shall inspect prior to unloading, for any damaged goods, and if OK, will allow unloading and be responsible for the goods.

B. Acceptance at Site:
   1. The Contractor shall accept delivery of any items and the responsibility for all items to be furnished to him by the Owner.

C. Storage and protection:
   1. Owner Furnished Equipment: The Owner will coordinate and inform the Contractor as to delivery dates for Owner Furnished Equipment to the Project Site. The Contractor shall be responsible for unloading, uncrating, and protecting such equipment.
   2. When only a supporting device, or sub-assembly is to be installed by the Contractor the Owner shall provide only that portion and shall store and safeguard those portions to be installed later by others.
   3. All products shall be protected, handled, and stored in complete compliance with the manufacturer's printed instructions to protect the Owner from warranty infringements or loss of the full function of the item specified.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Examine all preparatory work to determine its suitability and completeness. Notify the responsible Contractor of any deficiencies which must be corrected prior to installation.
   3. Be satisfied that all conditions affecting installation, operation or function are suitable for installation of the items scheduled.
   4. After installation, and acceptance by the inspector and the Architect, the Contractor shall provide protective guards, covers or barricades as required by the manufacturer.
   5. The Contractor shall promptly repair, refurbish, or replace items damaged by his operations to a condition satisfactory to the Owners representatives and at no cost to the Owner.

1.7 WARRANTY

   1. The Contractor shall provide access to the installed items or prepared substrates for the inspection of the manufacturers representatives, for the purpose of affirming the warranties scheduled.
   2. All work shall be performed in full accordance with the manufacturers warranty requirements and all governing codes.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
      a. Prepare all substrate blocking as required by the items Furnished By Owner.
      b. Prepare all wiring and piping connections as required by the items Furnished By Owner.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond or installation of materials specified within the Contract Documents.

3.2 INSTALLATION

A. General:
   1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Layout:
   1. Lines shall be straight and true.

C. Material and Equipment to be installed:

1. All items so noted or scheduled to be OFCI shall be unloaded, completely installed and placed in operable condition under this Contract.

3.3 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces at the end of each day, minimum.
   2. In accordance with manufacturer's instructions and recommendations.

3.4 SCHEDULES

A. This schedule is provided for the convenience of the General Contractor for items not scheduled elsewhere on the drawings or in the Specification Sections. Refer to Drawings for additional items not listed below:
   1. SITE EQUIPMENT STATUS
      a. Playfield Equipment OFCI
      b. Shade Structure OFCI
      c. Synthetic Turf OFCI

   2. BUILDING EQUIPMENT STATUS
      a. Markerboards OFCI

END OF SECTION

SECTION 01 73 29 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary for cutting and patching existing materials, accessories and other related items necessary to remodel the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of Work.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Coordination Drawings:

1. Submit any installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.

1.4 QUALITY ASSURANCE

A. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades.

1. Review areas of potential interference and conflict.
2. Coordinate procedures and resolve potential conflicts before proceeding.

B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

C. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. The Contractor shall do all cutting, fitting or patching of existing construction and his work as may be required to make the several parts come together properly and ready to receive or be received by work of other contractors as shown, or reasonably implied by the drawings and specifications for the completed structure. All work shall be as directed by the Architect to achieve the intended work and degree of finish shown.

F. Any cost caused by defective or ill-timed work shall be borne by the party responsible therefor.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 FIELD QUALITY CONTROL

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill. ***Do not overcut concrete corners*** – hand chip all corners to prevent over-cutting lines. Cut any masonry pavers at grout lines, and ***don't overcut*** into adjacent brick that is to remain.

4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Grinding and Sandblasting: Where grinding and sandblasting is required of existing construction, perform in accordance with industry standards for proper preparation of new construction or finishes.

D. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    a. All hard paving and walk replacement shall be flush with adjacent existing construction. Compact existing subgrade so that there is no settling of adjacent horizontal surfaces greater than 1/4", and that all surfaces are ADA compliant.
    b. When altering surfaces in brick paving, match nearby adjacent horizontal concrete surfaces in color and texture. Take care to protect adjacent brick surfaces from concrete slurry and finishing operations. Clean exposed surfaces of brick immediately so that no signs of adjacent concrete work is seen.
    c. Match existing adjacent exposed aggregate concrete paving (color and texture) when construction is proposed for areas paved with exposed aggregate concrete.
    d. Match existing adjacent colored concrete paving (color and texture) when construction is proposed for areas paved with colored concrete.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

E. Insert specific installation requirements if not specified elsewhere. Specific installation requirements are better specified in individual Sections.

END OF SECTION

SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Requirements governing execution of the work including, but not limited to, the following:
   1. Salvaging non-hazardous demolition waste.
   2. Recycling non-hazardous construction and demolition waste.
   3. Disposing of non-hazardous construction and demolition waste.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS
   2. DIVISION 01 SPECIFICATION SECTIONS
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, modernization, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition and site clearing operations.

C. Disposal: Removal off-site of construction and demolition waste and subsequent sale, recycling, reuse, or deposit in landfill acceptable to authorities having jurisdiction.

D. Recycle: Recovery of construction or demolition waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of construction or demolition waste and subsequent sale or reuse in another facility.

1.3 SYSTEM DESCRIPTION

A. Performance Requirements
   1. General:
      a. Achieve end-of-project rate for salvage/recycling of minimum [65][75][90] percent by weight of total non-hazardous construction and demolition waste generated by the Work.
      b. Practice efficient waste management in the use of materials in the course of the Work.
      c. Use all reasonable means to divert construction demolition waste from landfills and incinerators.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section – SUBMITTAL PROCEDURES:

B. Quality Assurance/Control Submittal:
   1. Waste Management Plan.
   2. Waste Management Progress Reports.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:
      a. CARB Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board and the Environmental Protection Agency (EPA), in the area where the project is located.
      b. CAL/OSHA California Division of Occupational Safety and Health Administration.

c. CF County of Merced, codes and ordinances.
d. DTSC Department of Toxic Substances Control.
e. EPA Environmental Protection Agency.

B. Waste Management Plan:
1. Prior to commencing the Work, submit Waste Management Plan. The Plan must include, but not limited to, the following:
a. Contractor's name and project identification information.
b. Procedures to be implemented.
c. Materials to be salvaged, recycled, or disposed.
d. Estimated quantities of material broken down by material categories.
e. Names and locations of entities who receive salvaged and recycled materials.
f. Tonnage calculations that demonstrate that the Contractor will salvage, re-use, or recycle the minimum percentage by weight of the construction and demolition waste materials generated by the Work.

C. Waste Management Progress Reports:
1. Submit the Report with each application for progress payment.
a. Failure to submit the Report and it supporting documentation can render the application for progress payment incomplete and delay the progress payment.
2. Each Report must include, but not limited to, the following:
a. List of material categories.
b. Weight quantity of waste by material category.
c. Weight quantity of waste salvaged.
d. Weight quantity of waste recycled.
e. Total weight quantity of salvaged and recycled waste by material category.
f. Weight percentage of waste salvaged and recycled by material category.
g. Include manifests, weight tickets, receipts, and invoices specifically identifying the universal waste, salvaged, reused, and recycled materials.
h. Signature line for Contractor.

D. Meetings:
1. Pre- Demolition……Schedule prior to the start of work.
a. Coordinate the work with other work being performed.
b. Identify any potential problems, which may impede the proper disposal of materials.
c. Review areas where waste and recycle bins will be located.
d. Review where salvaged materials will be stored.
e. Review demolition waste disposal and material recycling procedures and environmental goals per Waste Management Plan with all subcontractors and waste haulers.
2. Progress:……Scheduled by the Contactor during the performance of the work.
a. Review for maintaining proper procedures.
b. Inspect and identify any problems and acceptable corrective measures.
3. Completion:……Scheduled by the Contactor upon proper completion of the work.
a. Inspect and identify any problems.
b. Submit final Progress Report summarizing total construction and demolition waste weights, percentages salvaged, recycled, and disposed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Cleaning, handling, and packing:
1. Salvaged Items shall be handled in such a manner as to assure that they are free from damage.
2. Salvaged Items shall be cleaned and packed or cleaned and palleted before off-site transport.

B. Storage and protection
1. Salvaged Items shall be stored in a dry, protected area prior to transport.

2. Cover with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental requirements;
   1. Comply with federal, state, and local regulations pertaining to solid waste, recycling, chemical waste, sanitary waste, and noise pollution.
   2. Perform work in a manner as to minimize the spread of dust and flying particles.
   3. No burning will be allowed on-site.

B. Existing conditions:
   1. Examine project site and building(s) and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Conduct work so as not to interfere unnecessarily with adjacent buildings, roads, streets, drives, and walks.
      a. Do not close or obstruct streets, alleys, walks, or passageways without permission from authorities having jurisdiction and coordinating same with immediate neighbors whose business operation may be affected.
      b. Safety measures shall be taken to insure an uninterrupted flow of traffic around the site as required by local Police and Fire Departments.
   3. Storage or sale of removed items on-site is not permitted.
   4. Hazardous materials are present in buildings and structures to be selectively demolished. The Owner has prepared a report for the Contractor to review and use.
      a. Hazardous material remediation is specified in Specification Section - HAZARDOUS MATERIAL PROCEDURES.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Furnish all materials, tools, equipment, facilities, and services as required for performing the construction and demolition waste disposal work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions:
   1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   2. Execution of work under this specification section shall constitute acceptance of existing conditions.
   3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the Work under this Section.

3.2 PREPARATION

A. Coordination:
   1. Before proceeding, verify plans match existing conditions.
   2. Review documents of existing construction provided by Owner against existing conditions.
   3. If conflicts are encountered, report it to the Architect. Then prepare recommendation(s) for correction and submit to Architect for review.
   4. Coordinate work under this specification section with work specified under other sections.

B. Protection:

1. Property:
    a. Provide temporary weather protection to prevent damage to salvage and recycled items.
    b. All damage inflicted on public and private property and the property of the Owner shall be repaired or restored to the original condition prior to the start of this Work. All repair or replacement work shall be done at no additional cost to the owner.

3.3 IMPLEMENTATION

A. General:
    1. Implement waste management plan as submitted.
    2. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the contract.
    3. Designate and label specific areas on project site necessary for separating materials that are to be salvaged, recycled, reused, and donated.
    4. Universal Waste: Dispose per DTSC requirements.
        a. Batteries
        b. Electronic Waste, Cathode Ray Tubes (CRT's), and CRT glass
        c. Lamps: fluorescent light tubes, CFL bulbs, HID bulbs, metal halide bulbs, etc.
        d. Mercury wastes
        e. Non-empty aerosol cans
        f. PV modules

B. Demolition Waste:
    1. Salvaged items for delivery to Owner or other entity:
        a. Clean salvaged items.
        b. Pack or crate items after cleaning. Identify contents of containers.
        c. Store items in a secure area until pick-up or delivery to Owner.
        d. Transport item to Owner's storage area [on-site][off-site][list address].
        e. Protect items from damage during transport and storage.
    2. Salvaged items for reuse in the work:
        a. Clean salvaged items.
        b. Store items in a secure and dry area until ready for installation.
    3. Recyclable materials:
        a. Prepare and maintain recyclable waste materials according to recycling facility requirements.
        b. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
        c. Separate recyclable demolition waste from other waste materials. Separate recyclable waste by material type at project site to the maximum extent practical according to approved waste management plan.
            1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from the project site.
            2) Include a list of acceptable and unacceptable materials at each container or bin.
            3) Inspect containers and bins for contamination and remove contaminated materials if found.
            4) Processed materials stockpiled on site shall not be mixed with other materials. Shape stockpiles to drain surface water. Cover stockpiles to prevent windblown dust.
            5) Processed material shall be stockpiled away from construction. Do not stockpile within drip line of remaining trees.
        d. Remove recyclable demolition waste off project property and transport to recycling receiver or processor.
        e. The following list is of common material types which can be recycled. The list of material types is in no way complete but is representative of materials that can be sorted and recycled as per the intent of this specification section.
            1) Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

2) Wood: Sort and stack members according to size, type, and length of member.
3) Metals: Separate metal by type. Stack structural steel members according to size and length. Remove bolts, nuts, washers, and other hardware from members.
4) Gypsum Board: Stack large clean pieces on wood pallets in a dry location. Remove edge trim and sort with other metals.
5) Acoustical Ceiling Tile: Stack large clean pieces on wood pallets in a dry location.
6) Metal Suspension System: Separate metal members including trim and other metals from acoustical ceiling tile and sort with other metals.
7) Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and any tack strips. Store carpet in a dry location.
8) Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
9) Conduit: Reduce conduit to straight lengths and store by type and size.

4. Site clearing waste:
   a. Excavated top soil and land clearing debris not recycled and reused on-site shall be removed to an off-site recycling location or disposed of at a landfill that accepts inert material.

C. Construction Waste:
1. Recyclable materials:
   a. Prepare and maintain recyclable waste materials according to recycling facility requirements.
   b. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
   c. Recycle paper and beverage containers used by on-site workers.
   d. Separate recyclable construction waste from other waste materials. Separate recyclable waste by material type at project site to the maximum extent practical according to approved waste management plan.
   e.
      1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from the project site.
      2) Include a list of acceptable and unacceptable materials at each container or bin.
      3) Inspect containers and bins for contamination and remove contaminated materials if found.
   f. Remove recyclable construction waste off project property and transport to recycling receiver or processor.
   g. The following list is of common material types which can be recycled. The list of material types is in no way complete but is representative of materials that can be sorted and recycled as per the intent of this specification section.
      1) Cardboard Packaging: Breakdown into flat sheets. Bundle and store in a dry place.
      2) Polystyrene Packaging: Separate and bag materials.
      3) Pallets: As much as possible, require deliveries using pallets to remove pallets from the project site. For pallets that remain on-site, breakdown 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.
      5) Wood: Clean Cut-Offs of lumber and grind or chip into small pieces.
      6) Gypsum Board: Stack large clean pieces on wood pallets in a dry location.

D. Disposal of Waste:
1. Except for items or materials to be salvaged, recycled, or otherwise reused remove and transport waste materials from project site and legally dispose of them in a manner acceptable to authorities having jurisdiction.
2. Dispose of universal waste properly per DTSC standards.
3. Do not allow waste material to accumulate on site.
4. Transport waste in a manner that will prevent spillage on adjacent surfaces and areas.

3.4 CLEANING

1. Clean in accordance with Specification Section – PROJECT CLOSEOUT:
   a. Immediately clean any soiled surfaces to remain.

END OF SECTION

SECTION 01 77 20 – PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

C. Work Included:
   1. Project cleanup and coordination of all cleaning work required under all sections of this specification.
   2. Collection of and processing for delivery to the Architect of all Project Record Drawings required under this and other various Sections of the Specifications.
   3. Compile and assemble all required documents, operation data, maintenance manuals, and parts lists for all equipment items provided for this project.
   4. Start-up of all mechanical, electrical, and miscellaneous equipment items; and adjustment required for the performance specified.
   5. Compile and assemble all guarantees, warranties, or other written documentation to establish the requirements outlined under all sections of this specification.
   6. Repair and touch-up on all items damaged during the construction and handling processes.
   7. Furnish maintenance material and spare parts as specified within DIVISIONS 02 through 49 of these specifications.
   8. Deliver to the Architect all assembled copies of those items required in Articles 1 through 6 above for presentation to the Owner.

D. It shall be the responsibility of the Contractor to provide all labor and materials necessary to achieve completion of the items listed under Paragraph A, B and C above, although certain items may be specified under the work of other trades. Periodic removal of debris, cleaning, repair, and testing of times in various areas of the construction site shall be carried out under the direction of the Contractor.

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Quality Assurance/Control Submittals:
   1. Design Data.
      a. All design data as required by the Contract Documents.
   2. Test Reports:
      a. Submit four (4) copies of reports.
      b. Submit four (4) copies of reports required by regulatory requirements.
      c. Submit four (4) copies of ICC Evaluation Service Report.
      d. Submit four (4) copies of Testing Laboratory's report.
      e. All other Test Reports as required by the Contract Documents.
   3. Certificates:
      a. Submit three (3) copies of certificates.
   4. Manufacturer's Instructions:
      a. Submit three (3) copies of manufacturer's instructions.
   5. Manufacturer's Field Reports:

a. Submit three (3) copies of manufacturer's field reports.

6. Engineering Calculations:

a. Submit four (4) copies of engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.

1.3 Closeout Submittals in accordance with Specification Sections in Division One:

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

B. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.

C. Warranty in accordance with Specification Section - WARRANTIES.

D. Project Record Documents:

1. Various Sections of the detailed specifications require Project Record Drawings to be prepared by the Contractor(s). These drawings shall be collected by the Contractor, checked for conformance to the specific requirements, and when completed, delivered to the Architect. The Contractor shall also be responsible for collecting bound operating and maintenance manuals required of all trades supplying equipment, and for delivering them to the Architect.

E. Documents Required for Project Certification

1. Compile and neatly assemble with indexed and labeled tabs, three (3) sets of the required documents for project certification by the State Agencies. The required documents include, but are not limited to, the following;

a. Document Required List "Form" for Project Certification: ORS-6.

1) This document shall be used to organize and index the required documents.

b. Project Information "Forms":

1) Project Site Inspector(s): SSS-5.
2) In-Plant Inspector(s), required for re-locatable buildings only: SSS-5.
3) Contract Information: DSA-102.

c. Final Verified Report "Forms" from the Architect and Engineers:

1) Architect’s Final Verified Report: DSA-6A/E.
2) Structural Engineer's Final Verified Report: DSA-6A/E.
3) Mechanical Engineer's Final Verified Report: DSA-6A/E.
4) Electrical Engineer's Final Verified Report: DSA-6A/E.

d. Final Verified Report "Forms" from the Contractor(s) and Inspector(s):

1) Project Site Inspector(s) Final Verified Report: DSA-6.
2) Contractor(s) Final Verified Report: DSA-6.
3) In-Plant Inspector(s) Final Verified Report: DSA-6.
4) Special Inspector(s) Final Verified Report: DSA-6.

e. Other Final Verified Reports and Affidavits for:

1) Laboratory - To be signed by Licensed Professional Engineer.
2) Shop Welding and Fabrication - To be signed by AWS/CWI Welding Inspector
3) Field Welding - To be signed by AWS/CWI Welding Inspector
4) High Strength Bolt Installation
5) Glu-Laminated Fabrication
6) Manufactured Trusses
7) Masonry Inspection
8) Engineered Fill - To be signed by the Geotechnical Engineer
9) Bleacher Fabrication
10) Other items required by the State Agencies

f. Notices, Certificates, and Change Orders

1) Notice of Completion - Signed by the Owner, Notarized and recorded with the County Recorders Office.
2) Weighmaster Certificate(s)
3) Automatic Fire Sprinkler System
4) Fire Alarm System Components

5) Fire Standpipe System
6) Fire Suppression System
7) Smoke Ventilation System
8) Skylight System
9) Bleacher System
10) Change Orders - Signed and fully executed.
11) Other documents and/or requirements required by the State Agencies

g. Field Visit Reports, Correction Reports, Punch Lists & Final Review Reports

1) Field Visit Reports from State Agencies
2) Field Visit Reports from Architect and Engineers
3) Inspector's Correction Reports
4) Contractor Punch Lists
5) Architect, Engineers and Owner Final Review Reports
6) A jointly signed and notarized Affidavit from the Contractor and Project Inspector (formerly the Inspector of Record), indicating that any and all items of correction noted in the above documents have been corrected (including Testing Laboratory Reports).

1.4 QUALITY ASSURANCE:

A. Safety, Fire and Environmental Protection, and Insurance standards shall be strictly adhered to in all phases of the construction work. It shall be the responsibility of the Contractor to determine the standards applicable to this project as set forth in all codes, regulations, and ordinances having jurisdiction, and as set forth elsewhere in the Specifications.

B. All specific requirements stipulated in, or required by code references included under all sections of DIVISIONS 02 through 49 inclusive of this specification, and as detailed under Article 3.4 of this Section, shall be required under this Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Materials:

1. Use only those specified materials or types of materials recommended and approved by the manufacturer of the item to be cleaned.

B. Touch-Up Materials:

1. Use only those materials furnished by or as recommended and approved by the manufacturer of the item to be touched up. Colors and finish characteristics shall exactly match the base material and extra materials, labor, and services required to achieve this result shall be provided by the Contractor(s).

C. Replacement Materials:

1. Materials that are damaged and not repairable, or materials that are destroyed shall be replaced with equal and identical materials of the same manufacture and shall function in conjunction with the remaining portions of that material. Items no longer manufactured or available shall be replaced with comparable materials as approved by the Architect and at no additional cost to the Owner.
2. Materials that are required for maintenance replacement by the owner after the guarantee period has expired, or by the contractor during the guarantee period shall exactly match those materials installed as to make, style, color lot, etc., under this contract, and shall be delivered to the owner in marked, identified containers.

D. Extra Materials:

1. Carefully examine the requirements of the applicable Sections of all DIVISIONS and specifically of DIVISION 09 and deliver the materials required to the Owner.

PART 3 - EXECUTION

3.1 REPAIR AND RESTORATION

A. All damaged items shall be repaired and replaced as directed using proper materials and craftsmen skilled in that particular trade. Materials shall be as follows:
   1. All repair or replacement parts shall be of the same equality and manufacturer as the item being repaired.
   2. All touch-up paint shall be as provided by the item manufacturer for that purpose and shall exactly match the original color and finish.

3.2 FIELD QUALITY CONTROL

A. Final Reviews:
   1. In addition to all items covered under those Sections of Divisions 02 through 49 inclusive, the Contractor shall comply with the requirements stated herein.
      a. The Contractor shall request in writing a final review (see Contractor's Request for Final Review form at the end of this Specification Section).
         1) The Contractor shall allow a forty-eight (48) hour time period of advance notification prior to the requested date and time indicated on the Review Request form.
         2) The Contractor represents that the work has been carefully inspected by the Contractor to determine that the work is complete and in compliance with all requirements set forth.
      b. The Contractor shall prepare and shall submit the initial Contractor's Punch List identifying the items that remain uncompleted forty-eight (48) hours prior to the scheduled final review by the Architect.
      c. Under no circumstances shall the Contractor ask the Architect or his representative to make these determinations for him.
   2. The Architect shall review the initial Contractor's Punch List along with the Owner's Project Inspector, and determine together whether or not the Project is ready for final review. If approved, the Architect or its representative will make the final review on the date and time requested in the Contractor's Request for Final Review form, except under the following conditions:
      a. Upon reviewing a portion of the Project and finding quantities of work incomplete or not in compliance, the review shall cease, and the Architect will notify the Contractor.
      b. If the Contractor has assured the Architect of the completeness and/or accuracy of the work, and the review does not bear this contention out.
   3. The above conditions will be adhered to rigidly to prevent the Architect from being required to act as a supervisory agent of the Contractor by being asked to determine the degree of completion.
      a. When the Contractor requests additional reviews, he shall reimburse the Architect for all time and expense incurred as indicated on the Contractor's Request for Final Review form at the end of this Specification Section.
      b. The Architect is herein defined as any of those firms or individuals listed by references on the drawings, including all consultants identified herein.
      c. All requests for Project Final Review (and re-review) shall be made in writing on the form provided at the end of this Specification Section.
   4. When the Architect does approve of the degree of readiness for the Project based on the initial Contractor's Punch List and the readiness of the Project, the Architect will make his final review, adding to the Contractor's Punch List any other items that require further completion.
   5. The Contractor shall take the initial Contractor's Punch List, together with the Architect's Punch List, and initial and date each item on each list as to when it was completed.
   6. Once both lists are completed and signed by the Project Inspector, the Contractor shall submit to the Architect the completed lists for final review and approval prior to filing for Substantial Completion.

3.3 CLEANING

A. During Construction:
   1. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish.
   2. Sprinkle dusty debris with water.
   3. At reasonable intervals during progress of work, clean up site and access and dispose of waste materials, rubbish, and debris.
   4. Provide suitable containers and locate on site for collection of waste materials, rubbish, and debris.
   5. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.
   6. Remove waste materials, rubbish and debris form the site and legally dispose of at public or private dumping areas off the Owner's property.
   7. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.
   8. Lower waste materials in a controlled manner with as few handling as possible; do not drop or throw materials from heights.
   9. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

B. Final Cleaning:
   1. Use experienced professional cleaners for final cleaning.
   2. At completion of construction and just prior to acceptance or occupancy, conduct a final review of exposed interior and exterior surfaces.
   3. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior surfaces.
   4. Repair, patch, and touch-up marred surfaces to match adjacent finishes.
   5. Broom clean paved surfaces; rake clean other surfaces of grounds.
   6. Replace air conditioning filters if units were operated during construction.
   7. Clean ducts, blowers, and coils if air conditioning units were operated during construction
   8. Maintain cleaning until the building, or portion thereof, is accepted by the Owner.

3.4 DEMONSTRATION

A. During Construction and as each piece of equipment is installed, provide the following tests:
   1. Verify that all external service connections have been properly completed, and that piping and/or wiring is properly sized, and contain all necessary safety devices.
   2. Verify that the equipment is free of shipping materials, tie downs, or other internal obstructions.
   3. Conduct tests employing the manufacturer's operating instructions as a sequential guide.
   4. Verify that all portions of the equipment function properly and that the total performance criteria is satisfied.
   5. Make adjustments, replacements, or repairs necessary to achieve full operational capability and repeat tests until performance is achieved and approval obtained.

B. Prior to acceptance, verify that all conditions specified in the Article titled FIELD QUALITY CONTROL, Final Review, have been satisfied and that equipment is ready for continuous use. Provide the following services preparatory to acceptance:
   1. Clean or replace all filters and/or strainers.
   2. Adjust all belts and drive mechanisms.
   3. Lubricate all moving parts as required by manufacturer's operating instructions.
   4. Demonstrate to the Owner's representative and the Architect or Engineer the method and sequence of operation, and provide testing devices and/or data to verify that performance equals that specified.
   5. Provide operating instructions in bound form along with manufacturer's parts list and written warranties.

3.5 SCHEDULES

A. See next page for Request for Final Review from the Contractor(s):

(The rest of this page is left intentionally blank)

CONTRACTOR'S REQUEST
FOR
FINAL REVIEW FORM

PROJECT:_____
(Name of Project and DA Project Number)

TO: **DARDEN ARCHITECTS, INC.**
6790 N. West Avenue
FRESNO, CA 93711

FROM:_____
(Contractor)

_____
(Address)

_____

WE HEREBY request Final Review on _____ and _____.
(Date) (Time)

WE HEREBY, request and certify:

- The project is ready for Final Review.
- The undersigned will compensate the Architect at a rate of $176.00 an hour for further review, investigation and comments if it is determined that the Project is not ready for final review as indicated earlier within this Specification Section. The Architect is herein defined as any of those firms or individuals listed by reference on the Drawings, including all Consultants identified herein.

Submitted By (Contractor)

Signature_____
Firm_____
Address_____
Date_____
Telephone_____

Below is
for Use by Design Consultant only

___ Conditions for Final Review Accepted
___ Final Review Accepted as Noted
___ Final Review Not Accepted

By_____
Date_____
Remarks_____
_____
_____
_____

END OF SECTION

SECTION 01 78 36 – WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

A. In addition to providing all other warranties specified in the Project Manual and without affecting any rights of Owner under State or Federal law, Contractor shall warrant that the Work done under this Project Manual will be free from faulty materials or workmanship and hereby agrees, upon receiving notification from the Owner or his Agent, to immediately remedy, repair or replace, without cost to the Owners and to his entire satisfaction, all defects, damages or imperfections appearing in said work within a period of one (1) year unless specified otherwise, after date of final acceptance by the Owner of all work done under this Project Manual, regardless of whether or not the Owner or persons operating under contract with the Owner partially or wholly occupies any portion of the work prior to acceptance. For work performed after completion, the one (1) year period shall be extended by the period of time between the date of final acceptance by Owner and actual performance of the work. This obligation shall survive acceptance of the work and termination of the Contract.

1. Warranties shall be in the form outlined below and shall be submitted in duplicate to the Contractor and submitted on his own letterhead.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 SUBMITTALS

Warranty Form: (following page.)

(Contractor's Letterhead)
Project Number: _____
Project Name: _____

WARRANTY FOR
_____
We hereby warrant and the General Contractor warranties that
_____
_____
_____
has been done in accordance with the Drawings and the Specifications and that the Work as installed will fulfill the requirements of the warranty included in the Project Manual. We agree to repair, replace any or all of our work together with any other adjacent work which may be displaced or damaged by so doing that may prove to be defective in its workmanship or materials within a period of _____ years from date of acceptance of the above-named without any expense to the Owner, ordinary wear and tear and unusual abuse or neglect excepted. In the event of our failure to comply with above-mentioned conditions within ten (10) days after being notified in writing by the Owner or his agent, we collectively or separately, do hereby authorize the Owner to proceed to have said defects repaired and made good at our expense and we will honor and pay the costs and charges therefor upon demand.

_____
(Signature of Subcontractor)

_____
(Signature of Contractor)
Date: _____

A. Submit 2 copies of all manufacturer's or installer/applicator's warranties and bonds as specified within Division 02 –49.
B. Submit to Architect together with Project Record Documents.
C. Accompany submittals with transmittal letter in duplicate.
D. When Product Submittals are required, submit copy of warranty with product submittal.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION - NOT APPLICABLE

END OF SECTION

SECTION 01 78 39 – PROJECT DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the administrative and procedural requirements for Project Record Documents, including the following:
   1. Project As-Built Drawings.
   2. Project Record Drawings.
   3. Record Specifications.
   4. Record Product Data.

B. Related Requirements:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. CONTRACT DOCUMENTS: Contract Documents include Contract Forms, Project Manual (Contract Requirements and Specifications), Drawings, Addenda, Change Orders and Modification Documents (Supplemental Instructions, Request for Information, Construction Change Directives).

B. PROJECT "AS-BUILT" DOCUMENTS: A set of Contract Documents used during construction for recording of actual construction information during construction. The recording of construction information shall be maintained on the Contract Drawings and in the Project Manual.

C. PROJECT "RECORD" DOCUMENTS: A set of Contract Documents used at the completion of construction for transferring and documenting the actual construction information recorded on the PROJECT "AS-BUILT" DOCUMENTS.

D. RECORD PRODUCT DATA: A set of Submittals and Shop Drawings that have documentation of field changes made after review.

E. AGENCY DOCUMENTATION: Documents required by the Agency Having Jurisdiction to be prepared and submitted by the contractor.

1.3 SUBMITTALS:

A. Submit the following in accordance with specification Section SUBMITTAL PROCEDURES.

B. Format for Submittals:
   1. Accompany each submittal with a SHOP DRAWING AND SUBMITTAL TRANSMITTAL:
   2. PDF electronic file names shall match the Sheet Numbers of the Contract Documents.
   3. Provide labels on DVD's and DVD Cases and include the following:
   4. First Line: CLOSE-OUT DOCUMENTS
   5. If submittal contains multiple disks append to first line Disk, i.e. (1 of 2)
   6. Second Line: Project Name and Year
   7. Third Line: Architect Firm Name and Architect's Project Number
   8. Fourth Line: DSA or HCAI Number (if applicable)
   9. Fifth Line: Contractor Company Name
   10. PDF files for Project "Record" Documents and Record Product Data shall be combined with PROJECT CLOSEOUT, Maintenance Data and Operations Data, and WARRANTIES on a single set of DVD's.

C. PROJECT "AS-BUILT" DOCUMENTS: Comply with the following:
   1. Number of Copies: Submit one paper-copy set of marked-up as-built drawings and one paper-copy of marked-up as-built specifications.

2. Clearly Label each copy "PROJECT 'AS BUILT' DOCUMENTS" in two-inch-high printed letters.

D. PROJECT "RECORD" DOCUMENTS: Comply with the following:
   1. Number of copies: Submit copies of the Record Documents as follows:
      a. Initial Submittal:
         1) Submit one paper-copy of marked-up record drawings and one paper copy of marked-up record specifications,
         2) Alternatively, submit PDF electronic files of scanned marked-up record drawings and marked-up record specifications on one set of DVD's
         3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
   2. Final Submittal:
   3. Submit one paper-copy of marked-up record drawings, one paper copy of marked-up record specifications, and PDF electronic files of scanned marked-up record drawings and marked-up record specifications on three sets of DVD's.
   4. Each record drawing sheet shall be labeled, "PROJECT "RECORD" DOCUMENT.
   5. Print each drawing, whether or not changes and additional information were recorded.
   6. Clearly Label each copy "PROJECT "RECORD" DOCUMENTS in two-inch-high printed letters in a prominent location.

E. RECORD PRODUCT DATA: Comply with the following:
   1. Number of Copies:
      a. Submit one paper-copy set of marked-up shop drawings.
      b. Submit three DVD's of PDF electronic files of scanned marked-up shop drawings.

F. AGENCY DOCUMENTATION: Comply with the following:
   1. Submit Documentation Required by the Agency Having Jurisdiction utilizing the format and system established by the Agency.

1.4 SYSTEM DESCRIPTION

A. The Architect considers the Project Record Documents to be of significant importance to the Owner.

B. Project Record Documents provide important information for the Owner's records, they form an invaluable record for future reference for concealed conditions, facilities management processes, and future additions and renovations.

PART 2 - PRODUCTS

2.1 General:

A. All costs (including the time) required for recording, transferring, and copying all documentation shall be part of the Contractor's Overhead Expense.

B. Provide red pencil or ink (contrasting color) for all marking of the PROJECT "AS-BUILT DOCUMENTS, PROJECT "RECORD" DOCUMENTS, and RECORD PROJECT DATA.

C. Do not permanently conceal any work until required information has been recorded.

2.2 RECORD DRAWINGS

A. PROJECT "AS-BUILT" DOCUMENTS: Maintain one set of marked-up paper copies of the Contract Drawings: and Specifications, incorporating new and revised drawings as modifications are issued.
   1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
      a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:
   a. Elevation for finish grade for all points indicated on Site Grading Plan.
   b. Depths of various elements of foundation in relation to first floor finish elevation.
   c. Horizontal and vertical location of underground utilities and appurtenances referenced to visible and accessible features of structure.
   d. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities Field changes of dimensions and details.
   j. Changes made by Addenda, Change Orders and other Modification Documents.
   k. Details not on original Contract Documents.
   l. Changes made on Shop Drawings.
3. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
   a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   b. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
   c. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
   d. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
   e. Note related Changes Orders, record Product Data, and record Drawings where applicable.
4. Mark the Contract Drawings and Specifications completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
5. Note Request for Information numbers, Supplemental Instruction numbers, Construction Change Directive numbers, Change Order numbers, and similar identification, where applicable.

2.3 PROJECT "RECORD" DOCUMENTS:

A. General: Transfer all changes, notations, etc. from the "AS-BUILT" PROJECT DOCUMENTS to the "PROJECT RECORD" DOCUMENTS in the same quality as the original Contract Documents.

2.4 RECORD PRODUCT DATA

A. Maintain one set of marked-up paper copies of the Shop Drawings and Product Data, incorporating any modifications to the reviewed documents.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies from that indicated in Product Data submittal.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   3. Note related Change Orders and record Drawings where applicable.
   4. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.5 AGENCY DOCUMENTATION

A. Contractor shall prepare and upload all applicable forms pertaining to the Contractor as required by the Division of State Architect DSA Procedure 13-02, including but not limited to:
   1. DSA 6-C - Contractor Verified Report.
   2. NFPA System Record of Completion.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE:

A. Recording:
   1. Keep all documents current, PROJECT "AS-BUILT" DOCUMENTS shall be kept current at all times. Post changes and revisions to project as-built documents as they occur; do not wait until end of Project.
   2. The Project Inspector will review the PROJECT "AS-BUILT" DOCUMENTS periodically for the Architect at the time Payment Requests are processed. Should the PROJECT "AS-BUILT DOCUMENTS not be current and up to date, the Owner reserves the right to hold the Payment Request until compliance with the Contract Documents has occurred.

B. Maintenance of Documents:
   1. Maintain at job site the following:
      a. Contract Drawings.
      b. Project Manual/Specifications.
      c. Addenda.
      d. Reviewed shop drawings.
      e. Change Orders.
      f. All Modification Documents.
      g. Field test records.
   2. Store documents in field office apart from documents used for construction.
   3. Provide files and racks for storage of documents.
   4. File documents in accordance with Project Filing Format or Uniform Construction Index.
   5. Maintain documents in clean, dry, legible condition.
   6. Do not use record documents for construction purposes.
   7. Make documents available at all times for inspection by Architect, Owner and Owner's Inspector.

END OF SECTION

SECTION 02 01 10 – EXISTING LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Protection: Provide all barricades as required to prevent all damage to existing plant materials to remain including, but not limited to, protection from mechanical damage, soil compaction, pollution from all sources, and description of environmental support which would result in the loss of vigor of said plantings.

B. Drip Line: An imaginary line on the ground around a tree representing its outermost branch tips. All of the area within the drip line of existing trees to remain is to be protected from damage as specified herein, unless otherwise noted.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Shop Drawings:

1. Construction details for protective barriers and barricades are required.

C. Schedule:

1. Watering schedule, where interruption of irrigation systems will exceed one watering period.

D. Record of Existing Conditions:

1. Video record all existing planting at the project site designated to remain. Recording shall show all aspects of existing planting to remain throughout the project site.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. In accordance with Specification Section - Regulatory Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage:

1. Do not store materials or equipment under the branches of all existing trees or in turf or ground cover areas to remain.

1.6 PROJECT CONDITIONS

A. Review:

1. Visit and walk the site with Owner's representative to clarify Scope of Work and understand project conditions.

B. Documentation:

1. Confirm location of all plant materials to remain. Examine existing irrigation system to remain and report all malfunctioning equipment to be repaired by Owner. Record all discrepancies and all conditions which threaten existing plantings.

C. Acceptance:

1. Commencing work shall be taken as acceptance by the Contractor of responsibility for the protection of all existing site plantings with the exception if discrepancies and corrections noted above.

D. Replacements:
   1. General:
      a. Existing planting to remain which exhibits conditions which are determined as unacceptable due to inadequate protection during construction shall be replaced by Contractor at no expense to Owner.
   2. Planting:
      a. Closely match replacements to adjacent specimens of the same species, variety, and cultivate. Replacements are to be the same size as adjacent material at the time of replacement.

E. Traffic:
   1. Do not operate or park equipment within the drip line of existing trees to remain. Keep foot traffic out of existing ground cover and turf areas. Protect shrub areas from cross traffic.

F. Operations:
   1. Do not permit burning, temporary, or permanent dumping or storage of construction debris within drip line of existing trees to remain. Give written notification if any construction activity by any Contractor threatens to damage existing plants to remain.

1.7 SCHEDULING

A. Construct protective barriers prior to demolition and selective clearing. Construct other barriers as indicated in the Part 1 Article titled - SUMMARY.

B. A demolition meeting will be called prior to demolition where the Project Inspector, owner and Architect will set the extent of the protective barriers.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's General Warranty: 1 Year
   1. During the Warranty Period for new planting, similarly warrant all existing plant materials against decline resulting from damage during construction.

C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section - WARRANTIES:

1.9 MAINTENANCE

A. Existing Planting:
   1. General:
      a. During the Maintenance Period for new planting, similarly maintain all existing plantings to remain.
   2. Fertilizers:
      a. Do not use complete fertilizers on existing plant materials unless oils test indicates specific nutrient deficiencies.

PART 2 - PRODUCTS

2.1 FERTILIZERS, HERBICIDES, AND PEST CONTROL

A. At Contractor’s option as required to maintain existing landscaping.

2.2 BARRIERS AND BARRICADES

A. Contractor's option.

2.3 SAFETY MATERIALS

A. Provide all reflective signage and/or flashers as required by all codes and ordinances affecting barricaded plantings to remain.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide barriers at the drip line of all trees designated to remain. Grouping of trees maybe enclosed by a single protective fence. Similarly protect turf, groundcover, and shrub areas form construction activities

3.2 FIELD QUALITY CONTROL

A. Cut: Do not permit machine excavation within the drip line of existing trees to remain. All such work shall be by hand labor. Do not permit more than two (2) inches of existing soil to be removed within the drip line except as authorized in writing by Architect.

B. Fill: Do not permit stockpiling of soil within the drip line of all existing trees nor on existing turf or ground cover areas. Do not permit more than three (3) inches of fill to be placed within the drip line during grading operations without written acceptance by Architect.

C. Storage: Do not store materials or equipment under branches of all existing trees nor in turf or ground cover areas to remain.

3.3 IRRIGATION

A. One week prior to the start of construction the contractor shall install and maintain for the project duration a controlled water system to maintain consistent and even watering to all plants to remain. System shall be type appropriate for the plants to remain and configured to give the appropriate amount of water for each type of plant.

B. If the irrigation system is disrupted for any reason during construction the contractor shall restore irrigation within twenty-four (24) hours of the disrupted service.

3.4 REPAIR OF DAMAGED PLANT MATERIAL

A. During the course of construction, if roots two inches (2) or larger in diameter are cut, the contractor shall take the following immediate action to minimize further damage to the plant material.

B. Stop construction activity, inform the Project Inspector and Architect. Contact a qualified arborist for inspection of plant material and report of construction impact on plants. The expense for the Arborist's services shall be the contractor's responsibility.

C. If the arborist determines that damage occurred the contractor will be directed within forty-eight (48) hours to perform the following:

1. Prune plant material to I.S.A. standard specifications to compensate for root loss.
2. Aerate soil to relieve compaction and to improve air and water exchange to root system.
3. Fertilize trees with deep water bore at a rate of one pound of actual nitrogen per 1,000 sq. ft.
4. Inject plant hormones (growth stimulator) through irrigation system.

D. This process shall be implemented within forty-eight (48) hours of direction by the arborist.

E. Failure to perform repairs within specified time will institute liquidated damages to the contractor of two hundred (200) dollars for each calendar day by which the completion of the repairs is delayed.

F. The owner reserves the right to hire a person or persons to perform the repair work in the event the contractor does not respond in a timely manner. The expense for this work will be the contractors responsibility at no further expense to the Owner.

3.5 CLEANING

A. At close of construction in each area, remove all protective barriers at the direction of the Architect. Transport all barrier materials off site at no additional expense to Owner.

B. Repair all grades and restore all damaged plant materials.

3.6 PROTECTION

A. Provide all reflective signage and/or flashers as required by all codes and ordinances affecting barricaded plantings to remain.

B. Barriers and Barricades:

1. Provide as required to meet all regulatory requirements and protection of landscaping during construction.
2. Remove when Owner occupies the Project.

END OF SECTION

SECTION 02 26 00 – HAZARDOUS MATERIALS PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to provide Hazardous Materials Procedures, accessories and other related items necessary to complete the Project as indicated by the Owner provided Testing Reports and Abatement Procedures.
   1. Refer to the Appendix that contains Testing Reports and Abatement Procedures for materials, location, and scope of the Work.

B. Testing Reports and Abatement Procedures have been prepared by the Owner and incorporated into the Project Manual. The Architect and Architect's consultants have no responsibility for the discovery, presence, handling, removal or disposal of or exposure of persons to hazardous materials in any form at the Project Site.
   1. The Contractor and all subcontractors shall agree to bring no claim for negligence, breach of contract, indemnity or otherwise against the Architect (principals and employees), agents and consultants if such claim in any way involves or is related to any hazardous materials in the Project.

C. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 09 65 19 RESILIENT TILE
   4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCES

A. Standards:
   1. CAL-OSHA: California Occupational Safety and Health Act.
   2. DOSH: Department of Occupational Safety and Health.
   3. EPA: Environmental Protection Agency

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Quality Assurance/Control Submittals:
   1. Provide to the Owner the following requirements:
      a. Provide a copy of California Contractor License, and current registration with CAL-OSHA (DOSH) for Asbestos related roof work.
      b. Hazardous Material Removal Subcontractor shall provide proof of Workers Compensation, General Liability ($1,000,000.00 minimum), and professional liability Insurance Certificates which specifically state the insurance will cover Asbestos Abatement.

C. Pre-Construction Requirements – submittal to the Owner's Representative prior to construction:
   1. CAL-OSHA Plan of Action per DOSH Registration.
   2. Illness and Injury Prevention Program.
   3. Code of Safe Working Practice.
   4. Hazard Communication Program.
   5. List of Hazardous Materials Your Company uses.
   6. Material Safety Data Sheets (MSDS) of All Material required for Project.
   7. Copy of Project Notices to CAL-OSHA and County EPA office. Post all information at the Project Site.
   8. Copy of all CAL-OSHA and EPA Citations, (if any) for Asbestos removal during the last 24 months.

1.4 CLOSEOUT SUBMITTALS

A. Project Completion Documentation - submittal to the Owner's Representative prior to final approval:
   1. Daily Air Monitoring reports.
   2. Dump Receipts and Notaries Letters.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Hazardous Material Removal Subcontractor's Qualifications:
      a. Engage an experienced Hazardous Material Removal Subcontractor who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. Other applicable City, County, State and Federal Requirements where the Project is located.

PART 2 - PRODUCTS

2.1 ABATEMENT

A. Provide all materials as required to complete the work as indicated by the Owner's Testing Reports and Abatement Procedures.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
   2. Contractors shall cooperate with other contractors and the Owner in the use of the site facilities and shall adjust their operations to maintain harmonious relations and uninterrupted progress of the Work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
   2. Install and maintain shelter as may be necessary to protect completed Work and existing structures from damage and disfigurement by the elements and other natural causes.
      a. Any portion of Work (or existing facilities) damaged or disfigured prior to final acceptance of the abatement, shall be properly, neatly and satisfactorily reconstructed or repaired and the Project left without defects at final acceptance.

3.3 FIELD QUALITY CONTROL

A. Provide the Owner's Representative (prior to final acceptance) the following:
   1. Provide copies of Daily Air Monitoring of both personal and work areas, completed and tested by an Independent Testing Laboratory.
   2. Provide copies of Dump Receipts and Notaries Letter confirming site and amount of debris dumped.
      a. Burning of combustible materials from demolished work will not be permitted on site.
      b. Transport materials removed from the work and dispose of off site at legally designated hazardous material dumps.

3.4 CLEANING

A. The Contractor shall at all times keep the premises free from accumulations of waste materials or rubbish caused by its employees or Work, and at the completion of the Work the Contractor shall remove all rubbish from and about the building and all tools, scaffolding and surplus materials and shall leave work "broom clean" (or its equivalent), or in accordance with code requirements (which ever is most restrictive).

END OF SECTION

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements governing execution of the work including, but not limited to, the following:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of selected site elements.
   3. Salvage of existing items to be reused or recycled.

B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
   1. DIVISION 00 SPECIFICATION SECTIONS
   2. DIVISION 01 SPECIFICATION SECTIONS
   3. 02 01 10 EXISTING LANDSCAPE MAINTENANCE
   4. 02 26 00 HAZARDOUS MATERIALS PROCEDURES
   5. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP

1.2 REFERENCES

A. Standards:
   1. ANSI: A10.6 American National Standards Institute

1.3 DEFINITIONS

A. Remove: Detach items from existing site or building (s) and legally dispose or recycle off-site.

B. Remove and Salvage to Owner: Carefully detach from existing site or building (s), in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing site or building (s), prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing item(s) within project site that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Shop Drawings:
   1. Proposed Protection Measures - Submit report and drawings that indicates the measures proposed for protecting individuals and property for dust and noise control.
      a. Indicate proposed locations and construction of barriers.
      b. Indicate occupant paths of egress and travel.
      c. Indicate how long utility services will be interrupted.
   2. Salvaged Item Inventory List
      a. Indicate items to be salvaged and delivered to Owner.

1.5 CLOSEOUT SUBMITTALS

A. Existing Warranties

B. Pre-demolition Photographs

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:

a. CAL/OSHA California Division of Occupational Safety and Health Administration.
b. CM County of Merced, codes and ordinances
c. EPA Environmental Protection Agency

B. Meetings:
1. Pre- Demolition: Schedule prior to the start of work.
a. Coordinate the work with other work being performed.
b. Review requirements of work performed by others that rely on substrates exposed by selective demolition work.
c. Identify any potential problems that may impede planned progress and proper demolition of work.
d. Review structural load limitations of existing structure.
e. Review areas where existing construction is to remain and requires protection.
f. Review demolition waste disposal and material recycling procedures.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper work progress.
b. Identify any problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems.
b. Establish method and procedures to maintain protections while progressing to project completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Cleaning, handling, and packing:
1. Salvaged Items and Reinstalled Items shall be handled in such a manner as to assure that they are free from damage.
2. Salvaged Items shall be cleaned and packed or cleaned and palleted.
3. Reinstalled Items shall be cleaned.

B. Storage and protection
1. Salvaged Items and Reinstalled Items shall be stored in a dry, protected area.
2. Salvaged Items and Reinstalled Items shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation underneath.
3. Cover with protective waterproof covering providing for adequate air circulation and ventilation.

C. Waste Management and Disposal:
1. Disposal of all selective demolition items shall be per Specification Section - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.8 PROJECT CONDITIONS

A. Environmental requirements:
1. Dust control - perform site, exterior, and interior work in a manner as to minimize the spread of dust and flying particles.
a. Thoroughly moisten appropriate surfaces as required to prevent dust from being a nuisance to the occupants, public, and neighbors.
2. Noise control - perform work in a manner as to minimize construction noise.
a. When a certain level of noise is unavoidable and is objectionable to the occupants of the adjacent spaces, buildings, or premises, coordinate with Owner and make arrangements to perform such work at the most appropriate time periods of the day.

B. Existing conditions:
1. Examine project site and building(s) and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted

with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

2. Conduct work so as not to interfere unnecessarily with adjacent buildings, roads, streets, drives, and walks.
    a. Do not close or obstruct streets, alleys, walks, or passageways without permission from authorities having jurisdiction and coordinating same with immediate neighbors whose business operation may be affected.
    b. Safety measures shall be taken to insure an uninterrupted flow of traffic around the site as required by local Police and Fire Departments
3. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
4. Maintain existing utilities indicated to remain in service and protect against damage during selective demolition work.
    a. Maintain fire-protection facilities in service during the work.
5. Demolition waste becomes the property of the Contractor.
6. Storage or sale of removed items on-site is not permitted.
7. Hazardous materials are present in buildings and structures to be selectively demolished. The Owner has prepared a report for the Contractor to review and use.
    a. Hazardous material remediation is specified in Specification Section – HAZARDOUS MATERIAL PROCEDURES.

1.9 WARRANTY

A. Existing Warranties:
    1. Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warranter before proceeding. Existing warranties include the following:
        a. Roofing system
    2. Notify warranter on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect.

PART 2 - PRODUCTS

2.1 SELECTIVE DEMOLITION AND REMOVAL

A. Furnish all materials, tools, equipment, facilities, and services as required for performing the selective demolition and removal work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions:
    1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
    2. Execution of work under this specification section shall constitute acceptance of existing conditions.
    3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the Work under this Section.
    4. Verify that utilities have been disconnected and capped before starting selective demolition operations.
    5. Verify that rooftop utilities and service piping have been shut-off prior to roof selective demolition.
    6. Record existing conditions by use of Pre-demolition Photographs.
        a. Inventory and record the condition of items to be salvaged and/or re-installed.

3.2 PREPARATION

A. Coordination:
   1. Before proceeding, verify plans match existing conditions.
   2. Review documents of existing construction provided by Owner against existing conditions.
   3. If conflicts are encountered, report it to the Architect. Then prepare recommendation(s) for correction and submit to Architect for review.
   4. Coordinate work under this specification section with work specified under other sections.
   5. Coordinate any utility and HVAC unit shut-down with owner 48 hours in advance of the anticipated shut-down.
      a. Do not interrupt utilities and HVAC units serving occupied or used facilities, except when authorized in writing by the Owner.
      b. Provide temporary service during interruptions to existing facilities, as may be required by the Owner to maintain essential services.
   6. Prior to site selective demolition, review status of trees and shrubs with Architect and Owner. The Owner may wish to relocate trees or shrubs outside the limits of construction.
   7. Prior to roofing selective demolition, coordinate with Owner to shut down air intake equipment and service piping in the vicinity of work.

B. Protection:
   1. Structure and Property:
      a. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings, landscape, and facilities to remain.
      b. All damage inflicted on public and private property and the property of the Owner shall be repaired or restored to the original condition prior to the start of this Work. All repair or replacement work shall be done at no additional cost to the owner.
      c. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building and site.
      d. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and other weather damage to building envelope, structure, and interior areas.
      e. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
      f. Protect and maintain utility services and mechanical/electrical systems to remain.
      g. Cover and protect furniture, furnishings, and equipment that have not been removed.
      h. Cover all air supply and return ducts to remain before proceeding with demolition work.
      i. Cover air intake louvers before proceeding with work that will affect indoor air quality.
      j. During roof selective demolition have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
   2. Temporary Shoring:
      a. Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
         1) Strengthen or add new supports when required during progress of selective demolition.

3.3 APPLICATION

A. General:
   1. Selective demolition shall include the removal of all components of the existing building and/or site described in the documents to be removed. Unless otherwise specified, the component identified for removal shall include all materials, accessories and fabrications associated with that component.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction.
      a. Temporarily cover opening to remain.

b. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. When removing structural framing members, lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
5. Locate selective demolition equipment and demolished debris so as not to impose excessive loads on supporting walls, floors, or framing.
6. Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems.
7. Demolished items and materials that are recyclable or slated for disposal shall be promptly dealt with per Specification Section - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.
8. Removed and Salvaged items:
   a. Clean salvaged items.
   b. Pack or crate items after cleaning. Identify contents of containers.
   c. Store items in a secure area until delivery to Owner.
   d. Transport item to area as designated by Owner.
   e. Protect items from damage during transport and storage.
   f. In addition to items indicated elsewhere, salvaged items that the Owner wants to retain in usable condition are as follows:
      1) All door hardware
      2) All unit heater and controls
      3) All energy management controls
      4) All security system devices
9. Removed and Reinstalled items:
   a. Clean and repair items to functional condition adequate for intended reuse.
   b. Pack or crate items after cleaning and repairing. Identify contents of containers.
   c. Protect items from damage during transport and storage.
   d. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
10. Existing Items to Remain:
    a. Protect construction indicated to remain against damage and soiling during selective demolition.

B. Site Selective Demolition:
1. Utility lines to be abandoned within the construction area shall be removed and stubbed off outside the limits of construction.
2. Maintain existing storm drainage system to remain in functioning condition. Prevent debris from entering or blocking drains and piping. Use drain plugs specifically for this purpose. Remove drain plugs at the end of each work day.
3. Refer to drawings for trees and shrubs to be removed. Protect certain trees as indicated.
   a. Remove tops, trunks, and roots of trees and shrubs to a minimum depth of 3 feet or to a depth required to remove all roots 1/4 inch diameter and larger.
   b. Chip removed trees, shrubs, and roots.
      1) Removed chipped material to recycling station.
      2) Recycle chipped material into mulch for this project. Refer to Specification Section - LANDSCAPE PLANTING for treatment.
4. Remove debris, concrete, asphalt, and any other obstruction to the extent indicated.
5. Remove all:
   a. Buried objects which will interfere with the Work.
   b. Irrigation lines, irrigation risers, and irrigation valves.
   c. Stand pipes.
   d. Water wells and pumps.

e. Electrical service and power poles.

6. At building pads, site improvements, or trenching, strip topsoil which contains:
   a. Grass, weeds, and natural vegetation to a minimum depth of **12** inches.
   b. Stumps and roots 1/4 inch and larger.
7. Remove non-soil materials from topsoil, including clay lumps, gravel, trash, debris, weeds, roots, other waste materials, and objects more than 1/2 inch in diameter.
8. Stockpile reusable topsoil away from excavation and where work is to proceed.
   a. Do not stockpile topsoil within drip line of remaining trees.
9. Non-soil materials removed from topsoil shall be separated into like materials and recycled either within the project or removed from the project site to a recycling station.
   a. Those waste materials that are non-recyclable shall be legally disposed off of the project site.

C. Roofing Selective Demolition:
1. Maintain roof drains in functioning condition to ensure roof drainage at end of each work day. Prevent debris from entering or blocking roof drains and conductors. Use roof drain plugs specifically for this purpose. Remove roof drain plugs at end of each work day, when no work is taking place, or when rain is forecast.
2. Remove existing roofing membrane and other roofing system membrane components down to the deck including flashings, copings, and roof accessories.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT:
1. Clean any soiled surfaces to remain immediately.
2. Existing substrates shall be clean and ready for the installation of any additional materials.
3. Leave site areas level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.

END OF SECTION

SECTION 03 15 14 – DRILLED ANCHORS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all Drilled Anchor materials, labor, equipment and services necessary for Expansion, Adhesive, and Screw Anchors in Concrete, and Concrete Masonry Units, and related items necessary to complete the Project as indicated by the Contract Documents unless otherwise specifically excluded.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 05 12 00 STEEL AND FABRICATIONS
5. 06 10 00 ROUGH CARPENTRY
6. 06 41 23 MODULAR CASEWORK
7. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ASTM: American Society for Testing and Materials

1. ASTM A36 Carbon Structural Steel (Standard Specification for)
2. ASTM A193 Alloy-Steel and Stainless Steel Building Materials for High Temperature or High Pressure Service and Other Special Purpose Applications (Specification for)
3. ASTM A615 Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement (Specification for)

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

1. Submit manufacturer's product data for all expansion and adhesive anchors to be used in this project.
    a. Submit current ICC Evaluation Services research or evaluation reports evidencing maximum allowable shear and withdrawal load data.

C. Quality Assurance / Control Submittals:

1. Test Reports: Submit to DSA, copy to Project Inspector and Contractor.
    a. Tension Testing as required.
    b. Torque Testing as required.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:

1. To ensure consistent quality of anchorage, obtain drilled anchors from a single manufacturer.
2. To ensure consistency of anchorage, obtain adhesive for anchorage from a single manufacturer.

B. Manufacturer Qualifications: Provide drilled and adhesive anchors from a manufacturer that can demonstrate ICC approvals that are current and acceptable to review by the DSA/SSS.

C. In accordance with Specification Section - REGULATORY REQUIREMENTS and the following:

1. ICC International Code Council.
2. IR Interpretation of Regulations.

D. Job Testing: For verifying satisfactory installation workmanship, an independent laboratory will perform proof load tests of drilled anchors acting in tension or shear in the presence of the Project Inspector.

1. When drilled-in expansion-type anchors or other post-installed anchors acceptable to the enforcement agency are used in lieu of cast-in-place bolts, the allowable shear and tension values and installation verification test loads shall be acceptable to the enforcement agency.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in original, unopened packages with manufacturer's labels identifying products legible and intact.

B. Store materials inside, under cover and in a manner to keep them dry, protected from the weather, surface contamination, corrosion, damage from construction traffic and other causes.

1.6 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 1 Year
   1. In accordance with manufacturer's written standard warranty:

C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section - WARRANTIES.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 MATERIALS

A. Provide manufacturers standard drilled anchors (expansion or adhesive) for installation into Concrete or Concrete Masonry Units unless noted otherwise.
   1. Metal Finishes (corrosion resistant):
      a. Zinc Plated Carbon Steel.
      b. Stainless Steel.

2.3 EXPANSION ANCHORS

A. Specified: **HILTI**
   1. Alternate: **DEWALT/POWERS**.
   2. Alternate: **SIMPSON**.

B. Wedge Anchors: The WEDGE category features a small split expansion ring installed on a tapered (integral cone) part of the stud at the bottom. As the nut is tightened, withdrawing the stud portion from the hole, the expansion ring engages the concrete and is further expanded on the tapered part of the stud.

C. Sleeve Anchors: The SLEEVE category is similar to the wedge except a large expansion sleeve is used instead of a small expansion ring. The outside of the sleeve defines the anchor diameter with the threaded stud being of a smaller diameter since it fits inside the sleeve. The stud has an integral cone expander at the bottom similar to the wedge category. The expansion mechanism is similar to the wedge category except the top of the sleeve is normally in contact with the nut/washer and is initially forced down over the cone expander as the anchor is tightened. As the sleeve is expanded, it engages the concrete and continues to expand as the wedge anchor.

D. Shell Anchors: The SHELL category has the most variations, but all use a tapered cone expander, either internal or external, to expand the shell of the anchor against the hole. The

anchor is either hammered down over an external expander or a special tool is used to drive an internal expander further into the anchor.

2.4 ADHESIVE ANCHORS

A. Specified: **HILTI**
   1. Alternate: **DEWALT/POWERS**.
   2. Alternate: **SIMPSON**.

B. Adhesive Anchors which chemically bonds Steel Rods or Deformed Steel Reinforcement Dowels to concrete or masonry elements:
   1. Threaded Steel Rods with minimum yield strength of 36 ksi and complying with ASTM A36, or ASTM A193, Grade B7.
   2. Deformed Steel Reinforcement Dowels shall be a minimum of Grade 60 and comply with ASTM A615 or ASTM A706.
   3. Adhesives, consisting of two primary components that are stored separately, and having a mixing nozzle provided by the manufacturer combining the components prior to placing in the holes.
   4. Long term durability and stability of the adhesive anchor material and its resistance to loss of strength and chemical change at elevated temperatures shall be established to the satisfaction of the enforcement agency.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:
   1. Coordinate and provide anchors and installation instructions from the manufacturer for items to be embedded in Concrete or Concrete Masonry Unit construction. Manufacturer's written installation instructions shall be available on the project site.

3.2 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices where necessary for securing designated items indicated on the drawings, or as necessary for a complete and proper job to in-place construction.
   1. Install the anchors in accordance with the requirements given in the ICC Evaluations Services Report recommendations for the specific anchor used.
   2. When installing expansion anchors through metal deck into concrete, the anchors should be installed in the center of the low flute of the decking where practicable in minimum 20 gage deck.
      a. The minimum depth of embedment shall be 1-1/2 inches above the top flute of the decking (except 1/4 and 5/16-inch diameter anchors for ceilings) when the slab thickness above the top of the flute is at least 3 inches.
      b. Shell type anchors shall not be used on the underside of concrete and metal deck construction due to damage caused to the concrete when hammering in the shell anchors.
   3. Install Adhesive Anchors by placing adhesive into specially prepared holes, then insert rods or dowels into holes in a manner that disperses the adhesive to assure maximum contact between adhesive, surface of the holes and surface of the anchor.
      a. Adhesive anchors shall not be used in overhead applications.

B. Cutting, Fitting, and Placement: Perform cutting, drilling and fitting required for designated items of construction. Set work accurately in location, alignment and elevation, level true and free of rack, measured from established lines and levels.
   1. The minimum edge distance and spacing of wedge and adhesive anchors shall not be less than ten (10) diameters or as required by ICC Evaluation Service Report unless specifically shown on drawings.

C. Use care and caution to avoid cutting or damaging reinforcing bars in Reinforced Concrete or Concrete Masonry Construction.

D. Do not install expansion or adhesive anchors in recently placed concrete which has not had a minimum 28 day curing period and which has not been accepted as having a minimum compressive strength of 3000 psi.

3.3 FIELD QUALITY CONTROL

A. Testing, General:
   1. Perform testing in accordance with ACI 318 "Building code Requirements for Structural Concrete and Commentary," and herein specified.
      a. When expansion or adhesive anchors are listed for sill plate bolting applications, 10 percent of the anchors shall be tested.
      b. When expansion or adhesive anchors are used for other structural applications, all such anchors shall be tested.
         1) Expansion-type anchors shall not be used as hold-down bolts.
      c. When expansion or adhesive anchors are used for nonstructural applications such as equipment anchorage, 50 percent or alternate bolts in a group shall be tested, except that if the design load is less than 75 pounds, only one anchor in ten need be tested. See drawings for items weighing 75 pounds or less.
         1) The testing of the anchors shall be done in the presence of the Project Inspector and a report of the test results shall be submitted to the enforcement agency.
   2. When expansion anchors are used for ceiling hanger wires, 1 out of 10 must be field tested for 200 pounds of tension per IR 25-2.
      a. When expansion anchors are used for ceiling bracing wires, 1 out of 2 must be field tested for 440 pounds in tension.
      b. Test ceiling anchors with wires attached.
   3. The proof load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, calibrated spring-loading devices, etc.
   4. If any anchor fails testing, test all anchors of the same category not previously tested until twenty (20) consecutive pass, then resume the initial testing frequency.
      a. The cost of any additional testing as a result of failures shall be the responsibility of the Contractor at no additional cost to the Owner.
   5. When a drilled-in adhesive anchor is used in lieu of a required cast-in-place bolt, cost of testing shall be the responsibility of the Contractor at no additional cost to the Owner.

B. Testing:
   1. Expansion Anchors:
      a. Anchor diameter refers to the thread size for the WEDGE & SHELL categories, and to the anchor outside diameter for the SLEEVE category and Adhesive anchors.
      b. Apply proof test loads to WEDGE & SLEEVE anchors without removing the nut if possible. If not, remove nut & install a threaded coupler to the same tightness of the original nut using a torque wrench & apply load.
      c. For SLEEVE/SHELL internally threaded categories, verify that the anchor is not prevented from withdrawing by a baseplate or other fixtures. If restraint is found, loosen and shim or remove fixture(s) prior to testing.
      d. Reaction loads from test fixtures may be applied close to the anchor being tested, provided the anchor is not restrained from withdrawing by the fixture(s).
      e. SHELL type anchors shall be tested as follows:
         1) Visually inspect 25 percent for full expansion as evidenced by the location of the expansion plug in the anchor body.
            a) Plug location of a fully expanded anchor shall be as recommended by the manufacturer, or, in the absence of such compensation, as determined on the job site following the manufacturer's written installation instructions.

b) At least 5 percent of the anchors shall be proof loaded as indicated in the Test Values schedule on the drawings, but not less than three anchors per day for each different person or crew installing anchors. or;
c) Test installed anchors per ACI 318 "Building code Requirements for Structural Concrete and Commentary."

2. Adhesive Anchors:
   a. Adhesive anchors shall be tension tested. The tension test load shall equal one and one-quarter (11/4) times the maximum design strength of the anchor as determined in compliance with ACI 318 Chapter 17 and the anchors evaluation report, or 80 percent of the yield strength of the bolt (0.8AbFy), whichever is less.
      1) The test procedure for expansion-type anchors in the test values table shall also be used for the adhesive anchors.
   b. Where adhesive anchors are used as shear dowels across cold joints in slabs-on-grade and the slab is not part of the structural system, testing of those dowels is not required.
   c. Anchors shall exhibit no discernible movement during the tension test.
3. Test equipment (including torque wrenches) is to be calibrated by an approved testing laboratory in accordance with standard recognized procedures.
   a. Alternate torque test procedures and test values for SHELL type anchors may be submitted to the enforcement agency for review and approval on a case-by-case basis when test procedures are submitted and approved by the enforcement agency.
4. The following criteria apply for the acceptance of installed anchors:
   a. HYDRAULIC RAM METHOD: The anchor should have no observable movement at the applicable test load. [For wedge and sleeve type anchors, a practical way to determine observable movement is that the washer under the nut becomes loose].
   b. TORQUE WRENCH METHOD: The applicable test torque must be reached within the following limits:
      1) Wedge or Sleeve Type: One-half (1/2) turn of the nut.
         a) One-quarter (1/4) turn of the nut for the 3/8 inch sleeve anchor only.
      2) Torque testing of adhesive anchors is not permitted.
5. If the manufacturer's recommended installation torque is less than the test torque note in the table, the manufacturer's recommended installation torque shall be used in lieu of the tabulated values.
6. Testing should occur 24 hours minimum after installation of the subject anchors.
7. Required Maximum Test Values for Concrete, or Concrete Masonry Units in tension for the ranges and sizes of Drilled Anchors are shown on the drawings.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Cast-In-Place Concrete materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 03 11 01 CONCRETE FORMWORK
4. 03 15 14 DRILLED ANCHORS
5. 03 20 00 REINFORCEMENT
6. 04 22 00 CONCRETE MASONRY UNITS
7. 05 12 00 STEEL AND FABRICATIONS
8. 06 10 00 ROUGH CARPENTRY
9. 07 84 00 FIRESTOPPING
10. 07 92 00 SEALANTS
11. 09 65 10 RESILIENT BASE AND ACCESSORIES
12. 09 65 16 RESILIENT SHEET
13. 09 65 19 RESILIENT TILE
14. 09 68 40 CARPET
15. 10 05 00 MISCELLANEOUS SPECIALTIES
16. 10 14 00 IDENTIFYING DEVICES
17. 10 14 53 ROAD AND PARKING SIGNAGE
18. 10 21 13 TOILET PARTITIONS
19. 11 68 00 PLAYFIELD EQUIPMENT

20. 31 20 00 EARTHWORK
21. 32 17 23 PAVEMENT MARKINGS
22. 32 31 19 DECORATIVE METAL FENCE AND GATES
23. 32 31 13 CHAIN LINK FENCING
24. 33 40 00 STORM DRAINAGE
25. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
26. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ACI: American Concrete Institute

B. ASTM: American Society of Testing Materials.

1. ASTM C31 Making and Curing Concrete Test Specimens in the Field (Practice for)
2. ASTM C33 Concrete Aggregates (Specification for)
3. ASTM C39 Compressive Strength of Cylindrical Concrete Specimens (Test method for)
4. ASTM C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete (Test method for)
5. ASTM C94 Ready-Mixed Concrete (Specification for)
6. ASTM C109 Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens) (Test Method for)
7. ASTM C143 Slump of Hydraulic-Cement Concrete (Test method for)
8. ASTM C150 Portland Cement (Specification for)
9. ASTM C171 Sheet materials for Curing Concrete (Specification for)
10. ASTM C172 Sampling Freshly Mixed Concrete (Practice for)
11. ASTM C260 Air-Entraining Admixtures for Concrete (Specifications for)
12. ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete (Specification for)
13. ASTM C330 Lightweight Aggregates for Structural Concrete (Standard Specification for)

14. ASTM C494 Chemical Admixtures for Concrete (Specification for)
15. ASTM C578 Rigid, Cellular Polystyrene Thermal Insulation (Specification for)
16. ASTM C618 Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete (Specification for)
17. ASTM C881 Epoxy-Resin-Base Bonding Systems for Concrete (Specification for)
18. ASTM C979 Pigments for Integrally Colored Concrete (Specification for)
19. ASTM C1028 Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method (Standard Test Method for)
20. ASTM C1077 Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation (Standard Practice for)
21. ASTM C1107 Packaged Dry, Hydraulic-Cement Grout (Non-shrink) (Specification for)
22. ASTM C1116 Fiber Reinforced Concrete and Shotcrete (Standard Specification for)
23. ASTM C1602 Mixing Water Used in the Production of Hydraulic Cement Concrete (Standard Specification for)
24. ASTM D448 Sizes of Aggregate for Road and Bridge Construction (Standard Classification for)
25. ASTM D570 Water Absorption of Plastics (Test Method for)
26. ASTM D638 Tensile Properties of Plastics (Test method for)
27. ASTM D695 Compressive Properties of Rigid Plastics (Test Method for)
28. ASTM D792 Density and Specific Gravity (Relative Density) of Plastics by Displacement (Test Methods for)
29. ASTM D828 Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation Apparatus (Standard Test Method for)
30. ASTM D1505 Density of Plastics by the Density-Gradient Technique (Test Method for)
31. ASTM D1557 Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.) (Test Methods for)
32. ASTM D1709 Impact Resistance of Plastic Film by the Free-Falling Dart Method (Test Methods for)
33. ASTM D1751 Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types) (Specification for)
34. ASTM D2240 Rubber Property – Durometer Hardness (Standard Test Method for)
35. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
36. ASTM E96 Water Transmission of Materials (Test Methods for)
37. ASTM E154 Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover (Test Methods for)
38. ASTM E329 Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction (Standard Specification for)
39. ASTM E1155 Determining FF (Floor Flatness) and FL (Floor Levelness) Numbers (Standard test method for)
40. ASTM E1643 Installation of Vapor Retarder used in Contact with Earth Fill Under Concrete Slabs (Standard Practice and Procedure for)
41. ASTM E1745 Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs (Standard Test Methods for)

C. NRMCA: National Ready Mix Concrete Association

D. RFCI: The Resilient Floor Covering Institute

E. RIS: Redwood Inspection Service

F. RMAI: Rubber Manufacturers Association Inc.

1.3 SUBMITTALS

A. Submit per Specification Section - SUBMITTAL PROCEDURES.

B. Coordination Drawings:

1. Layout drawings for construction, control and expansion joints.
    a. Coordinate joints with floor patterns.

C. Product Data.

1. Submit data on all products listed.

1.4 QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Coordinate with Specification Section - TESTING LABORATORY SERVICES for additional Testing Requirements as required by DSA.

B. Material samples and mix designs:

1. Material samples and mix designs as required for testing shall be submitted to Architect at least fourteen (14) days prior to any concrete work and shall include results of test data used to establish proportions.
    a. Grout samples and colors for colored surfaces upon Architect's request only.

C. Continuous batch plant inspection required per CBC Section 1705A.3.3, or may be waived per CBC Section 1705A.3.3.

1. Continuous Batch Plant Inspection is waived for this project in compliance with CBC Section 1705A.3.3, subject to the following requirements:
    a. The concrete plan complies fully with the requirements of ASTM C94, Sections 9 and 10, and has a current certificate from the National Ready Mixed Concrete Association or another agency acceptable to the **DSA**. The certification shall indicate that the plant has automatic batching and recording capabilities.
    b. A licensed Weighmaster shall positively identify the quantity of materials and certify each load with a batch ticket.
    c. Batch tickets shall accompany the load and be transmitted to the Inspector of Record by the truck driver with the load identifies thereon. The load shall not be placed without a batch ticket identifying the mix. The Inspector of Record shall keep a daily record of placements, identifying each truck, its load, and the time of receipt at the jobsite, and approximate location of deposit in the structure. A copy of the daily record shall be maintained.
2. Test Reports:
    a. Testing Laboratory shall submit to Architect, Structural Engineer, Owner, and to the DSA one (1) copy of each report showing results of tests.
        1) Report shall state whether materials were in conformance with specifications.
        2) Report shall state whether the curing of the concrete slabs are within parameters required for future flooring installations.
    b. Moisture and Alkalinity Tests.
        1) Relative Humidity (RH).
        2) Moisture Vapor Emission Report (MVER).
3. Certificates:
    a. Submit three (3) copies of certificates.
        1) Provide Vapor Retarder manufacturer's certificate of inspection and compliance to installation procedures.
        2) Cement manufacturer's Mill Certificate of Compliance with the specification.
        3) Certificates for aggregates and admixtures.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents per Specification Section - PROJECT DOCUMENTS.

B. Warranty Documents per Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
    a. Engage an experienced Installer who has successfully completed 3 projects of similar scope and size to that indicated for this Project.
    b. Engage an experienced Installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician.

2. Manufacturer/Supplier Qualifications:
    a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the Work.
    b. Firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
    c. Manufacturer certified per NRMCA's *Certification of Ready Mixed Concrete Production Facilities*.
3. Testing Laboratory Qualifications:
    a. Qualified Testing Laboratory and personnel approved by DSA.
        1) Cost of testing and inspection will be paid by the Owner unless otherwise specified. The Owner shall pay all costs of re-inspection and/or re-tests due to non-compliance with specifications and/or failures, but the Contractor shall reimburse the Owner for these tests when billed or deducted from its payment.
    b. A testing agency qualified per ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

B. Regulatory Requirements:
1. Per Specification Section - REGULATORY REQUIREMENTS, and the following:
    a. All materials, equipment and placing operations shall be subject to inspection, tests and approval at all items. Testing Agent shall have free and unhampered access to all places where concrete materials are stored proportioned and mixed.

C. Mockups:
1. Provide mockups prior to application of work and prior to installation of any materials.
2. Mockups shall be used for establishing construction sequences, installation requirements of materials, and shall be representative for the intended end-use configuration.
3. Mockup Assemblies:
    a. Slab-On-Grade: Mockups shall be the finish and texture of concrete.
        1) Mockups shall be a minimum overall size of 3' x 3' x 4" thick panels.
        2) Provide Mockups for each texture and finish required.
        3) Divide mockup panel into four equal panels to demonstrate saw joint cutting.
4. Installation of Mockups:
    a. The Project Inspector, the Architect, and Contractor's Superintendent shall observe the installation of materials and work.
    b. Installation crew for the Mockups shall be the Cast-In-Place Concrete, Reinforcement and Polished Concrete Finishing installers for this project and installers, as necessary, of other related work.
    c. Unacceptable Mockups shall be removed and reinstalled until the work is deemed to be in compliance with the project requirements and is acceptable by the Owner, Architect and Project Inspector.
5. Allow 24 hours for inspection of mockup before proceeding with work.
6. Protect the Mockups during the course of construction.
7. Remove mockup and dispose of materials when no longer required and when directed by the Architect at the end of the project.

D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
    a. Coordinate the work with other related work being performed.
        1) Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
            a) Contractor's superintendent.
            b) Independent testing agency responsible for concrete design mixtures.
            c) Ready-mixed concrete manufacturer.
            d) Concrete pumping equipment manufacturer.
            e) Concrete Subcontractor.

f) Special concrete finish Subcontractor.
g) Polished Concrete Contractor.
h) Architect/Engineer.
i) Admixture Manufacturer.
j) Fiber Reinforcement Manufacturer.
k) Vapor Retarder Manufacturer.
l) Owner's Representative.

b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
c. Prior to submitting design mixes, review detailed requirements for preparing concrete design mixes and determine procedures for satisfactory concrete operations.
d. Review requirements for submittals, status of coordinating work, and availability of materials.
e. Polished Concrete Finishing requirements.
f. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications.

2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
      1) Schedule installation review at the start of installation with the Vapor Retarder Manufacturer to ensure compliance with all manufacturers' written instructions.
      2) Prior to pouring concrete, have the Vapor Retarder manufacturer inspect and provide a certified report to the Architect describing the condition of the Vapor Retarder, and that the installation was in full compliance with the manufacturer's written instructions
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
   1. Cold Weather Requirements:
      a. Do not pour concrete unless air temperature is at least 40 degrees Fahrenheit and rising.
      b. Do not pour concrete on frozen ground or ice.
      c. Heat and otherwise prepare materials per ACI Standard 306.1.
      d. Maintain concrete temperature at 50 degrees Fahrenheit (minimum) the first three (3) days after pouring. Protect concrete from freezing the first six (6) six days, after placing.
   2. Hot Weather Requirements:
      a. Do not pour when temperature exceeds 90 degrees Fahrenheit.
      b. During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive Concrete temperatures or water evaporation, which will impair the required strength or serviceability of the member or structure.
      c. Cool and otherwise prepare materials per ACI Standard 305.1.

1.8 WARRANTY

A. Contractor's General Warranty: In accordance with Specification Section – WARRANTIES.
B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 CONCRETE MATERIALS

A. Cement: Type I or II per ACI 318 Building Code Requirements for Structural Concrete and Commentary, Chapter 3, and ASTM C150.

1. Natural (Grey) Portland Cement:
   a. Specified: **LEHIGH**.
   b. Specified: **MARTIN MARIETTA (TXI CEMENT COMPANY)**.
2. White Cement:
   a. Specified: **LEHIGH WHITE CEMENT**
   b. Specified: **MARTIN MARIETTA (TXI CEMENT COMPANY)**.
   c. Provide white cement for mixing when the Project requires patching for defective work, to match adjacent material color.

B. Water: ASTM C1602.

1. Clean and free from deleterious amounts of acids, alkalis, salts, organic material, or other substances that may be deleterious to concrete or reinforcing.

C. Aggregates: ACI 318 Building Code Requirements for Structural Concrete and Commentary, Chapter 3.

1. Normal weight aggregates: ASTM C33.
   a. Crushed Granite or "Perkins" type aggregates.
   b. Maximum Aggregate Size: 1-1/2 inches.
   c. Coarse aggregate: cleanliness 75 minimum, per State of California Highways Test Methods 227.
   d. Fine aggregates: sand 75 minimum, per State of California Highways Test Methods 217.

D. Admixtures: per ACI 318 *Building Code Requirements for Structural Concrete and Commentary*, Section 3.6. DSA approval required. Calcium Chloride is not permitted.

1. Fly Ash: ASTM C618 (Class C not permitted per CBC 1903A.6).
2. Water Reducing, High Range:
   a. Contingent upon DSA/HCAI/AHJ, Architect, and Structural Engineer approval.
   b. High Range Water Reducer: ASTM C494 Type F.
      1) Specified: **EUCLID** “Plastol Series”.
   c. Finishing Aid Admixture: ASTM C494 Type S.
      1) Specified: **EUCLID** “EucoShield”.
      2) Liquid admixture to be used as an integral finishing aid that reduces rapid moisture loss from the concrete surface during placement and finishing.
3. Fiber Reinforcing: ASTM C1116.
   a. Specified: **EUCLID** “TUF-STRAND SF”.
   b. Polypropylene / polyethylene macro synthetic fiber.
   c. Suitable for Slab On Grade and Above Grade Slab Construction.
   d. UL Certified for composite metal deck construction.
4. Shrinkage Control: ASTM C494 Type S.
   a. Specified: **SIKA** “CONTROL-40”.
   b. Alternate: **EUCLID** “Eurcon SRA Series”.
   c. Verify compatibility with Polished Concrete Finishing.

5. Integral Waterproofing:
    a. Specified: **XYPEX** “Axmix C-500”.
    b. Alternate: **EUCLID** “Eucon Vandex AM-10 or Eucon Vandex AM-10L”.
    c. Crystalline Waterproofing: Prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate.

2.3 BUILDING MATERIALS

A. Rock Base: ASTM D448.
1. Clean mixture of crushed stone or uncrushed gravel.
2. Top Layer:
    a. Percent passing 1-inch sieve: 100 percent.
    b. Percent passing No. 8 sieve: 0 to 5 percent.
3. Bottom Layer:
    a. Percent passing 2-inch sieve: 100 percent.
    b. Percent passing No. 8 sieve: 0 to 5 percent.

B. Sand Base: ASTM C33.
1. Sand to be washed and of natural siliceous or igneous origin, having hard, strong, and durable particles.
2. Percent passing 3/8 inch sieve: 100 percent.
3. Percent passing No. 4 sieve: 95 to 100percent.
4. Percent passing No. 50 sieve: 10 to 30 percent.
5. Percent passing No. 100 sieve: 2 to 10 percent.

C. Vapor Retarder: ASTM E1745 Class A.
1. Specified: **STEGO INDUSTRIES** “Stego-Wrap”.
2. Alternate: **EPRO SERVICES, INC.** “Ecoshield-E15”.
3. Alternate: **W.R. MEADOWS** “Perminator 15”.
4. Thickness: 15 mils minimum.
5. Performance: ASTM E154
    a. Permeance ASTM E154: 0.01 Perms.
    b. Tensile Strength ASTM D828: 45.0 lbf/in.
    c. Resistance to Puncture ASTM D1709: 2200 grams.
    d. Resistance to decay:
6. Accessories (provide products recommended by manufacturer):
    a. Pressure sensitive seam tape: ASTM E96: 0.3 perms or lower
    b. Vapor Proof Mastic: ASTM E96: 0.3 perms or lower.
    c. Pipe Boots: Construct pipe boots from vapor retarder material, pressure sensitive seam tape, and /or mastic per manufacturer's written instructions.
    d. Vapor Stakes:
        1) Density ASTM D1505: 0.0289 lb/cu.in.
        2) Specific Gravity ASTM D792: 0.0477.

D. Curing Paper (Absorptive Covers): ASTM C171.
1. Specified: **FORTIFIBER CORPORATION** “Orange Label Sisalkraft”.

E. Cementitious Based Underlayment Compounds (**CBUC**): ASTM C109 4500 psi minimum
1. Specified: **ARDEX** “V-1200”.
2. Alternate: **QUIKRETE PRODUCTS CORP.** “QUIKRETE No. 1249”.
3. Alternate: **EUCLID** “EucoFloor SL160”.
4. Free-flowing, self-leveling, pumpable, cement-based compound for applications from 1-1/4 inch thick to feathered edges.

2.4 SITE MATERIALS

A. Waterstops: Corps of Engineers standard CRD-C 572.
   1. Specified: **GREENSTREAK PLASTIC PRODUCTS CO.** “Polyvinyl Chloride Type”.
   2. Provide polyvinyl chloride type waterstops, model number and size to fit the construction required.

B. Fiber Expansion Joint Filler: ASTM D1751
   1. Specified: **W.R. MEADOWS** "Fiber Expansion Joint" with “Snap Cap”.
   2. Alternate: **JD RUSSELL CO.** “Fiberflex Fiber Expansion Joint Filler with snap cap”.
   3. 3/8" thick at vertical joints and 1/2" thick under thresholds (unless specifically noted otherwise), asphalt saturated fiber expansion joint filler.
   4. Provide manufacturer’s recommended removable expansion joint cap.

C. Semi-Rigid Joint Filler: ASTM D2240 Type A shore durometer hardness of 80.
   1. Specified: **W.R. MEADOWS** “Rezi-Weld Flex”.
   2. Alternate: **EUCLID** “Euco 700” or “QwikJoint UVR”.
   3. Two-component, semi-rigid, 100 percent solids, epoxy or polyurea.

D. Foam Expansion Joint Filler: ASTM C578.
   1. Specified: **DOW CHEMICAL CORP**. "Styrofoam”.
   2. Alternate: **U.C. INDUSTRIES** "Foamular”.
   3. Extruded Polystyrene Foam products thickness and depth as indicated on the drawings.

E. Sack Finish Materials: For repair and patching of defective areas.
   1. Mix: One part cement to one part fine sand with enough water to provide a creamy consistency.

2.5 ACCESSORIES

A. Bonding Agents:
   1. Specified: **EUCLID** "Eucoweld 2.0."
   2. Alternate: **LARSON PRODUCTS CORPORATION** "Weld-Crete."
   3. Alternate: **GCP** "Darweld C."
   4. Alternate: **W.R. MEADOWS** "Deck-O-Weld."
   5. Polyvinyl acetate or acrylic base, mixed per the manufacturer's written recommendations.

B. Mortar:
   1. Site Mix:
      a. Mix: One part cement to 3 parts aggregate. All aggregate shall pass No. 4 sieve.
      b. Mixing: Thoroughly mixed per ACI 318 *Building Code Requirements for Structural Concrete and Commentary*.
   2. Concrete Mortar:
      a. Specified: **EUCLID** “VersaSpeed LS100”.
      b. Greater than 1/4 inch thick: Floor leveling, patching and repair, non-shrink trowel applied concrete mortar where repair areas of fill.
   3. Epoxy Concrete Mortar:
      a. Specified: **SHERWIN WILLIAMS** “TPM 115”.
      b. Alternate: **ANTI-HYDRO CORPORATION** “A-H Emery Epoxy Topping #170”.
      c. Less than 1/4 inch thick: Floor leveling, non-shrink trowel applied epoxy concrete mortar where repair areas to fill.
   4. Epoxy Mortar and Adhesive Materials: ACI 503.4; ASTM C881 Grade 1, 2, and 3, Type I, II, and IV, Class B & C.
      a. Specified: **W.R. MEADOWS** “Rezi-Weld, LV, 1000, or Gel-Paste”.
      b. Alternate: **EUCLID** “Dural 452 LV/ Dural 452MV/ Dural 452 Gel.”
      c. Modified Polyamide, high modulus mortar, strength to match adjacent concrete or greater.

C. Grout:

1. Strength to match adjacent concrete or greater, composed of specified Concrete Materials.
2. Mix: Same proportions as concrete mix except omit coarse aggregate and adjust water to produce a thick consistency. Provide mix design per CBC Section 1904A.2.
3. Mixing: Per ACI 318 *Building Code Requirements for Structural Concrete and Commentary*, mixed per the manufacturer's written recommendation.

D. Non-Shrink Grout: ASTM C1107

1. Specified: **MASTER BUILDERS** “713”.
2. Specified: **MASTER BUILDERS** “928”.
3. Alternate: **EUCLID** “NS Grout”.
4. Alternate: **EUCLID** “Hi-Flow Grout”.
5. Flowable, non-shrink, self-leveling, non-staining, non-metallic grout, strength to match adjacent concrete or greater.

E. Drypack Grout: ASTM C1107

1. Specified: **EUCLID** “Dry Pack Grout”.
2. Alternate: **W.R. MEADOWS** “Pac-It Grout”.
3. Non-staining, non-shrink, non-metallic grout, strength to match adjacent concrete or greater.

2.6 CONCRETE MIXTURES, GENERAL

A. Mix Design and Proportions per ACI 318 Building Code Requirements for Structural Concrete and Commentary:

B. Prepare concrete mix designs by recognizing Testing Laboratory approved by Architect.

C. Notify the Testing Laboratory and Architect of intent to use concrete pumps to place concrete so that mix designs can be modified accordingly.

D. Mix designs with Fly Ash content greater than 15 percent of the total weight of cementitious materials shall be proportioned by ACI 318 *Building Code Requirements for Structural Concrete and Commentary*.

E. Provide 3 percent air entrainment typical, 6 percent for mixes with f'c greater than 4,000 psi when required.

F. Owner's testing laboratory shall review all mix design before submittal.

G. Minimum compressive strengths per ACI 318 *Building Code Requirements for Structural Concrete and Commentary* at 28 days and proportioned within the following limits:

2.7 CONCRETE MIXES

A. **Foundations**: Unexposed foundations.

1. 28-day Strength: 3,000 psi.
2. Aggregate Size, Max: 1-1/2 inch.
3. Water-Cement Ratio, Max: 0.58.
4. Admixture: Water Reducing.
5. Weight: 145 pcf.

B. **Building Slab on Grade**: Interior building slab on grade.

1. 28-day Strength: 4,000 psi.
2. Aggregate Size, Max: 1 inch.
3. Water-Cement Ratio, Max: 0.45.
4. Admixture: Water Reducing; Fly Ash.
5. Weight: 145 pcf.

C. **Structural Concrete**: Columns, beams, and walls.

1. 28-day Strength: 4,000 psi.
2. Aggregate Size, Max: 1 inch.
3. Water-Cement Ratio, Max: 0.50.
4. Admixture: Water Reducing.
5. Weight: 145 pcf.
6. Weight: 145 pcf.

D. **Architectural**: detailed concrete items, signs, plaques, landscape furniture, columns, walls.

1. 28-day Strength: 3,000 psi.
2. Aggregate Size, Max: 3/8 inch.
3. Water-Cement Ratio, Max: 0.64.
4. Admixture: Plasticizer.
5. Weight: 145 pcf.

2.8 CONCRETE MIXING

A. Consistency of Concrete: ASTM C143
   1. Slump, General: 3 inch plus or minus 1 inch.
   2. Slump, Polished Concrete Mix: 5" maximum.
   3. Slump, mixes employing specified high range water reducer: not to exceed 7 inch +/- 1 inch after dosing, 2 inch +/- 1 inch before dosing.
   4. Slump, Polished Concrete Mix employing water reducing admixture: 6" maximum.
   5. Concrete slump shall be taken at point of placement. Use water reducing admixtures as required, to provide a workable consistency for pump mixers. Water shall not be added in route by truck or at the jobsite without written review by the Architect.

B. Mixing:
   1. Equipment: All concrete shall be machine mixed. Provide adequate equipment and facilities for accurate measurement and control of materials.
   2. Method of Mixing to comply with ACI 318 Building Code Requirements for Structural Concrete and Commentary:
      a. Transit Mixing: Comply with ASTM C94. Ready mixed concrete shall be used throughout, except as specified below.
         1) On-Site Mixing: Use only if method of storing material, mixing of material and type of mixing equipment is approved by Architect.
         2) Approval of site mixing does not relieve Contractor of any other requirements of Specifications.
   3. Mixing Time: After mix water has been added, concrete shall be mixed not less than 1-1/2 minutes nor more than 1-1/2 hours. Concrete shall be rejected if not deposited within the time specified.
   4. Admixtures:
      a. Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.
         1) Integral Color: Follow the manufacturers written recommendations for proper mixing of the selected pigment color.
      b. Water Reducers may be used in concrete slabs on grade identified with a Polished Concrete Finish - coordinate with Specification Section - POLISHED CONCRETE FINISHING.
      c. Admixtures shall be charged into mixer as a solution and shall be dispensed by an automatic dispenser or similar metering device. Powdered admixtures shall be weighed or measured by volume as recommended by manufacturer. Accuracy of measurement of any admixture shall be within plus or minus 3 percent.
      d. Two or more admixtures may be used in same concrete, provided such admixtures are added separately during batching sequence, and provided further that admixtures used in that combination retain full efficiency and have no deleterious effect on concrete or on properties of each other.
      e. All admixtures are to be approved by Architect prior to commencing this work.
   5. Re-tempering:
      a. Concrete shall be mixed only in quantities for immediate use. Concrete, which has set shall be discarded, not re-tempered.
      b. Indiscriminate addition of water to increase slump is prohibited.
      c. When concrete arrives at project with slump below what is suitable for placing, water may be added only if neither maximum permissible water-cement ratio nor maximum slump is exceeded.

1) Water shall be incorporated by additional mixing equal to at least half of total mixing time required.
2) Any addition of water above that permitted by limitation of water-cement ratio shall be accompanied by a quantity of cement sufficient to maintain proper water-cement ratio.
3) Such additions shall only be used if approved by the Architect.
4) In any event, with or without addition of cement, not more than 2 gallons of water per cubic yard of concrete, over that specified in the design mix, shall be added.

6. Cold Weather Batching: When temperature is below 40 degrees F, or is likely to fall below 40 degrees F during a 24 hour period after placing, provide adequate equipment for heating concrete materials.
   a. No frozen materials or materials containing ice shall be used.
   b. Temperatures of separate materials, including mixing water, when placed in mixer shall not exceed 100 degrees F.
   c. When placed in forms, concrete shall have a temperature between 50 degrees F and 85 degrees F.
7. Hot Weather Batching: Concrete deposited in hot weather shall have a placing temperature below 85 degrees F. If necessary, ingredients shall be cooled to accomplish this.

2.9 FINISHES

A. Tooled Slab Finishes:
   1. Scratch Finish: Apply to surfaces to receive concrete floor topping or mortar setting beds for tile, and other bonded applied cementitous finish flooring material.
   2. Float Finish: Apply to surfaces to receive trowel finish and other finishes as specified; membranes, elastic waterproofing, elastic roofing, or sand-bed terrazzo.
   3. Trowel Finish: Apply to surfaces to be covered with resilient flooring, thin-set ceramic or quarry tile, paint or another thin film-finish coating system
   4. Sweat Trowel Finish: Apply non-slip steel trowel finish to exterior concrete paving and concrete finishes, at exterior concrete platforms, steps, ramps, walks, and other areas requiring non-slip finishes:
      a. Medium Finish: surfaces of pitch of less than 5 percent, equivalent to a "Medium Finish", with at least 1/16" reveal.
      b. Rough Finish: surfaces of pitch greater than 5 percent, equivalent to a "Heavy Finish" with at least 1/8" reveal.
   5. Broom Finish: All concrete paving and concrete finishes, and exterior concrete platforms, steps, ramps and other areas requiring non-slip finishes, unless otherwise indicated, shall have a non-slip broom finish applied in the following manner:
      a. Medium Broom Finish: 1/16" reveal.
      b. Rough Broom Finish: 1/8" reveal.

B. Applied Slab Finishes:
   1. Slab Curing Compound (**SCC**): Used as a curing compound for exterior slabs on grade with no flooring applications.
      a. This product must have an application of colored [**wax**][**sealer**].

C. Repair Finishes:
   1. Sack Finish: (Vertical surfaces) Apply to defective surfaces mixed to the color and consistency required to match the adjacent materials in color and strength.

2.10 SOURCE QUALITY CONTROL

A. Test, Inspection:
   1. Inspection of Mix:
      a. Quality and quantity of material used shall be subject to continuous inspection by a qualified person. Sampling and testing of cement and aggregates per Title 24, Part 1, Section 4-335, and CBC Section 1705A, and Table 1705A.3.
      b. Maintain sources of material supply constantly after approval of concrete mix.

PART 3 - EXECUTION

3.1 REQUIREMENTS FOR INTERIOR SLABS TO RECEIVE FLOORING

A. Ensure the proper levelness and flatness of all concrete substrates for the intended flooring products.
   1. If leveling materials are required because of inadequate leveling during the pour and curing periods, follow all manufacturers written instructions for the proper preparation and application of these products.
   2. Verify that the concrete substrates are at the right RH (Relative Humidity) and Alkalinity Levels for the leveling materials per manufacturers written instructions.

B. Keep finished concrete substrates clean and ready for scheduled flooring applications during the construction process.
   1. Protect those substrates from excessive moisture build-up, and keep free of moisture puddles.
   2. Ensure that construction equipment does not leak fluids on substrates that would prevent bonding of flooring adhesives at the proper time for flooring installations.

C. Provide concrete substrates that are within acceptable limits of RH and that the Alkalinity of the concrete substrates are within the acceptable levels for adhesively applied flooring at the scheduled time for flooring installations.

3.2 EXAMINATION

A. Site verification of conditions:
   1. Contractor shall inspect bearing soil and report soft or loose unsuitable bearing soil to Architect.
   2. Architect will furnish Contractor with corrective measures necessary to remedy field condition.
   3. Do not pour concrete until suitable bearing surfaces are achieved.
   4. At Engineered Fill, remove soft and loose unsuitable fill and replace with concrete. Cost shall be paid by Contractor.
   5. Contractor shall inspect and identify any site conditions and/or design information that prevents the Contractor from complying with the laws, regulations and/or building codes governing ADA access compliance.

3.3 PREPARATION

A. Transportation of Concrete:
   1. Handle Concrete from mixer to place of final deposit as rapidly as practical by methods which shall prevent the separation or loss of the ingredients per ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
   2. Do not move concrete horizontally by means of vibrators.
   3. Deposit concrete as nearly as practical at its final position in a manner which, will ensure that required quality is obtained.
   4. Chutes shall slope not less than 4 inches and not more than 6 inches per foot of horizontal run.

B. Protection:
   1. At old concrete or concrete which has begun to set upon which Concrete is to be placed:
      a. Surface shall be level, cleaned of all laitance and rough with solidly embedded large aggregate exposed.
      b. Rough surface by chipping entire surface not earlier than 5 days after set, by high pressure hosing (80 pounds per square inch) 2 to 4 hours after placing or by sand blasting with coarse silica sand, roughness amplitude shall be at least 1/4 inch.
      c. Not more than 1/2 hour prior to pouring concrete, place 2 inch thick uniform layer of grout on old concrete.

C. Surface preparation:
   1. Prepare base materials prior to forming footings and trenches.

2. Remove all water from excavation. Divert flow of water through drains using methods to avoid washing over freshly deposited concrete.
3. Remove hardened concrete, wood chips, shavings and other debris from interior of forms and from reinforcing steel by vacuum process.
    a. No wooden ties or blocking shall be left in concrete except where indicated for attachment of other work.
4. Forms shall have been erected, adequately braced, cleaned, sealed, lubricated if required, and bulkheaded where placing is to stop.
5. Any wood forms other than plywood shall be thoroughly water soaked before placing any concrete. The wetting of forms shall be started at least 12 hours before concreting.
6. Reinforcing steel shall have been placed, tied and supported.
7. Coordinate with Specification Section - SOIL TREATMENT before placing any concrete.
8. Embedded work of all trades shall be in place in the forms and adequately tied and braced.
9. Reinforcing steel, at the time the concrete is placed around it, shall be cleaned of scale, mill scale or other contaminants that will destroy or reduce bond.
10. Concrete surfaces to which fresh concrete is to be bonded shall be brush cleaned to remove all dust and foreign matter and to expose the aggregate, and then coated with the bonding adhesive herein specified.
11. Prior to placing concrete for any slabs on grade, the moisture content of the subgrade below the slabs shall be adjusted to at least optimum moisture.
12. No concrete shall be placed until formwork, reinforcement, and embedded items have been approved by the Architect.
    a. Clean forms of all debris and remove standing water.
    b. Thoroughly clean reinforcement and all handling equipment for mixing and transporting concrete.
    c. Concrete shall not be placed against reinforcing steel that is hot to the touch.
13. Provide runways or other approved means for wheeled equipment. Do not wheel equipment over reinforcing or formwork.

3.4 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
    1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
    3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.5 INSTALLATION OF BASE

A. Placing of Rock Base:
    1. Shall occur after scarification and compaction operations.
    2. Preparation of sub-grade and selection and placing of Rock Base subject to continuous inspection and supervision of Geotechnical Engineer.
    3. Compact to a density of not less than 92 percent, but not more than 95 percent, per Test Designation ASTM D1557 "Test methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)."
        a. Density of each layer of Rock Base shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing any other succeeding layers.
    4. Roll Rock Base under interior and designated exterior slabs to smooth surface, free of large or sharp particles.
    5. Conduct work to minimize inspection costs.
    6. Costs of initial compaction tests shall be borne by the Owner. Contractor shall pay for all re-tests required due to failure of initial tests.

B. Placing of Sand Base:
   1. Shall occur after scarification and compaction operations.
   2. Preparation of any sub-grade Engineered Fill, placing of Vapor Retarder, and placing of Sand Base subject to continuous inspection and supervision of Geotechnical Engineer.
   3. Compact Sand Base to a density of not less than 92 percent, but not more than 95 percent, per Test Designation ASTM D1557 (56,000 ft-lb/sq.ft.)."
      a. Density of each layer of Sand Base shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing any succeeding layers.
   4. Roll Sand Base under interior and designated exterior slabs to smooth surface, free of large or sharp particles.
   5. Conduct work to minimize inspection costs.
   6. Costs of initial compaction tests shall be borne by the Owner. Contractor shall pay for all re-tests required due to failure of initial tests.

3.6 INSTALLATION OF VAPOR RETARDER

A. General:
   1. Per ASTM E1643 and manufacturer's written installation instructions.
   2. Level, tamp or roll Earth Fill or Base Material beneath the slab. Remove sharp objects that could puncture or damage the Vapor Retarder.

B. Placement:
   1. Unroll Vapor Retarder over the area where the slab is to be poured, with the longest direction parallel with the direction of the pour.
   2. Follow manufacturer's written recommendations for vertical wall applications.

C. Seams and Joints:
   1. Overlap 6 inches and tape using a compatible 4-inch wide Pressure Sensitive Seaming Tape.
      a. Tape areas shall be free from dust, dirt and moisture to allow maximum adhesion of the pressure sensitive tape.

D. Perimeter Termination:
   1. Extend Vapor Retarder to the perimeter of the slab.
   2. Where practicable, terminate Vapor Retarder at the top of slab. Where not practicable, terminate at a location acceptable to the Structural Engineer or as required by site conditions.
   3. Seal Vapor Retarder continuously at slab edges, foundation walls, grade beams, and other vertical surfaces using manufacturer-approved accessories and sealants, installed in accordance with manufacturer's written recommendations.

E. Penetrations:
   1. Limit penetrations of the Vapor Retarder to those required for permanent construction, including reinforcing steel and permanent utilities.
   2. Seal all penetrations, including pipes, conduits, ducts, reinforcing steel, and block-outs, in accordance with the Vapor Retarder manufacturer's written recommendations to maintain continuity of the Vapor Retarder.
   3. Multiple penetrations in close proximity and irregular penetrations shall be sealed using manufacturer-approved sealants and accessories.

F. Forming, Supports, and Accessories:
   1. Avoid the use of non-permanent stakes or supports that penetrate the Vapor Retarder. Use Vapor Retarder–safe forming systems where available.
   2. Where penetration by temporary supports is unavoidable, repair penetrations in strict accordance with the Vapor Retarder manufacturer's written repair procedures.
   3. Use reinforcing bar supports and accessories with base sections designed to eliminate or minimize puncture of the Vapor Retarder.

G. Repairs:
   1. Inspect Vapor Retarder prior to concrete placement. Repair damaged areas, holes, or punctures in accordance with the manufacturer's written recommendations.

2. Repair materials shall be Vapor Retarder material of equal or better permeance, puncture resistance, and tensile strength than the original material.
3. Repairs shall extend a minimum of 6 inches beyond damaged areas in all directions and shall be sealed to maintain Vapor Retarder continuity.

3.7 JOINTS

A. General: Construct joints straight, horizontal, true with faces perpendicular to surface plane of concrete and free of "overhangs" or "lips" to line.

B. Construction Joints:

1. Location: as indicated or as approved by Architect.
2. Install as to least impair strength of structure, appearance of concrete and shall conform to typical details and per ACI Standards.
3. Joints between concrete and masonry shall be considered construction joints.
4. Spacing: Pour lengths shall be as follows, unless specifically noted otherwise.
    a. Foundations: 100 feet maximum
    b. Walls: 60 feet maximum
    c. Structural Slabs: 60 feet o.c. maximum
    d. Interior Slabs on grade: 30 feet o.c. maximum
    e. Exterior Slabs on grade: 30 feet o.c. maximum
5. Installation:
    a. Construction joints shall have level tops, vertical sides.
    b. Construction joints shall be thoroughly cleaned and roughened by removing entire surface film and exposing clean aggregate solidly embedded in mortar matrix.
    c. See drawings for doweling and required keys.
    d. Roughen construction joints by any of the following methods:
        1) By sandblasting joint.
        2) By thoroughly washing joint, using a high pressure hose, after concrete has taken initial set. Washing shall be done not less than 2 hours nor more than 4 hours after concrete has been poured, depending upon setting time.
        3) By chipping and wire brushing.
        4) Vertical construction joints need not be roughened
    e. All decisions pertaining to adequacy of construction joint surfaces and to compliance with requirements pertaining to construction joints shall be reviewed with the Architect.
    f. Just before starting new pour, horizontal and vertical joint surfaces shall be dampened but not saturated.
    g. Before placing regular concrete mix, horizontal and vertical joint surfaces shall be covered with a layer of mortar composed of cement and fine aggregate of same proportions as that used in prescribed mix, but omitting coarse aggregate.

C. Expansion Joints:

1. Location: as indicated or as approved by Architect.
    a. Exterior slabs on grade: locate at walks, curbs, gutters, etc.
        1) Locate at each side of structure/vertical surface, curb transition opposite apron joints, end of curb returns, and back of curb when adjacent to walk.
    b. Interior slabs on grade: Install at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
2. Spacing:
    a. Exterior Slabs on grade: 30 feet o.c. maximum, unless otherwise noted.
    b. Interior Slabs on grade: as indicated.
3. Installation:
    a. Install Expansion Filler in expansion joints.
        1) Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless noted otherwise.

2) Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface.
3) Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
4) "Glue" Expansion Filler to edge of previous pour.

b. When concrete has taken initial set, the edge of concrete surface shall be rounded by tooling to top of Expansion Filler.
c. Interrupt reinforcing at all expansion joints.

D. Control Joints (Contraction Joints):
1. Location: as indicated or as approved by Architect.
a. Construction and expansion joints shall be considered as control joints.
2. Spacing:
a. Exterior Slab on grade: 10 feet o.c. maximum, unless otherwise noted.
b. Interior Slab on grade: 15 feet o.c. maximum.
1) Maximum area not to exceed 225 sf.
2) Maximum length to width not to exceed 1 to 1 1/2 ratio.
3) Conform to bay spacing wherever possible (at column centerlines, half bays, third bays, etc.).
3. Installation: Form weakened-plane control joints, sectioning concrete into areas as indicated.
a. Use saw cuts 1/8 inch wide by 1/4 of slab depth, or tooled joints with rounded edges 1/8 inch wide by 1/4 of slab depth, unless specifically noted otherwise.
b. Control joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing without dislodging aggregate and with no spalling of edges on either side of the joint.
c. Slab reinforcing need not be terminated at control joints.

3.8 CONCRETE PLACEMENT

A. Placing of Concrete - General:
1. All concrete shall be placed under direct observation of the Owner's Inspector.
2. Notify Owner's Inspector not less than 48 hours prior to pouring of first concrete.
3. Place concrete per ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
4. Do not place Concrete outside of regular working hours except to complete work already started.
5. Do not use Concrete which has been mixed for a period longer than 90 minutes or which has started to stiffen or set.
6. Re-mixing on concrete, which has started to set, shall not be permitted.
7. Pouring of concrete shall be a continuous operation until the completion of the Section or Panel per ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
8. Consolidation:
a. Concrete shall be thoroughly compacted and worked to all points with solid continuous contact to forms and reinforcement to eliminate air pockets and honeycombing.
b. Power vibrators shall be used immediately following pour.
c. Spading by hand, hammering of forms or other combination of methods will be allowed only where permitted by Architect.
d. In no case shall vibrators be placed against reinforcing steel or used for extensive shifting of deposited fresh concrete.
e. Provide and maintain standby vibrators, ready for immediate use.
9. Keep a record of times, dates and locations of all concrete placing operations for the duration of the project. Record shall be available to Architect and Owner's Inspector at all times.
10. In no case shall concrete be poured into an accumulation of water ahead of pour.
11. If any concrete operation, once planned, can not be completed in a continuous operation, placement shall stop at temporary bulkheads located where resulting construction joints will

least impair the strength of the structure. The location of construction joints shall be as shown on the drawings, or as approved by Architect.

12. Hot Weather Concreting: Unless otherwise directed by the Architect, perform all work per ACI 305.1 "Specification for Hot Weather Concreting" when air temperature rises above 75 degrees F and the following:
    a. Mixing Water: Keep water temperature as low as necessary to provide for the required concrete temperature at time of placing. Ice may be required to provide for the design temperature.
    b. Aggregate: Keep aggregate piles continuously moist by sprinkling with water.
    c. Temperature of Concrete: The temperature of the concrete mix at the time it is being placed in the forms shall not exceed 85 degrees F.
        1) The method employed to provide this temperature shall in no way alter or endanger the design mix or the design strength required.
        2) Dampen subgrade and formwork before placing concrete.
        3) Remove all excess water before placing concrete.
        4) Keep concrete continuously wet when air temperature exceeds 85 degrees F for a minimum of 48 hours after placing concrete.
    d. Protection: Minimize evaporation from concrete in place by providing shade and windbreaks. Maintain such protection for 14 days minimum.
13. Cold Weather Concreting: Follow recommended ACI 306R "Cold Weather Concreting" procedures when air temperature falls below 40 degrees F, as approved by Architect.
    a. Concrete placed in freezing temperature shall have a temperature of not less than 50 degrees F.
    b. Maintain this temperature for at least 7 days.
    c. No chemicals or salts shall be used to prevent freezing and no accelerating agents shall be used without prior approval from Architect.
14. Concrete shall not be placed if sand overlying the vapor retarder barrier has been allowed to attain a moisture content greater than 5 percent due to precipitation or excessive watering.

B. Placing of Concrete at Footings, Walls, Columns, etc.:
    1. Concrete shall be placed in layers not to exceed 24 inches in depth, and shall be thoroughly compacted.
        a. Wait forty minutes before placing next layer.
        b. Re-vibrate 6 inches into previous lift before next lift is added.
        c. Locate top of lift at or below top of wall opening.
    2. Use openings in forms, elephant trunks or other approved methods to prevent accumulation of concrete on forms and reinforcement above the level of pour.
        a. Unconfined free falls shall not exceed 5 feet.
    3. Where placing or consolidation is restricted by close assemblage of reinforcing and/or forms use a Modified Mix Concrete with smaller aggregate and/or pour 3 inches of neat grout into form prior to regular mix.
    4. Concrete shall not be flowed horizontally along forms.

C. Placing of concrete at slab on grade:
    1. Slabs on grade shall not be poured until the sub-grade has been thoroughly compacted and properly prepared, complete with vapor retarder or barrier, nor until reinforcement and inserts are securely fastened in place.
        a. Sub-grade above and below vapor retarder where installed resilient flooring products or rubber/vinyl-backed products are proposed to be installed shall not be moistened prior to pouring concrete.
    2. No greater area shall be poured at one time than can be properly finished without checking.
    3. Slabs on grade shall be laid out in a checkerboard pattern when applicable. Pour and allow alternate slabs to set.
        a. Fill out balance of checkerboard pattern with subsequent pour.
    4. Concrete shall be poured as dry as possible, consistent with good workmanship.

a. Water shall not be added to mix to improve workability without approval of the Architect.

5. Concrete shall be compacted by hand tamping and by mechanical vibration.
   a. After the concrete is thoroughly compacted, the surface shall be screeded off, any surface water removed an finish applied as specified.
6. The Contractor may, on approval of DSA and the Architect, use Finish Enhancing Admixture (High Range Water Reducer).

D. Placing of concrete on above grade slabs:
   1. General: In addition to all the preceding requirements for pouring concrete, on above grade slabs the contractor shall coordinate the pour so as to not over stress the structure and evenly distribute the pours to minimize deflection for the structural members in order to minimize slab cracking.

E. Placing of concrete by pumps:
   1. If pumps are used to place concrete, the fines (3/8" and smaller) shall not exceed 45 percent of the total volume of aggregate. Standby equipment must be provided to insure completing pours to planned cutoffs.
   2. Pumps shall handle concrete at a uniform rate without bleeding or segregation of aggregates. Concrete from end of the hose shall have a free fall not to exceed 4 feet. Aluminum pipe shall not be used to transport pumped concrete.

3.9 INSTALLATION OF SHRINKAGE-RESISTANT GROUT

A. Installation of nonshrink grout or drypack: Install under base plates immediately after erection of structural steel.
   1. General: Ram in thin layers, using a short length of ram, the free end of which shall be struck with a heavy hammer or mallet, several blows for each layer, to compact the mixture. When completed, the exposed drypack shall show slight indication of moisture.
   2. Curing: Cure with a curing compound or with moisture-retaining barrier kept wet.

3.10 FINISHES APPLICATION

A. Screed, consolidate, and level concrete slabs prior to any Finishes.

B. Tooled Finishes:
   1. Scratch finish:
      a. After screeding, consolidating, and leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
   2. Float finish:
      a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
      b. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both.
      c. Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power units.
      d. Finish surfaces to tolerances indicated.
      e. Cut down high spots and fill low spots.
      f. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
   3. Trowel finish:
      a. After floating, begin first trowel-finish operation using a power-driven trowel.
         1) Begin final troweling when surface produces a ringing sound as trowel is moved over surface.
         2) Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances indicated.
         3) Grind smooth any surface defects that would telegraph through applied floor covering system.

b. Where thin set ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
c. Apply a non-slip "Sweat Trowel" finish (tight circular motion approved by the Architect) to exterior slabs in the final troweling operation.

4. Broom finish:
   a. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route for the indicated broom finish.
   b. Medium Broom Finish: On all surfaces having a pitch of less than 6 percent.
   c. Rough Broom Finish: On all surfaces having a pitch of more than 6 percent.

C. Applied Finishes:
   a. Slab Curing Compound Finish (**SCC**):
      1) Apply Clear Slab Curing Compound Sealer Finish at exterior areas only, per manufacturer's written recommendations, and as indicated by the Contract Documents.
   2. Repair Finishes:
      a. Sack Finish: Use only enough water as required for handling and placing.
         1) Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1-inch.
            a) Make edges of cuts perpendicular to the concrete surface.
            b) Thoroughly clean, dampen with water, and brush-coat the area to be patched with a bonding agent.
            c) Place patching mortar before bonding agent has dried.
         2) For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color.
            a) Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching.
            b) Compact mortar in place and strike-off slightly higher than surrounding surface.

D. Concrete curing and protection:
   1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
      a. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material.
      b. Apply according to manufacturer's written instructions after screeding and bull floating, but before power floating and troweling.
   2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less 10 days.
   3. Formed Surfaces:
      a. Wet forms immediately after pouring.
      b. Keep forms and exposed surfaces wet until forms are removed.
      c. Keep all surfaces wet after forms are removed for 10 days after placement of Concrete.
   4. Concrete Slab Curing Methods:
      a. One spray coat of clear curing compound.
         1) Agitate curing compounds thoroughly by Mechanical means continuously during use and spray or brush uniformly per manufacturer's written recommendations.
         2) Not applicable for:
            a) Slabs designated for Adhesively Applied Floor Coverings.
            b) Slabs designated for Resinous Flooring on top of concrete slab.
            c) Slabs designated for Polished Concrete Finishing.
      b. Curing paper:

1) Anchor the paper or film securely and seal all edges in such a manner as to prevent moisture escaping from concrete.
2) Protect all exposed surfaces with "Curing Paper." Curing Paper shall be kept moist.
3) Contractor shall be responsible for protection of finished concrete against injury by rain, cold, vibration, animal tracks, marking by visitors, vandalism, etc.
4) Required for the following:
    a) All interior concrete slabs.

3.11 CONSTRUCTION TOLERANCE

A. Exterior Site Improvements:
    1. Placement of all concrete shall not exceed 0.02 feet variance from designated grades.
    2. Surface variation of all concrete slabs shall not exceed 0.01 foot in 10 feet.
    3. Construction of all concrete subject to ADA access compliance, including Accessible Path of Travel, curb returns, parking stalls and unloading areas, barrier free amenities and / or other applicable site improvements shall conform to the Americans with Disabilities Act, California Title 24 and the California Building Code, regardless of any construction tolerances. Examples of minimum and maximum limits related to ADA access compliance include, but are not limited to:
        a. Accessible Path of Travel cross-slope shall not exceed 2 percent.
        b. Accessible Path of Travel longitudinal slopes shall not exceed 5 percent.
        c. Ramp longitudinal slopes shall not exceed 8.33 percent.
        d. Walks shall not have less than 48 inches in unobstructed width.
    4. Maintain all grades and slopes throughout construction and until Notice of Completion has been filed.

B. Building Slabs:
    1. General: All surface variations of slabs shall be less than 1/8 inch in 10 feet. Uniformly slope slab surfaces to drains where indicated on the drawings.
    2. Typical Building Slabs:
        a. Flatness: SOV greater than FF 35; MLV greater than FF 24.
        b. Levelness: SOV greater than FL 25; MLV greater than FL 17.
    3. Polished Concrete Flooring Slabs:
        a. Flatness: SOV greater than FF 45; MLV greater than FF 30.
        b. Levelness: SOV greater than FL 35; MLV greater than FL 24.
    4. FF (Floor Flatness) and FL (Floor Levelness): The Contractor shall measure according to ASTM E1155, within twenty-four (24) hours of the pour.
        a. Cut down high spots, and fill low spots, and adjust pour techniques to achieve floor tolerances specified.
        b. Contractor shall pay for and have a Certified Report in writing from an Independent Testing Agency that concrete substrates requiring FF and FL only are constructed to the specified tolerances, and are ready for floor coverings that require FF and FL.
        c. SOV = Specified Overall Value.
        d. MLV = Minimum Local Value.
        e. Tolerances are required by the Polished Concrete Finishing Industry as an adequate substrate for mechanized polishing machines to achieve specified sheens on concrete surfaces.

3.12 REPAIR / RESTORATION

A. Minor Defects:
    1. Minor defects in concrete shall mean any of the following:
        a. Pour joints, voids, rock pockets, tie holes, etc. where strength, and durability is not adversely affected.
        b. Shrinkage Cracks where slabs are not exposed or where appearance is not important
        c. Minor defects of pour joints, voids, rock pockets, tie holes, etc.

d. Immediately after removing forms, inspect all concrete surfaces. Patch any pour joints, voids, rock pockets, tie holes, etc., as soon as possible, but not until the defect has been examined by the Architect.
e. Chip away defective areas to a minimum depth of one inch, with edges perpendicular to surface. Clean area to be patched of all laitance.
f. Coat area to be patched with Bonding Agent. Patch with Mortar mixed with Bonding Agent thoroughly compacted into place and screeded off to leave the patch slightly higher than the surrounding surface. After at least one hour finish patch to match the adjoining surface. Cure patch by application of curing compound or by wetting for 7 days.
g. Fill tie holes solid with mortar after cleaning and thoroughly wetting. Fill through holes by means of a plunger-type grease gun.
h. See Specification Section - CONCRETE FORMWORK, Part 3, INSTALLATION, paragraph titled "Indentations" for exception.
i. Remove fins and rough surfaces from all exposed concrete.

2. Minor defect of shrinkage cracks:
   a. After entire slab is finished and fully cured, shrinkage cracks larger than 1/32 inch wide shall be filled with cement grout and struck off level with surface.

B. Serious Defects:
1. Serious defects in concrete shall mean any of the following:
   a. Concrete not meeting 100 percent of the specified 28 day compressive strength.
   b. Concrete exhibiting rock pockets, voids, spalls, streaks, cracks, exposed reinforcing to extent that strength, durability, or appearance is adversely affected.
   c. Concrete significantly out of place, line or level.
   d. Concrete not containing the required embedded items.
   e. Shrinkage Cracks where slabs are exposed and appearance is important.
   f. Concrete where patching does not satisfactorily restore quality and appearance of surface.
2. Upon determination that concrete strength is defective:
   a. Should cylinder tests fall below minimum strength specified, concrete mix for remainder of work shall be adjusted to produce required strength. Core samples shall be taken and tested from cast-in-place concrete where cylinders and samples indicate inferior concrete with less than minimum specified strength.
   b. Cores of hardened concrete shall be taken and tested per ASTM C39 and ASTM C42. Number and location of such cores shall be subject to the approval of Architect.
   c. Cost of core sampling and testing will be paid for by the Contractor.
   d. "500 psi" and "85 percent" reduction in ACI 318 "Building Code requirements for Structural Concrete and Commentary," Section 26.12.4 will not justify low cylinder tests.
   e. If core tests indicate that concrete is below the strength specified, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.
3. Major defect of shrinkage cracks.
   a. After entire slab is finished and fully cured, unsightly shrinkage cracks shall be repaired in a manner satisfactory in appearance to the Architect. If this cannot be accomplished, concrete shall be considered defective.
4. Upon determining that concrete surface is defective:
   a. Contractor may restore concrete to acceptable condition by cutting, chipping, pointing, patching, grinding, if this can be done without significantly altering strength of structure.
   b. Permission to patch defective areas will not be considered a waiver of the right to require removal if patching does not, in the opinion of the Architect, satisfactorily restore quality and appearance.
   c. If patching does not restore concrete to specified quality and appearance, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.
   d. No repair work shall begin until concrete has been examined and procedures have been reviewed by the Architect and Structural Engineer and approved by [**DSA**][**HCAI**][**AHJ**].

5. Repair defects by complete removal of concrete and replacement or repair defects with Shotcrete per CBC Sections 1908A, strength to match mix design and material being repaired.
6. Place and cure Shotcrete per CBC Section 1908A.
7. Inspect and test Shotcrete as per CBC Section 1908A.2.

C. Cost of repairing shall be borne by the Contractor.

3.13 MOISTURE AND ACCLIMATION REQUIREMENTS FOR INTERIOR SLABS RECEIVING FLOORING

A. Contractor shall protect slabs receiving flooring products from excess moisture after the curing process, removing excess moisture after rains, broken water pipes, etc., to ensure that the monolithic slabs are dry enough for application of flooring products. When all spaces have been enclosed, acclimate the building as soon as possible with the building's own mechanical heating and cooling system, and other outside devices as required to properly prepare the monolithic slabs for flooring installation.

1. The test sites for the RH Tests shall be at the same room temperature and humidity expected during normal use. If this is not possible, then the test site conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent relative humidity) 48 hours prior to, and during testing.

B. Contractor shall maintain temperature and humidity in a manner not deleterious to the flooring materials installed until the Owner assumes occupancy.

3.14 FIELD QUALITY CONTROL

A. General:

1. Costs of initial tests and inspections shall be borne by the Owner. Contractor shall pay for all re-tests and re-inspections required due to failure of initial tests.
2. Tests and inspections will be performed by the Owner's Testing Laboratory Agency in accordance with the Specification Section – TESTING LABORATORY SERVICES.

B. Site Tests:

1. Compression Tests:
   a. Testing Agent will make a set of four (4) concrete compression cylinders from each fifty (50) cubic yards or every 2,000 sq.ft. of surface area for slabs and walls per CBC Section 1905A.1.17 of each class of concrete, or fraction thereof, placed each day, and cure and test concrete compression cylinders per ASTM C31, ASTM C39, ACI Section 26.12 and ASTM C172.
      1) From each concrete compression cylinder set, Testing Agent shall test one cylinder at age seven (7) days, test two cylinders at age twenty-eight (28) days per ACI 318 "Building Code requirements for Structural Concrete and Commentary," Section, 26.12 and hold one cylinder for test only if directed by the Architect.
      2) Cylinders shall be identified as to area from which they were taken and show the date and time of day they were prepared.
   b. Testing Agent shall also test Grout and Mortar as required for compliance to Compression Requirements specified.

C. Inspection:

1. Project Inspector shall inspect placement of concrete and grout.

3.15 VAPOR RETARDER FIELD SERVICES

A. Contractor shall notify Vapor Retarder manufacturer at least one week prior to the Pre-Construction Conference regarding the Vapor Retarder installation, and will schedule subsequent visits at the appropriate times with at least one week's notice to ensure proper installation of the Vapor Retarder per the Manufacturer's Written Instructions.

B. Manufacturer shall provide and written Inspection and installation certification to the Architect that full compliance with the manufacturer's written instructions were followed and adhered to prior to covering with concrete.

3.16 CLEANING

A. The top of all concrete foundations receiving concrete masonry units shall be washed free of all laitance and loose concrete, and roughened to a roughness amplitude of 1/4".

B. Remove all debris, excess materials, tools, and equipment resulting from or used in this operation at completion of work.

END OF SECTION

SECTION 04 22 00 – CONCRETE MASONRY UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Concrete Masonry Unit (CMU) materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

1. Section includes liquid water-repellent admixture added to the concrete masonry units at the time of manufacture.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 03 15 14 DRILLED ANCHORS
4. 05 12 00 STEEL AND FABRICATIONS
5. 06 10 00 ROUGH CARPENTRY
6. 06 41 23 MODULAR CASEWORK
7. 07 21 00 INSULATION
8. 07 60 00 SHEET METAL
9. 07 92 00 SEALANTS
10. 08 11 00 METAL DOORS AND FRAMES
11. 09 24 00 CEMENT PLASTER
12. 09 29 00 GYPSUM BOARD
13. 09 50 00 ACOUSTICAL CEILINGS
14. 09 65 10 RESILIENT BASE AND ACCESSORIES
15. 09 91 00 PAINTING
16. 10 11 00 VISUAL DISPLAY BOARDS
17. 10 14 00 IDENTIFYING DEVICES
18. 10 21 13 TOILET PARTITIONS
19. 10 28 13 TOILET ACCESSORIES
20. 10 44 00 FIRE PROTECTION SPECIALTIES
21. 31 20 00 EARTHWORK
22. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ACI: American Concrete Institute

B. ASTM: American Society of Testing Materials

1. ASTM A82 Steel Wire, Plain, for Concrete Reinforcement (Specification for)
2. ASTM A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products (Specification for)
3. ASTM A153 Zinc Coating (Hot Dip) on Iron and Steel Hardware (Specification for)
4. ASTM A307 Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength (Specification for)
5. ASTM A615 Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement (Specification for)
6. ASTM C5 Quicklime for Structural Purposes (Specification for)
7. ASTM C90 Loadbearing Concrete Masonry Units (Specification for)
8. ASTM C140 Sampling and Testing Concrete Masonry Units and Related Units (Test Methods for)
9. ASTM C144 Aggregate for Masonry Mortar (Standard Specification for)
10. ASTM C150 Portland Cement (Specification for)
11. ASTM C207 Hydrated Lime for Masonry Purposes (Specification for)
12. ASTM C270 Mortar for Unit Masonry (Specification for)
13. ASTM C404 Aggregates for Masonry Grout (Standard Specification for)

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14. ASTM C426 Linear Drying Shrinkage of Concrete Masonry Units (Standard Test Method for)
15. ASTM C476 Grout for Masonry (Specification for)
16. ASTM C780 Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry (Test method for)
17. ASTM C979 Pigments for Integrally Colored Concrete (Specification for)
18. ASTM C1019 Sampling and Testing Grout (Standard Test Method for)
19. ASTM C1314 Compressive Strength of Masonry Prisms (Test Method for)
20. ASTM D1056 Flexible Cellular Materials – Sponge or Expanded Rubber (Specification for)
21. ASTM E514 Water Penetration and Leakage Through Masonry (Test Method for)

C. CMACN: Concrete Masonry Association of California and Nevada

D. NCMA: National Concrete Masonry Association

1. TEK Bulletins

E. TMS: The Masonry Society

1.3 DEFINITIONS

A. f'm: Specified compressive strength of masonry at age of 28 days, psi.

B. Grout: The filler within the Cells of the Concrete Masonry Units.

C. Mortar: The joint material between the Concrete Masonry Units, both Top and Bottom and on the Ends.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data: For each type of product specified.

1. Manufacturer's standard color range for selection by the Architect.
2. All data regarding Concrete Masonry Unit, type, and aggregate to be provided.
3. All data regarding mortar and grout materials, and mix designs to be provided.
4. All data regarding accessories to be provided.

C. Shop Drawings: For the following.

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending and placement of concrete masonry unit reinforcing bars.

D. Samples. For each type, texture and color selected.

1. Provide 4" x 4" x 1" nominal size Concrete Masonry samples for texture, color, finish and dimension provided on this project as examples of the major CMU Units for the project.
    a. Provide other chips for all others.
2. Pigmented Mortar: Make samples using the same sand and mortar ingredients to be used on this project.
    a. Label samples to indicate types and amount of pigments used.

E. Quality Assurance/Control Submittals:

1. Test Reports:
    a. Concrete Masonry Units: Lineal Shrinkage and Compressive Strength per ASTM C140 and ASTM C426.
    b. Mortar and Grout: Grout Compressive Strength and Mortar Properties per ASTM C270.
    c. Masonry Core test shall be per CBC Section 2105A.4.
2. Certificates:
    a. Concrete Masonry Unit Manufacturers Certification per ASTM C90.
    b. Concrete Masonry Unit Accessory Material Suppliers Certification.
    c. CMU producer shall be certified by the manufacturer of integral CMU water repellent admixture.
    d. Installer Certification.
    e. Contractors Certification.

1.5 PROJECT CLOSEOUT

A. Warranty.

B. Project Record Documents: In accordance with Specification Section – PROJECT CLOSEOUT.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Material:
    a. Manufacturers certification that Concrete Masonry Units furnished meet or exceed the requirements of this Specification Section per ASTM C90.
2. Suppliers certification for all grout and mortar materials (including aggregate, cement and admixtures) that items furnished meet or exceed the requirements of this Specification Section and per ASTM C270 and ASTM C476.
    a. Water Permeance of Masonry: ASTM E514.
    b. Compressive Strength of Masonry Prisms: ASTM C1314.
    c. Drying Shrinkage of CMU: ASTM C426.
3. Installer:
    a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
4. Manufacturer/Supplier:
    a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
    b. Manufacturer belonging to the CMACN.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

C. Certificates:

1. Installer's certification that Concrete Masonry Units installation meets or exceeds the requirements of this Specification Section.
2. Contractor's certification that Concrete Masonry Unit materials and installation meets or exceeds the requirements of this Specification Section.

D. Mockups:

1. Provide a four (4) foot by six (6) foot mock-up wall showing all Concrete Masonry Unit finishes in conjunction with one another, and the mortar joints and tooling required for this Project. Mock-up, once approved, will be the basis for verifying the aesthetic and structural quality of the work for this Project. Protect during construction.

E. Meetings:

1. Pre-Installation: Schedule prior to the start of work.
    a. Coordinate the work with other work being performed.
    b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
    c. Include discussions on the integral water-repellent CMU admixture and water-repellent mortars.
2. Progress: Scheduled by the Contractor during the performance of the work.
    a. Review for proper installation of work progress and properly tooled joints.
    b. Identify any installation problems and acceptable corrective measures.
    c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
    a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
    b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:
   1. Products shall be handled in such a manner as to assure that they are free from spalls, breakage and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original wrapped pallets with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and Protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation to prevent wetting prior to use.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Rain: Work under this section shall not be started or maintained under threat of rain unless the work is protected from the rain.
   2. Temperature: Ambient temperature to install products shall be forty (40) degrees Fahrenheit and rising.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.9 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty:

C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section - WARRANTIES

PART 2 - PRODUCTS

2.1 MANUFACTURERS

~~A.~~ Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 BLOCK

A. Specified: **BASALITE** DIXON.

B. Alternative: **ANGELUS BLOCK CO., INC**.
   1. Split-Faced on one side and Precision-Faced on opposite side.

C. Specified Integral Water Repellent Admixture for CMU Production:

1. Specified: **BASF** “Rheopel”.
2. Alternate: **ACM CHEMISTRIES** “RainBloc”.
3. Alternate: **W. R. GRACE and CO.** “Dry-Bloc II”.

D. Hollow Load Bearing Units per CBC Section 2103A.1, and ASTM C90, (85 - 105 pcf of concrete or greater):
   1. Primary Aggregate: Lightweight Expanded Shale aggregate.
      a. The aggregate used for all Precision Faced Units not visible on the exterior or the interior, can be Pumice aggregate.
   2. All exposed Concrete Masonry Units shall have integral color from manufacturer per material standard ASTM C979.
      a. Including all colors to maximum dye content of 6 percent.
   3. Maximum lineal shrinkage from saturated to over dry condition of not more than 0.065 percent.
   4. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2,000 psi.
   5. Integral CMU Water-Repellent:
      a. Integral liquid admixture mixed with concrete during production of CMUs.
      b. Water Permeance of Masonry: Capable of achieving a Class E Rating when evaluated using ASTM E514.

E. Nominal Face Dimensions and Finishes: See drawings for locations of Concrete Masonry Unit types and sizes.
   1. Exposed faces: To be selected by manufacturer’s full range of offerings including base, standard and premium colors.

2.3 JOINT REINFORCEMENT, TIES AND ANCHORS

A. Specified Joint Reinforcement, Ties and Anchors product manufacturer:
   1. Specified: **HOHMANN AND BARNARD, INC.**

B. General: Comply with requirements below for basic materials, as well as requirements for each form of joint reinforcement, tie, and anchor for size and other characteristics.

C. Hot-Dip Galvanized Steel Wire: Uncoated wire per ASTM A82 with zinc coating applied after prefabrication into units per ASTM A123, 1.5 oz. per sq. ft, of wire surface.

D. Joint Reinforcement: Welded-wire units prefabricated with deformed continuous side rods and plain cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units.
   1. Width: Approximately 2 inches less than nominal width of walls and partitions, providing mortar cover of not less than 5/8 inch on joint faces exposed to exterior and 1/2 inch elsewhere.
   2. Wire Size, Side Rods: 0 gage, 0.15 inches.
   3. Wire Size, Cross Rods: 9 gage, 0.15 inches.
   4. Wire Size, Two-Piece Adjustable: 9 gage diameter in exterior walls.
   5. Single-Wythe Configuration: Truss design, continuous diagonal cross rods spaced not more than 16 inches on center.
   6. Multi-Wythe Configuration: Non-Aligned Bed Joints in Cavity or Composite masonry Walls:
      a. Adjustable wall tie pintle section fitting into eye section of rectangular box-type cross ties spaced not more than 16 inches on center.
      b. Truss type units with side rods spaced for embedment within each face shell of back-up wythe, ties extended to within 1 inch of exterior face of facing wythe.
   7. Flexible Anchors: Masonry to Structural Framework: Two-piece anchors permitting vertical or horizontal differential movement between wall and framework parallel to, but resisting tension and compression forces perpendicular to, plane of wall.
      a. Anchorage to Steel Framework: Manufacturer's standard anchors with crimped 1/4 inch diameter wire anchor section for welding to steel 3/16", triangular-shaped wire tie section sized to extend within 1 inch of exterior face of facing wythe.

8. Unit Type Masonry Inserts in Concrete: Cast iron or malleable iron inserts of type and size indicated.
9. Dovetail Slots: Dovetail slots with filler strips, of slot size as required; 22 gage sheet metal.
10. Anchor Bolts: Steel bolts with hex nuts and flat washers, complying with ASTM A307, Grade A, hot dip galvanized complying with ASTM A153, Class C; sizes and configurations indicated.
11. Reinforcing Bars: Per Specification Section - REINFORCEMENT, deformed steel, per ASTM A615, Grade 60 for bars No. 3 to No. 18.

E. Miscellaneous Masonry Accessories:

1. Non-Metallic Expansion Joint Strips: Premolded, flexible cellular neoprene rubber filler strips, complying with ASTM D1056, Grade RE41E1, capable of compression up to 35 percent; width and thickness as required.
2. Weepholes: Pre-manufactured weeps.

2.4 MORTAR AND GROUT

A. Cement: Per ASTM C150, Type II.

B. Hydrated Lime: Per ASTM C207, Type [S][N], unless otherwise noted.

C. Quicklime: Per ASTM C5.

D. Lime Putty: Made from hydrated lime or quicklime.

1. If made from quicklime, other than processed pulverized quicklime, slake lime and then screen through a No. 16 mesh sieve. Before using, store and protect slaked and screened lime putty for not less than 10 days.
2. Processed pulverized quicklime shall be slaked for not less than 48 hours, and shall be cool when used.
3. Lime putty prepared from hydrated lime may be used immediately after mixing.
4. Lime putty prepared from quicklime or pulverized quicklime shall have a plasticity figure, after slaking and screening, or not less than 200, and shall weigh not less than 83 lbs. per cubic foot. Lime putty prepared from hydrated lime shall conform to ASTM C207, Type S.

E. Water: Clean and free of harmful amounts of acid, salts, alkali's, or organic materials.

2.5 MORTAR

A. Mortar Sand: Per ASTM C144.

B. Modified Mortar Sand:

1. Per ASTM C144 modified to not less than 3 percent shall pass the No. 100 sieve.
2. Per CBC Section 2103A.2 and ASTM C270.
3. Pre-Blended Mortar Mix:
   a. Per ASTM C270, Type [**M**][**S**][**N**].
4. Specified Pre-Blended Water Repellent Admixture for Mortar:
   a. Specified: **BASF** "Rheopel Plus".
   b. Alternate: **ACM CHEMISTRIES** "RainBlock".
   c. Alternate: W. R. GRACE and CO. "Dry-Bloc Integral Water Repellent".
5. Compressive Strength:
   a. See General Structural Drawings from the Structural Engineer.
   b. 1,800 psi at 28 days minimum.

2.6 GROUT

A. Per CBC Section 2103A.3 and ASTM C476.

B. Grout Aggregate: 3/8-inch maximum size and per ASTM C404.

C. Grout Admixture: Type II.

1. Specified: SIKA "Grout Aid".
2. Pre-Blended Bag Grout:
   a. Per ASTM C476.

3. Fine Grout Mix unless otherwise noted.
4. Compressive Strength:
   a. See General Structural Drawings from the Structural Engineer.
   b. 2,000 psi at 28 days minimum.

2.7 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:
   1. All materials, equipment and placing operations shall be subject to inspection, tests and approval at all times. Agent shall have access to all places where Concrete Masonry Unit materials are proportioned, mixed, cured and stored.

B. Tests and Inspection:
   1. All tests will be performed by the Owner's Testing laboratory Agency per the Specification Section – TESTING LABORATORY SERVICES.
   2. Concrete Masonry Units shall be tested per ASTM C140 and CBC Section 1705A.4.
      a. Lineal Shrinkage: Per ASTM C426.
      b. Compressive Strength: Per ASTM C140.
      c. Test three (3) samples of each type of the Concrete Masonry Unit prior to construction.
   3. Mortar Tests: At the beginning of Masonry Work, at least 1 test sample each of mortar and grout shall be taken on 3 successive working days, then once per week with at least one sample taken for each 5,000 square feet of wall area, or fraction thereof.
      a. Test specimens for mortar shall be made per ASTM C780. Test specimens shall be continuously stored in moist air until tested.
      b. Mortar shall show a compressive strength of not less than 1,800 psi at 28 days.
   4. Grout Tests: At the beginning of Masonry Work, at least 1 test sample each of grout shall be taken on 3 successive working days, then once per week with at least one sample taken for each 5000 square feet of wall area, or fraction thereof.
      a. Test specimens for grout shall be made per ASTM C476 and CBC Section 1705A.4 Test specimens shall be continuously stored in moist air until tested.
      b. Grout shall show a compressive strength of not less than 2,000 psi at 28 days.

C. Verification of Performance:
   1. A special inspector shall be employed during the placement of all units, placement of all reinforcing steel, during all grouting operations and during taking of all test specimens.
   2. Reports:
      a. Special Inspector shall submit to Architect and to DSA two copies of each report showing results of tests and inspections.
      b. Report shall state that tests and inspections were made per specifications.
      c. Report shall state whether materials were in conformance with specifications.
   3. Cost of testing and inspection will be paid by the Owner, unless otherwise specified. Contractor shall pay all costs of re-inspection and/or re-tests due to non-compliance with specifications as a reimbursement directly to the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
      a. Installation of bolts, reinforcing, inserts, etc. as required.
      b. Check and be responsible for accuracy of dowel locations in concrete where dowels project into Concrete Masonry Unit work.
   2. Control Joints:
      a. See drawings for type and location of control joints.
   3. Bond Beams:
      a. Bond beams shall be located where shown and detailed on the drawings, and shall be reinforced as indicated and as here after specified.
   4. Built-in Work:
      a. Miscellaneous Embedded Items: All items indicated to be embedded in masonry shall be carefully located and anchored to prevent movement during grouting operations. Avoid cutting and patching.
         1) Install all anchor bolts and anchors furnished under other sections.
   5. Cutting or Patching:
      a. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of the surrounding environment, and other damage from work under this specification section.
   2. Protect and cover the top of all Concrete Masonry Unit walls at the end of each day's work to minimize water intrusion, regardless of the time of year.
      a. Continue to temporarily cover the top of the walls until the final parapet cap is installed, and the sealer coats are applied.

C. Surface Preparation:
   1. Prepare surface per manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
   3. Top surfaces of foundation or slab to receive Concrete Masonry Units shall be clean, rough, and free of laitance, as specified in Specification Section - CAST-IN-PLACE CONCRETE, PART 3. Roughness amplitude shall be a minimum of one-fourth inch.

3.3 INSTALLATION

A. General:
   1. Per Regulatory Requirements and TMS 602.
   2. Set plumb, level, and square.
   3. Provide temporary bracing during erection of masonry work. Maintain in place until masonry has set to provide permanent bracing.

B. Layout:
   1. Lines shall be straight, true and built accurately to dimension.
   2. Masonry lines and levels shall be placed to the following tolerances:
      a. Variation from unit to adjacent unit: 1/8 inch maximum.
      b. Variation from plane of wall: 1/4 inch in 10 feet.

C. Reinforcement Bar installation:
   1. Installation of Vertical Reinforcement Bars:
      a. Where possible, bars shall be one length and centered in open end of Concrete Masonry Units unless noted otherwise on drawings.
      b. Bar may be doweled at top of footing.

c. Bars shall be accurately and positively held in place before setting Concrete Masonry Units by wiring to a 2 x 6 properly braced near top of bars and not over 8 feet above foundation or at last Grout pour.
d. For Low Lift Grout, corner bars and other bars in closed cell units shall be lapped a minimum of 48 bar diameters, unless indicated otherwise.
e. All vertical reinforcing steel shall be braced throughout its height in a manner that will retain the steel in proper position and provide the proper clearance at spacing not to exceed 192 bar diameters.

2. Installation of Horizontal Reinforcing Bars:
   a. Bars shall be laid in bond beam units directly on top of the cross walls of block webs.
   b. Lap splice bars a minimum of 48 bar diameters, unless indicated otherwise.
   c. Reinforcing steel shall be secured to all foundation dowels and held in place at spacing not to exceed 192 bar diameters.
3. Wire horizontal and vertical bars together.
4. Reinforcing steel shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the plans shall not be used. Heating of bars for bending will not be permitted.
5. Bars shall conform accurately to the sizes, shapes, lines and dimensions shown on drawings and with hooks and beds made as detailed. Bars shall be placed as indicated on the drawings and centered on grout space.
6. At the time grout is placed around it, reinforcing steel shall be clean of mill scale or other coatings that will destroy or reduce bond.

D. Setting of Concrete Masonry Units:
1. Bonds: Use Running Bond, or as shown on details.
   a. Place masonry to lines and levels indicated to the following tolerances:
      1) Variation from Unit to Adjacent Unit: 1/8-inch max.
      2) Variation from Plane of Wall: 1/4-inch in 10 feet.
   b. Bond: Unless noted otherwise, lay concrete masonry units in bond pattern indicated with vertical joints located over score of unit in course below (and vice versa).
   c. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
   d. Preserve the vertical continuity of cells in concrete unit masonry. The minimum clear horizontal dimensions of vertical cores shall be 3" x 3" for 8-inch wide block.
2. Align vertical cells to maintain vertical continuity of cells to be filled. Open end or notched units may be used to facilitate installation around cells that contain vertical reinforcement. Minimum unobstructed vertical flue 3" x 3". Remove overhanging mortar or other obstructions or debris from inside of cells.
3. Provide bond beam units at cells containing horizontal reinforcement.
4. Integral Water-Repellent CMU:
   a. Installer shall use only mortar containing compatible integral liquid water-repellent mortar admixture at the manufacturer's recommended addition rate and mixed according to manufacturer's recommended instructions for construction of water repellent masonry exterior walls.
   b. Cover top of unfinished masonry work to protect it from the weather and to prevent accumulation of water in the cells of the CMU.
   c. Cleaning:
      1) Remove "primary" efflorescent from masonry walls exposed in the finished work per the manufacturer's recommendations and the NCMA TEK Bulletin #8-3A.
      2) Remove dirt or stains from masonry walls exposed in the finished work per the manufacturer's recommendations and the NCMA TEK Bulletin #8-2A.
      3) Promptly remove excess wet mortar and grout containing integral water-repellent mortar admixture from the face of the masonry as work progresses. Do not use strong acids, over-aggressive sandblasting or high-pressure cleaning methods.
      4) Comply with applicable environmental laws and restrictions.
5. Joints:

a. Set Concrete Masonry Units in full shoveled bed of Mortar.
b. Width of joint: 3/8 inch.
    1) Depth of joint: Equal to Face Shell Wall Thickness.
c. Head joints shall be solidly filled.
d. Mortar Joint Finish Method:
    1) All mortar joints shall be compressed and shaped by a specific designated tool throughout the project. Provide identical tools when more than one worker is scheduled to finish joints.
    2) At exposed and concealed surfaces:
        a) Vertical Joints: Compressed, Raked and Tooled joints.
        b) Horizontal Joints: Compressed, Raked and Tooled joints.
    3) Provide compressed Flush Joints when other material is to be applied directly onto and over Concrete Masonry Units being covered (including areas covered by rubber base).

6. Vertical Control Joints:
    a. Space joints at 25'-4" o.c. maximum, unless specifically noted otherwise. Joints shall be spaced symmetrically and uniformly and shall be subject to the Architect's approval.
    b. All joints shall be through wall separations with horizontal reinforcing discontinuous.
    c. All joints shall be sealed with backer rods and urethane sealant on both faces. Refer to Specification Section - SEALANTS for sealant requirements.
7. Prior to grouting, the grout space shall be clean so that all spaces to be filled with grout do not contain mortar projections greater than 1/4-inch, mortar droppings and other foreign material, per CBC Section 2104A.1.3.2.
8. Do not install cracked, broken, chipped or stained masonry units.
9. Lay only dry concrete masonry units.
10. Lay masonry in full bed of mortar, properly jointed with other work. Deep or excessive furrowing of mortar joints is not permitted.
    a. Block Cap: Lay with full mortar coverage on horizontal and vertical joints.
    b. Install grout cap where and as indicated.
11. Fully bond intersections and external and internal corners.
12. Do not shift or tap masonry units after mortar has taken initial set. Where adjustments must be made, remove mortar and replace.
13. Remove excess mortar.
14. Perform jobsite cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.
15. Step back unfinished work for joining with new work. Do not use toothing.
16. Provide cleanouts as indicated in "installation of grout."

E. Installation of Grout:
1. General:
    a. All cells shall be grouted solid.
    b. Use low lift or high lift grouting at Contractor's option.
    c. Use grout pump, hopper or bucket to place grout.
    d. Place grout in final position within 1-1/2 hours after introduction of mixing water.
    e. Place grout and rod with a 3/4-inch flexible cable vibrator sufficiently to case it to flow into all voids between the cells and around the reinforcing steel. Slushing with mortar will not be permitted.
    f. Stop grout approximately 1-1/2 inches below top of last course, except at top course bring grout to top of wall.
2. Low Lift Grouting Procedure: Per CBC, and to be used only if approved by the Architect.
    a. Set all vertical bars.
    b. Concrete Masonry Unit walls shall be built up 16 inches high uniformly around one complete building unit. No vertical construction joints will be allowed unless noted and detailed on the drawings.
    c. Lay Concrete Masonry Units no higher than 24" and clean cells of mortar.

d. Set horizontal bars on bond beam unit crosswalls next to verticals.
e. If course at top of lift contains horizontal reinforcement, grout all cells to a level 3/4" below the top of the Concrete Masonry Units. This will provide about 1-1/4" grout cover over the horizontal bar. Puddle grout in place using a No. 4 bar or a 1 x 2 stick and repeat puddling in 30 to 60 minutes.
f. Consolidate each lift twice. Once while placing grout and once more after initial absorption of water but before set.
g. Repeat steps "c.", "d.", "e." and "f." above until the wall is completed.

3. High Lift Grouting Procedure (only upon prior approval of the Architect, Structural Engineer and DSA) shall be per CBC:
   a. Clean-outs must be provided at the bottom of each pour for each cell.
      1) Construct clean out courses with inverted open-bottom bond beam units involved to permit cleaning of all cells by flushing. Cleanouts shall not be less than 3x4 inch openings cut from one full shell. Do not plug cleanout holes until masonry work, reinforcement and final cleaning of the grout spaces have been completed and inspected.
   b. The Contractor is cautioned that with the high lift method, the walls have very little lateral stability against winds or earthquake before grout has set and it shall be this Contractor's responsibility to adequately brace the walls until the roof sheathing is installed.
   c. "Dur-O-Wall" reinforcing shall be provided in mortar joints at all wall corners, ends, jambs of openings and wall intersections.
   d. Layup walls subject to maximum height limitations of CBC.
   e. Construction procedure shall be as follows:
      1) Set all full-length vertical bars on center line of wall, centered in cells, and braced as noted above under typical reinforcing.
      2) Lay Concrete Masonry Units full height of walls, or 12 feet maximum including wiring horizontal bars to verticals, for one complete building unit. No vertical construction joints will be allowed unless noted and detailed on the drawings.
      3) Construct clean out courses with open-bottom bond beam units inverted to permit cleaning of all cells by flushing. Cleanouts shall not be less than 3 x 4-inch openings cut from one full shell. Do not plug cleanout holes until masonry work, reinforcement and final cleaning of the grout spaces have been completed and inspected.
      4) Clean all cells and top of foundation wall of mortar by hosing cells with suitable nozzle jet or sandblasting as soon as mortar has partially set. Final cleaning shall be inspected through clean-outs at each cell in base of wall. Remove all mortar fine protruding more than 1/2 inch into the grout space by dislodging the projections with a rod as the work progress or by washing the grout space at least twice a day during erection using a high pressure stream of water.
      5) Set vertical bars in closed cells where required, i.e., at wall corners, sides of openings, etc. Wire to horizontals at top and bottom. Use metal spacers at 48" o.c. maximum to hold bars in line.
      6) No grout shall be placed until mortar has set a minimum of 3 days in hot weather or 5 days in cold weather, and the top of foundation wall has been thoroughly cleaned and grout plugs have cured a minimum of 48 hours.
      7) Place grout in lifts not to exceed 4 feet in height, with a waiting period between lifts, dependent on weather and absorption rate of the masonry, in order to place the succeeding lift after the preceding lift becomes plastic but prior to initial set. The first lift shall be consolidated using mechanical vibrators. After the required waiting period, place the second lift and consolidate with the vibrator, reconsolidating the lift below to a depth of 12 to 18 inches. Repeat the waiting, placing and consolidating process until the top of the grout pour is reached. Reconsolidate the top lift after the required waiting period. The high-lift grouting of any section of wall between lateral flow barriers shall be completed to the top of a pour in one working day unless a new series of clean out holes is established and the resulting horizontal construction joint cleaned.
      8) Repeat items 1 - 7 until all cells are filled. The wall must be grouted to its full height during one working day. No horizontal construction joints will be allowed.

9) Above 12 feet level low lift grouting procedures shall be used.

F. Curing:
1. While Concrete Masonry Units are being laid and after, dampen both faces for a period of 3 days using a spray regulated to keep surface damp. After grouting, dampen for a period of 24 hours.

3.4 APPLICATION

A. Applied Finish:
1. Sealer (Coordinate with Specification Section – PAINTING):
a. Apply sealer to all exterior and all interior surfaces (including all concealed areas such as the backs of parapet walls and in concealed exterior and interior soffits) to minimize efflorescence, and to prevent water intrusion into the interior of buildings from the exposed exterior surfaces.
b. Apply sealer as directed by the manufacturer.
1) Coverage and installation rates shall be as per manufacturer's written recommendations.
2) Apply sealer in minimum two coats at the rates required.

3.5 REPAIR / RESTORATION

A. General:
1. Materials or Workmanship not conforming to appearance or strength specified will be deemed defective and shall be removed and replaced with no change to the contract in time or cost.
2. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units.
3. Pointing: During the tooling of joints, enlarge any voids or holes and completely fill with mortar.
4. Dry brush masonry surface after mortar has set, at the end of each day's work and after final pointing.
5. Leave work and surrounding surface clean and free of mortar sports and droppings.
6. Cleaning: Upon completion of masonry installation, repair all holes. Defective joints shall be cut out and rejointed. Exposed masonry surfaces shall be cleaned free of mortar, or grout stain and efflorescence.

B. Defective Mortar Or Grout:
1. Should the strength of mortar or grout fall below that specified, remainder of Work shall be adjusted to reach required strength. Work in place representing inferior grout and mortar and indicating a strength less than the minimum specified shall be tested by taking and testing core samples. Number and location of cores shall be determined by Structural Engineer.
2. Should compression tests of cores fail to meet required strength, masonry shall be deemed to be defective and shall be removed and replaced at no cost to Owner.
3. Costs relative to taking and testing of core samples shall be paid by the Owner and will be deducted from Contract Amount. Cost of patching core holes shall be borne by the Contractor.

3.6 FIELD QUALITY CONTROL

A. Site Tests:
1. Tests will be performed by the Owner's Testing Laboratory Agency per the Specification Section – TESTING LABORATORY SERVICES.
2. Mortar and Grout shall be tested per CBC Section 2105A.
a. Samples shall be continuously stored in moist air until tested.
b. Grout Compressive Strength: For each mix provided, per ASTM C1019.
c. Mortar Property Specification: For each mix provided per ASTM C780.
3. Masonry Core test shall be per CBC Section 2105A.4.
4. One set of tests for each 5,000 square feet of wall area or portion thereof.

B. Inspection:
   1. Inspections will be performed by the Owner's Project Inspector per Specification Section – TESTING AND INSPECTION SERVICES.
      a. Special Project Inspector shall be employed during the placement of all units, placement of all reinforcing steel, during all grouting operations and during taking of all test specimens.
         1) Per CBC Section 1701A.4 for DSA/SSS.
   2. Schedule inspections and notify the Architect, Project Inspector, Testing Agency and any other regulatory agencies of the time at least 48 hours prior to the inspection.
   3. No work shall be without the required inspections.

3.7 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. At the conclusion of the Concrete Masonry Unit work, the Contractor shall clean down all walls, remove all scaffolding and equipment, clean up all debris, refuse, any surplus materials and remove them from the premises.
   2. Concrete Masonry Unit walls shall be brushed daily with a mason's soft hair brush to remove surplus mortar and splattering at scaffolding lines. This must be done immediately after initial, but before final set.
   3. Grout or mortar spillage shall be removed by use of clean, plain water before it has a chance to set.
   4. In areas not cleaned in accordance with the above, the Architect shall have the right to require sandblasting of the entire wall between concrete columns or piers, between control joints or entire wall unit that includes the affected areas.

B. Removal of Stains and Efflorescence:
   1. Removal of Stains: Per NCMA TEK Bulletin #8-2A "Removal of Stains from Concrete Masonry."
   2. Removal of Efflorescence: Per NCMA TEK Bulletin #8-3A "Control and Removal of Efflorescence."

3.8 PROTECTION

A. Protection from Weather:
   1. Protect newly installed work from temperatures per CBC 2104A.
      a. Cold Weather: When ambient air temperature falls below 40 degrees F.
      b. Hot Weather: When ambient air temperature rises above 100 degrees F.
   2. During installation, cover the top of unfinished masonry work to protect it from the weather and to prevent accumulation of water in the cores of the masonry units.

END OF SECTION

SECTION 05 12 00 – STEEL AND FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Steel and Fabrications, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 06 10 00 ROUGH CARPENTRY
5. 06 41 23 MODULAR CASEWORK
6. 07 21 00 INSULATION
7. 07 60 00 SHEET METAL
8. 08 11 00 METAL DOORS AND FRAMES
9. 08 70 00 HARDWARE
10. 09 50 00 ACOUSTICAL CEILINGS
11. 09 91 00 PAINTING
12. 10 05 00 MISCELLANEOUS SPECIALTIES
13. 10 44 00 FIRE PROTECTION SPECIALTIES
14. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. AESS: Architecturally exposed structural steel.

B. Welding Definitions:

1. CVN: Charpy V-Notch (Testing Procedure).
2. FCAW: Flux Core Arc Welding.
3. FCAW-G: Flux Core Arc Welding-Gas Shielded.
4. FCAW-SS: Flux Core Arc Welding-Self Shielded.
5. G-MAW: Gas Metal Arc Welding.
6. SMAW: Shielded Metal Arc Welding.
7. SAW: Submerged Arc Welding.

1.3 REFERENCE STANDARDS

A. AISC: American Institute of Steel Construction "Specification for Design, Fabrication and Erection of Structural Steel buildings" and "Code of Standard Practice for Steel Buildings and Bridges" and "Recommended Procedure for Identification of High Strength Steels During Fabrication."

1. NOTE: All connections shall be designed by the Structural Engineer and approved by DSA/SSS.
2. NOTE: All connections shall be as shown in the Contract Document drawings.
3. AISC: "Architecturally Exposed Structural Steel" 2016 AISC "Code of Buildings and Bridges," Section 10.
4. AISC: "Specification for Structural Steel Buildings" using the AISC 360-16.
5. AISC 341-16 Seismic Provisions.

B. ANSI: American National Standards Institute:

1. ANSI B18.22.1: "Plain Washers."
2. ANSI B18.22.1: "Beveled Washers."

C. ASTM: American Society for Testing and Materials.

1. ASTM A6 Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use (General Requirements for)
2. ASTM A36 Carbon Structural Steel (Standard Specification for)

3. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless (Standard Specification for)
4. ASTM A108 Steel Bars, Carbon, Cold-Finished, Standard Quality (Standard Specification for)
5. ASTM A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products (Specification for)
6. ASTM A153 Zinc Coating (Hot Dip) on Iron and Steel Hardware (Specification for)
7. ASTM A307 Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength (Specification for)
8. ASTM A385 Providing High-Quality Zinc Coatings (Hot-Dip) (Standard Practice for)
9. ASTM A500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes (Standard Specification for)
10. ASTM A501 Hot-Formed Welded and Seamless Carbon Steel Structural Tubing (Standard Specification for)
11. ASTM A563 Carbon and Alloy Steel Nuts (Standard Specification for)
12. ASTM A572 High-Strength Low-Alloy Columbium-Vanadium Structural Steel (Standard Specification for)
13. ASTM A588 High-Strength Low-Alloy Structural Steel with 50 ksi (345 Mpa) Minimum Yield Point to 4-inc (100-mm) Thick (Standard Specification for)
14. ASTM A653 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process (Specification for)
15. ASTM A780 Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings (Practice for)
16. ASTM A992 Steel for Structural Shapes for use in Building Framing (Standard Specification for)
17. ASTM A1011 Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength (Specification for)
18. ASTM E329 Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction (Standard Specification for)
19. ASTM F436 Hardened Steel Washers (Standard Specification for)
20. ASTM F606 Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets (Standard Test Methods for)
21. ASTM F959 Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners (Standard Specification for)
22. ASTM F1145 Turnbuckles, Swaged, Welded, Forged (Standard Specification for)
23. ASTM F1554 Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength (Standard Specification for)
24. ASTM F3125 High Strength Structural Bolts And Assemblies, Steel And Alloy Steel, Heat Treated, Inch Dimensions 120 Ksi And 150 Ksi Minimum Tensile Strength, And Metric Dimensions 830 MPa And 1040 MPa Minimum Tensile Strength (Standard Specification for)

D. AWS: American Welding Society "Structural Welding Code."
   1. AWS D1.1 "Structural Welding Code."
   2. AWS D1.8 "Structural Welding Code - Seismic Supplement."
   3. AWS A2.4 "Standard Symbols for Welding, Brazing, and Nondestructive Examination."

E. ICC: International Code Council

F. NAAMM: National Association of Architectural Metal Manufacturers
   1. Metal Stairs Manual
   2. Pipe Rail Manual.

G. RCSC: Research Council on Structural Connections, "Specification for Structural Joints Using High-Strength Bolts."

H. SSPC: The Society for Protective Coatings.
   1. SSPC-SP 1 "Solvent Cleaning."
   2. SSPC-SP 2 "Hand Tool Cleaning."
   3. SSPC-SP 3 "Power Tool Cleaning."
   4. SSPC-SP 6 "Commercial Blast Cleaning."
   5. SSPC-SP 7 "Brush-Off Blast Cleaning."

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

1. Submit Load Indicating Device information as indicated in Part 3 of this Specification Section and include Laboratory Test Reports and other data to show compliance with Specification (include Specified Standards).
2. Include certified copies of mill reports covering chemical and physical properties of each type of steel.
3. Submit primer paint system. Obtain certification from the project's Painting Contractor and Paint Manufacturer that primer paint system is compatible with proposed painting systems for this project.

C. Shop Drawings.

1. The Contract Drawings represent the spatial relationship as conceived by the Architect.
   a. The production of the structural steel Shop Drawings may require the employment and utilization of a 3-dimensional structural steel fabrication layout program to achieve the exact relationship of all intersecting members.
   b. Building sections and details represent interpretations of these relationships and the dimensions shown shall not be relied upon for accuracy and fit, but the Contractor / Structural Steel Fabricator shall verify them and double-check them for accuracy and fit.
   c. Any significant variations shall be submitted to the Architect and Structural Engineer for review and approval, of which the conditions may or may not require **DSA/SSS** review and approval.
   d. "Fit-Up" means and methods are the sole responsibility of the Contractor.
2. Provide all information necessary for the fabrication of component parts. Indicate size and weight of members, type and location of shop and field connections, size and extent of all welds, and welding sequence when required.
3. Include details of cuts, connections, camber, holes and other pertinent data. Include welds by Standard AWS Symbols, and show size, length and type of each weld.
4. Provide sections, drawings, templates and directions for installation of anchor bolts and other anchors.
5. Dimension requirements of structural steel for manufactured items, such as Mechanical Equipment, Dock Levelers, etc. All of these items shall be coordinated and provided by the General Contractor. The General Contractor shall also coordinate and provide dimensions to locate Structural Steel for Window Washing supports such as davits, tie-backs, etc.

D. Shop Drawings, AESS.

1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment Drawings.
4. Indicate orientation of mill marks and HSS seams.
5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation and location of bolt heads.
7. Indicate exposed surfaces and edges and surface preparation being used.
8. Indicate special tolerances and erection requirements.
9. Indicate weep holes for HSS and vent holes for galvanized HSS.
10. Indicate surface preparation, primer, and coating requirements, including systems specified in other Sections.

E. Samples.

1. Provide material samples cut and machined for testing without charge to the Owner.

F. Quality Assurance/Control Submittals.

1. Test Reports:
   a. Submit mill analysis and test reports for each heat per ASTM A6, certifying conformity with the Specifications. Steel shall be identifiable in the fabricating shop.
   b. Submit test reports for each lot of high strength bolts per ASTM F3125 for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
   c. Submit Welding Procedure Specification (WPS) to the Structural Engineer for review prior to use.
      1) For WPS's that have been qualified by test, the supporting Procedure Qualification Record (PQR) shall be submitted to the Structural Engineer for review prior to use.
   d. Submit to the Structural Engineer for approval, a step-by-step welding sequence for the field welding of each type of connection.
   e. Submit to the Structural Engineer a quality control plan that addresses all inspection issues, including in process and final inspection that are addressed in AWS D1.1.
2. Certificates:
   a. Submit current valid certificate issued by an independent testing agency for all welders, welding operators, and tack welders.
   b. Certification of Welder's Qualifications: Welders that will make welds in restricted access, such as, but not limited to, the bottom flange-to-column welds through a cope hole or access hole in the beam web, shall be qualified by the Contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration.
   c. Provide Certified Mill Test Report Sheets per ASTM A123, certified at the plant after galvanizing, but prior to shipment.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
B. Warranty in accordance with Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Welders shall be recently qualified by Test as prescribed in AWS "Structural Welding Code" for the type of welding to be performed.
         1) All welders, welding operators, and tack welders shall be qualified with the largest diameter electrode(s) to be used on the work by test and hold a current valid certificate issued by an independent testing agency, to perform the type of welds required by the work; including the process, position, and thickness of materials used (AWS D1.1: Clauses 3 & 4 Sections).
         2) In addition to meeting the requirements of AWS, welders that will make welds with restricted access, such as, but not limited to, the flange to column welds through a cope hole or access hole in the beam web, or where access to the bottom of a groove is restricted by the presence of a column flange, shall be qualified by the Contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration.
         3) All welders on the project shall be capable of understanding and following the requirements of the written WPS.
         4) Each welder employed on the project shall understand all the requirements of this welding specification before welding on the project.
         5) The written WPS shall be available to the welder, welding supervisor, and all inspectors.
         6) Provide weld procedures for both pre-qualified welds and special welds to be submitted to the Owner's Testing laboratory and the Architect. Procedures shall be

provided for both shop & field welds and shall be provided prior to commencing welding operations.

2. Manufacturer/Supplier Qualifications:
   a. Structural Steel firm experienced in successfully producing/supply capacity to produce/supply required units without causing delay in the Work.
   b. Provide documentation that the Hot-Dipped Galvanizer is a member in good association with the AGA (American Galvanizers Association).

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

C. Mockups:
   1. A typical mockup of welded connections shall be provided prior to shop fabrication.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Product Handling:
   1. Store materials to permit easy access for inspection and identification. Keep steel members off the ground using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

1.8 SCHEDULING

A. Schedule the Work so that there will be no excessive inspection time. At all times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the Inspector's time will be used to full advantage. If inspection costs become excessive because of poor shop procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price. Poor procedures will be determined upon review of Inspection and/or Testing Reports. The rate for charging the excess costs will be as follows:
   1. Minimum of three (3) certified welders are used, Owner will pay 100 percent.
   2. Only two (2) certified welders are used, Contractor will be charged 1/3 of the Inspection cost.
   3. Only one (1) certified welder is used, the Contractor will be charged 2/3 of the inspection cost.

1.9 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty:

C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section - WARRANTIES

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 STEEL

A. Structural Shapes, Plates, and Bars: per ASTM A36,
   1. ASTM A572, Grade 50.
   2. ASTM A992, Grade 50.

2.3 PIPE

A. Per ASTM A53, Grade B, or otherwise noted.
   1. Finish: Type E, for concealed conditions, Black, except where indicated on the drawings to be galvanized.
   2. Finish: Type S, for visually exposed conditions, Black, except where indicated on the drawings to be galvanized.

2.4 STRUCTURAL TUBES

A. Cold-Formed tubing: per ASTM A500, Grade B.
B. Hot-Formed tubing: per ASTM A501.
C. All HSS sections (round and square) shall have their material certifications reviewed by the special inspector.
   1. The special inspector shall verify that all seam welds are fused per ASTM A500, Grade B.
   2. The special inspector shall, as a minimum, visually inspect the exterior of all seam welds.

2.5 LIGHT GAUGE COLD FORMED SHAPES

A. Unless otherwise noted on the Structural Engineer's Drawings, per:
   1. ASTM A653, such as "Zee" purlins, angles bent plated, etc.
   2. ASTM A1011.

2.6 PLASTIC STEEL PUTTY

A. Specified: **DEVCON** “Plastic Steel Putty A”

2.7 FASTENERS

A. Fasteners, unless otherwise noted on the Structural Engineer's Drawings shall be:
B. Anchor Bolts:
   1. Bolts cast in concrete or masonry shall be headed bolts with cut threads per ASTM F1554.
C. Machine Bolts:
   1. Per ASTM A307.
D. Direct Tension Indicators:
   1. Per ASTM F959, type as required.
      a. Use on all bolts for ASTM F3125.
   2. High Strength Bolts, Nuts and Washers: Install per ASTM F3125, slip critical and snug tight conditions as indicated on drawings. Install high strength bolts with snug tight type connections with threads included in shear plane except as otherwise noted. Install hardened washers in conformance with AISC Specifications.
   3. Bolt Geometry: Bolt dimensions shall conform to the current requirements of the American National Standards Institute for Heavy Hex Structural Bolts, ANSI Standard B18.2.1. The length of bolts shall be such that the end of the bolt will be flush with or outside the face of the nut when properly installed.
   4. Provide hexagonal heads and nuts for all connections per ASTM A563, Appendix Table X1.1.
   5. Nut Specifications: Nuts shall conform to the current chemical and mechanical requirements of the American Society for Testing and Materials Standard Specification for Carbon and Alloy Steel Nuts, ASTM A563, Appendix Table X1.1 Provide grade A Heavy Hex nuts for ASTM A36 threaded rods. Use grade C, Heavy Hex nuts for ASTM A572 Grade 50 and ASTM A588 threaded rod.
   6. Washers: Flat circular washers and square or rectangular beveled washers shall conform to ASTM F436.
   7. Tension Control Fastener System:
      a. Specified: **LOHR, LEJEUNE, NUCOR FASTENER, CORDOVA BOLT, INC**.
E. Stud-Type Shear Connectors: ASTM A108 Grade 1015 or 1020 Cold-finished carbon steel with dimensions complying with AISC Specifications.

F. Power Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool.
   1. Specified: **HILTI FASTENING SYSTEMS**

G. Filler Metal and Welding Flux per AWS D1.1 Clause 5 "Fabrication Section", and AISC 360, Section A3.5, and shall meet a CVN Impact Energy of 20 ft-lbs at minus 20 Degrees F.
   1. FCAW A5.20 or A5.29: E7XT-X.
   2. G-MAW A5.18 or A5.28: E70S-X.
   3. SAW A5.17 or A5.23: E7X-EXXX.
   4. SMAW A5.1 or A5.5: E70XX Low Carbon.

2.8 FABRICATION

A. Shop Assembly:
   1. Fabricate per AISC Spec and AISC Code unless otherwise indicated on Drawings or Specifications.
      a. Mechanically curve specific Structural members as indicated on the drawings per AISC requirements and tolerances.
   2. Fabricate all structural steel members and fittings.
   3. Fabricate all miscellaneous metal fabrications scheduled in Part 3 of this Specification Section.

B. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel per the AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated to provide the flattest floor possible. The contractor shall coordinate member tolerances with finishes.
   1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
   2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
   3. Columns:
      a. All columns and beams shall adhere to Section M2.7 of the referenced "Specification for Structural Steel for Buildings" which states that completed members shall be free of twists, bends, and open joints.

C. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.

D. Unless noted otherwise, make holes 1/16 inches larger than the nominal bolt diameter.
   1. For anchor bolts, the hole diameter may not exceed the sizes indicated in CBC Section 2204A.4, nor what is specified on the drawings.

E. Welding, Shop and Field: Weld by shielded arc method, submerged arc method, flux cored arc method, or other method approved by AWS. Perform welding per AWS Code. All welders, both manual and automatic, shall be certified per AWS "Standard Qualification Procedure" for the Work to be performed. See paragraph "welding" herein, for detailed requirements. If sizes of fillet welds are not shown on drawings, use AWS minimum weld size but not less than 3/16-inch fillet welds.

F. Bolt Holes for Other Work: Provide holes required for securing other work to structural steel framing.
   1. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
   2. Cut, drill or punch holes perpendicular to metal surfaces and remove all burrs. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

G. AISC Heavy Section shapes and built-up members shall meet the requirements for joints in AISC Sections J1.5, J1.6, J2.7 and M2.2.

H. High Strength Bolts:
1. Installation and Tightening:
a. Handling and Storage of Fasteners: Fasteners shall be protected from dirt and moisture at the job site.
1) Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protective storage.
2) Fasteners not used shall be returned to protected storage at the end of the shift.
3) Fasteners shall not be cleaned of lubricant that is present in as-delivered condition.
b. Tension Calibrator: A tension measuring device shall be required at all job sites where bolts in slip-critical joints are being installed and tightened.
1) The tension measuring device shall be used to confirm:
a) The suitability to satisfy the requirements of AISC for the complete fastener assembly, including lubrication if required to be used in the work,
b) Calibration of wrenches, if applicable, and
c) The understanding and proper use by the bolting crew of the method to be used.
2) The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in 1.d. below, as applicable.
a) The accuracy of the tension-measuring device shall be confirmed through calibration by an approved testing agency at least annually.
c. Joint Assembly and Tightening of Shear/Bearing Connections: Bolts in connections not within the slip-critical category shall be installed in properly aligned holes, but need only be tightened to the snug tight condition.
1) The snug tight condition is defined as the tightness that exists when all plies in a joint are in firm contact.
2) This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.
3) If a slotted hole occurs in an outer ply, a flat hardened washer or common plate washer shall be installed over the slot.
d. Joint Assembly and Tightening of Connections Requiring Full Pre-tensioning. Slip-critical connections shall be installed in properly aligned holes and tightened by one of the following methods.
1) Turn-of-nut Tightening: When turn-of-nut tightening is used, hardened washers are not required except as specified in the AISC.
a) A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension.
b) The test shall demonstrate that the method of estimating the snug-tight condition and controlling turns from snug tight to be used by the bolting crews develops a tension not less than five percent greater than the tension required for slip-critical connections.
2) Installation of Alternate Design Bolts: A representative sample of not less than three bolts of each diameter, length and grade shall be checked at the job site in a device capable of indicating bolt tension.
a) The test assembly shall include flat-hardened washers, if required in the actual connection, arranged as in the actual connections to be tensioned.
b) The calibration test shall demonstrate that each bolt develops a tension not less than five percent greater than the tension required by AISC.
c) Manufacturer's installation procedure shall be followed for installation of bolts in the calibration device and in all connections.
d) When alternate design features of the fasteners involve an irreversible mechanism such as yield or twist-off of an element, bolts shall be installed in all holes of the connection and initially brought to a snug tight condition.
e) All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize

relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual fasteners.

f) In some cases, proper tensioning of the bolts may require more than a single cycle of systematic tightening.

e. Mark bolts that have been completely tightened with an identifying symbol.

1) Final tightening of high strength bolts in webs of beam to column moment connections shall be performed after completion of flange welding.

I. Welding - General:

1. General: Quality of materials and design and fabrication of all welded connections shall conform to AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Building," AWS "Code for Welding in Building Construction," AWS "Structural Welding Code - Seismic Supplement," and requirements of this section.
   a. Location and type of all welds shall be as shown. Make no other welded splices, except those shown on drawings, without prior approval of the architect.
2. Automatic Welding: Use electrode wire and flux for automatic and semi-automatic welding acceptable to Architect. All methods, sequences, qualification and procedures, including preheating, and post heating if necessary, shall be detailed in writing and submitted to the architect for review.
3. Qualification of Welders:
   a. Structural steel welding: Manual and automatic welds for structural steel construction shall be made only by operators who have been previously qualified by tests, as prescribed in AWS D1.1 to perform type of work required.
   b. Welders shall be checked by the welding inspector. Those not doing satisfactory work may be removed, and may be required to pass qualification tests again. All qualification testing shall be at the Contractor's expense.
   c. Only welders whose weld procedures and pre-qualification by testing that have passed shall be considered qualified for such welds.
4. Control cooling process after weld is completed by either step down post heat or thermal blankets as determined by procedures and prequalification.
5. Box columns and built-up members shall have ultrasonic testing before and after welding.
6. Flame cut surfaces shall be ground to remove contaminated steel layer to provide welds proper fusion without impurities.
7. Preparation of surface: Surfaces to be welded shall be free of loose scale, slag, rust, grease, paint and any other foreign material.
8. Welding equipment: Welding equipment to be used in each case shall be acceptable to welding inspector. Use equipment with suitable devices to regulate speed and manually adjust operating amperage and voltage. The amperage capacity shall be sufficient to overcome line drop, and to give adequate welding heat.
9. Remove runoff tabs and grind surfaces smooth where the tabs would interfere with fireproofing and architectural finishes.
10. End-welded studs:
    a. Automatic end-welded studs: Automatically end-weld per the manufacturer's written recommendations in such a manner as to provide complete fusion between the end of the stud and the plates. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate. The stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch, and 3/16 inch for 3/4 inch diameter. Stud sizes indicated on drawings represent the finish stud height.
    b. Fillet-end welded studs: Studs may be welded using prequalified FCAW, GMAW, or SMAW processes provided the requirements of the AWS D1.1 Clause 7 "Stud Welding" are met as well as any other pertinent requirements of D1.1.
11. Provide mill camber as shown on the construction documents within AISC tolerance. Place mill tolerance upward for all beams specified no camber.

2.9 FABRICATION, AESS 3

A. Provide AESS Category 3 for all visibly exposed structural steel elements, unless otherwise indicated.

B. AESS 3: Conform to ANSI/AISC 303, Chapter 10.

2.10 FINISHES

A. Shop Cleaning:

1. Clean all surfaces of steel. Remove all rust, mill scale, deposits of splatter, slag or flux, oil, dirt, and all other materials.
    a. Use hand tool, power tool, sandblasting, chemical cleaning, and any other method necessary to provide a smooth, sound surface.
2. Clean contact surfaces of high strength bolt of all burrs and material, which might prevent solid seating of the parts. Steel to receive bolts shall be primer painted except beneath the contact area of slip-critical bolts.

B. Shop Priming:

1. General:
    a. "Painting of structural steel shall comply with the requirements contained in AISC 360. Painting of open-web steel joist girders shall comply with the requirements of SJI CJ-1.0, SJI JG-1.1, SJI K-1.1 and SJI LH/DLH-1.1. Individual structural members and assembled panels of cold-formed steel construction shall be protected against corrosion per the requirements contained in AISI S100. Protection of cold-formed steel light-frame construction shall also comply with the requirements contained in AISI S200 per CBC Section 2203A.1.
    b. Shop prime all steel except the following:
        1) Surfaces embedded in concrete, or mortar. Extend priming of partially embedded members to a depth of 2 inches.
        2) Contact surfaces for slip-critical (sc) high strength bolts.
        3) Surfaces within 2 inches of field welds.
        4) Top of structural support members when metal deck is welded to supports.
            a) Primer is required when metal deck is mechanically attached to structural support members.
        5) Surfaces to receive sprayed-fire-resistive materials (applied fireproofing).
        6) Surfaces to be galvanized.
2. Priming:
    a. Immediately after surface preparation, apply primer according to manufacturer’s written instructions and at a rate recommended by SSPC to provide minimum film thickness. Use priming methods that results in full coverage of joints, corners, edges and exposed surfaces.
        1) Strip paint corners, crevices, bolts, welds and sharp edges.
        2) Apply two shop prime coats to areas, which will be inaccessible after assembly or erection.
    b. Specified: **PPG** “field primers”.
    c. Should the Contractor substitute another paint company via Specification Section - PAINTING, then it is the Contractor’s responsibility to coordinate steel primers with finish coats specified in Specification Section - PAINTING.
    d. Use the following shop painting systems on all normal environment interior steelwork:
        1) Surface Preparation: SSPC-SP2 "Hand Tool Cleaning" or SSPC-SP3 "Power Tool Cleaning."
        2) Application: Follow coating manufacturer’s printed directions.
        3) Specified: **PPG** MULTI-PRIME “94-258 Primer”.
        4) Number of Coats: One.
        5) Dry Film Thickness: 2.0 mils minimum.
        6) Volume Solids: 51.0 +/- 1.0% minimum.

7) Generic Description: Modified Alkyd Resin Universal Primer.

e. Use the following shop painting systems on all exterior steelwork and interior steelwork subjected to wet conditions or fumes.

1) Surface Preparation: SSPC-SP6 "Commercial Blast Cleaning."
2) Application: Follow coating manufacturer's printed directions.
3) Specified: **PPG** “AMERCOAT 68HS Primer”.
4) Number of Coats: One.
5) Dry Film Thickness: 5.0 mils minimum.
6) Volume Solids: 78% +/-2%
7) Generic Description: Reinforced Inorganic Zinc-Rich Urethane.

C. Hot-Dip Galvanizing:

1. Zinc coatings on iron and steel products per ASTM A123.
   a. Minimum thickness required shall be 3.9 mils.
2. Galvanize all items outside of the building envelope including, but not limited to structural steel columns and beams, railing systems, awnings, canopies, shade structures, etc. per ASTM A385.
3. Zinc coatings on iron and steel hardware shall be per ASTM A153.
4. Galvanized repair paint: High-Zinc-Dust-Content per SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

D. Stainless Steel Finishes:

1. Remove tool and die marks and stretch lines or blend into finish.
2. Grind and polish to produce uniform, directionally textured, polished surfaces without cross-scratches. Run grain with long dimension of each piece.
3. Bright Directional Satin Finish No.4, unless otherwise shown on drawings.
4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.11 SOURCE QUALITY CONTROL

A. Tests, Inspection:

1. In accordance with Specification Section – TESTING LABORATORY SERVICES and the following:
   a. Materials shall be certified, identified and tested in conformance with CBC Table 1705A.2.1. Commercial stock steel shall be identified per CBC Table 1705A.2.1.
   b. Complete four-sided inspection of all steel shall be made when required by Architect.
   c. Tests and inspection of Shop and field welding per CBC Table1705A.2.1. Perform shop and field welding only under supervision of welding inspector.
      1) Welds shall be per CBC Table 1705A.2.1.
      2) Inspection:
         a) Welding inspector shall be an AWS Certified Welding Inspector (CWI).
   d. Tests & Inspection for High Strength Bolts per CBC Table 1705A.2.1.
2. Testing Laboratory:
   a. An inspection and testing laboratory will be selected by the Owner for testing and inspection as required by the Contract Documents. The selected laboratory shall conform to the requirements of ASTM E329. Documentary evidence of such conformance shall be submitted to the Owner and the Governing Agency.
   b. All materials, work, methods and equipment shall be subject to inspection at the mill, fabricating plant and at the building site. Material or workmanship not complying fully with the Contract Documents will not be accepted. The Contractor shall give the Testing Laboratory reasonable notice when ready for inspection and shall supply samples and test pieces and all facilities for inspection without extra charge. The Owner will assume the expense of making the tests and inspection except as otherwise specified in Division 1.

3. Cost of Testing and Inspection: Costs of testing and inspection of structural steel, except as specified hereunder and in Division 1, will be paid for by the Owner.
    a. All transportation costs and per diem living costs for inspection at fabricator's plant further than 75 miles from the job site will be back-charged to the Contractor.
    b. It is assumed that all fabrication will take place in one shop location only. All additional inspection costs will be back-charged to the Contractor.
    c. All mill tests and costs or re-test of plain materials shall be at the expense of the Contractor.
    d. Costs of tests required due to Contractor's failure to provide steel identifiable per the indicated ASTM designation shall be at the expense of the Contractor.
4. Structural Steel Testing and Inspection:
    a. If structural steel tests are indicated as required on the structural drawings, one tension and one bend test shall be made for each size of structural shape, plate and for each tube and pipe size. Tests to be made per requirements of appropriate ASTM designations.
    b. If structural steel tests are not indicated as required on the structural drawings, then for shapes, plates, bars, pipe and tubing, manufacturer's certified mill test reports and analysis for each heat will be acceptable for steel identifiable per indicated ASTM designation. Mill test reports shall indicate the physical and chemical properties of all structural steel used. Correlate individual heat numbers with each specified structural section.
    c. Unidentifiable Steel:
        1) For Fy less than or equal to 36.0 ksi: Provide one tension and elongation test and one bend for each 5 tons or fraction thereof for each size.
        2) For Fy greater than 36.0 ksi: Provide one tension and elongation test and one bend or flattening for each piece.
    d. Costs of re-tests and additional testing required by the use of unidentifiable steels shall be the Contractor's responsibility. Additional costs of testing incurred by the Owner shall be deducted from the Contract Final Payment.
5. Expansion Anchors: Load test as indicated on the drawings.
6. Welding Inspection:
    a. If shop or field welding inspection is indicated on the structural drawings, all shop and field welded operations shall be inspected by a qualified welding inspector employed by the Testing Laboratory. Such Inspector shall be a person trained and thoroughly experienced in inspection of welds. The inspector's ability to distinguish between sound and unsound welding will be reliably established.
    b. The Welding Inspector shall make a systematic record of all welds. This record shall include:
        1) Identification marks of welders.
        2) List of defective welds.
        3) Manner of correction of defects.
    c. The welding inspector shall check the material, equipment and procedure, as well as the welds. He/she shall also check the ability of the welder. He/she shall furnish the Architect with a report, duly verified by him/her that the welding which is required to be inspected is proper, and has been done in conformity with the Contract Documents, and that he/she has used all means to determine the quality of the welds.
    d. All full penetration groove welds shall be subject to ultrasonic testing per AWS D1.1, Clause 6 "Inspection, Part "C", Ultrasonic Testing of Groove Welds." All defective welds shall be repaired and re-tested with ultrasonic equipment at the Contractor's expense.
    e. Column Flanges: An area extending 6 inches above and below point where girder flanges area attached shall be inspected. Column flange edges shall be inspected visually, and entire area ultrasonically for lamination, plate discontinuities, and non-metallic inclusions.
    f. All partial penetration groove welds shall be tested by ultrasonic testing.
    g. When ultrasonic indications arising from the weld root be interpreted as a defect, the Engineer shall be notified. The Engineer may require the removal of backing strip. The backing strip shall be removed at the expense of the Contractor, and if no root defects

are visible the weld shall be re-tested. If no defect is indicated on this re-test, and no significant amount of base and weld metal have been removed, no further repair of welding is necessary. If a defect is indicated, it shall be repaired and re-tested at the Contractor's expense.

h. The ultrasonic instrumentation will be calibrated by the technician to evaluate the quality of the welds per AWS D1.1.
i. Other methods of inspection, for example, X-ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if felt necessary by the inspection laboratory, and with the approval of the Engineer.
j. Base metal thicker than 1-1/2 inches, when subjected to through thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such weld before and after joint completion.
k. End-welded studs shall be sampled, tested, and inspected per the requirements of the Structural Welding Code – Steel D1.1, published by the American Welding Society.
l. At the discretion of the Owner's testing agency, the ultrasonic testing frequency may be reduced but may not be less than the following:
    1) Initially, all welds requiring ultrasonic testing will be tested at the rate of 100 percent in order to establish the qualifications of each individual welder. If the reject rate is demonstrated to be less than 5 percent of the welds tested for each welder, then the frequency of testing for that welder may be reduced to 25 percent. If the reject rate increases to 5 percent or more, 100 percent testing will be re-established until the rate is reduced to less than 5 percent. The percentage of rejects will be calculated for each welder independently.
m. A sampling of at least 40 completed welds will be made for such reduction evaluation. Reject rate is defined as the number of welds containing rejected defects divided by the number of welds completed. For evaluating the reject rate of continuous welds over 3' in length, each 12 linear inch increment of welds, 1 inch or less in thickness, will be considered as one weld. For evaluating the reject rate of continuous welds greater than 1 inch thickness, each 6 linear inches will be considered one weld.

7. High Strength Bolting Tests and Inspection:
    a. Furnish certified test reports for each lot of bolts which are tested per ASTM F3125. Install bolts under the supervision of a qualified bolting inspector per, Research Council "Specifications for Structural Joints Using High-Strength Bolts" and AISC 341-16 §J7.
    b. While the work is in progress, the Inspector shall determine that the requirements of this Specification are met in the work. The Inspector shall observe the calibration procedures and shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is properly used to tighten all bolts.
        1) In addition to the requirement of the foregoing paragraph, for all connections specified to be slip critical (SC), the Inspector shall assure that the specified procedure was followed to achieve the pretension specified in the AISC. The pre-tension shall be verified by the Inspector for these bolts.
        2) Bolts in connections identified as not being slip-critical nor subject to direct tension need not be inspected for bolt tension other than to ensure that the piles of the connected elements have been brought into snug contact.

B. Verification of Performance:
    1. Testing Agent shall be a qualified person or Testing Laboratory listed and approved by DSA/SSS and selected by the Architect, and the Owner.
    2. Testing Agent shall make Test and Inspection Reports certifying materials and workmanship to conform with Drawings and Specifications.
        a. Cost of Testing and Inspection will be paid by Owner unless otherwise specified.
        b. Cost of cutting and machining test samples shall be paid by Contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
   1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Employ a licensed land surveyor for accurate erection of structural steel.
   1. Check elevations of bearing surfaces (concrete or masonry), and locations of anchor bolts and similar devices, before erection work proceeds.
   2. Report discrepancies to Architect.
   3. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with the Architect.

B. Erect all Structural Steel frame work per AISC Specifications "Specification for the Design, Fabrication and Erection of Structural Steel for Building," latest edition, and AISC Code unless otherwise indicated on Drawings or Specification.
   1. Framing: Carry up framing true and plumb. Provide temporary bracing wherever necessary to support all loads to which the structure may be subjected, including erection equipment and its operation. Leave bracing in place as long as may be required for safety. As erection progresses securely connect the work to take care of all dead load, wind and erection stresses.
   2. Connections:
      a. Machine Bolts shall be installed with cut washer under nut.
      b. High Strength Bolts shall be used to assemble structural joints per AISC "Specification for Structural Joints using bolts for ASTM F3125, unless otherwise indicated on the drawings.
         1) Tighten nuts for Bolts per CBC Sections 1705A.2.1. Load Indicating Devices shall be pre-approved by the DSA/SSS, and certification by an independent testing laboratory stating that the devices meet AISC Specifications shall be submitted to Project Engineer and DSA/SSS.
         2) Manufacturer shall also submit installation procedures prior to incorporation into the work for approval by the Project Engineer.
         3) Once approved, manufacturer's installation instructions shall be followed for all conditions. Mark bolts that have been completely tightened with an identifying symbol.
         4) Connections shall be slip-critical (SC) type, unless indicated otherwise on the drawings.
            a) Slip-critical connections, surfaces shall be per ASTM F3125.
         5) Contacting surfaces shall be painted, except for friction-type (SC) connections.
         6) Provide washers per ASTM F3125.

c. Welding: The details of all joints, the technique of welding employed, the appearance and quality of welds made, and the methods used in correcting defective work shall conform to "AISC Specs," "AWS Code," Table 1705A.2.1.
   1) All "exposed-to-view" welds will be smooth and flush with no voids showing and still be in conformance with standards referenced herein.
   2) All exposed to view butt welds shall be flush as connected members will allow. Minor defects and transitions in metal surfaces shall be filled and sanded out with an approved metal filler prior to painting.
   3) Exposed fillet welds are acceptable "as is" provided the surface chevrons are shallow and have no abrupt protrusions.

3. Cutting Holes: The use of a cutting torch is permissible only if the metal being cut is not carrying stress during the operation and only with the prior approval of the Architect and DSA/SSS for each specific condition.
4. Setting Plates: Set column base plates and leveling plates to correct elevations and temporarily support on steel wedges or shims until the supported members have been plumbed, locked in place and grouted.

C. Erection Sequence: Erect steel per special erection sequences where special erection sequences are indicated on the contract documents.

D. Before and during erection, keep all structural steel clean. Ship, handle and store steel in a manner to avoid injury to members. Steel members showing evidence to rough handling or injury will be rejected.

E. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.

F. Provide sufficient bracing, shoring and guys to effect safe and satisfactory erection. Provide bracing and shoring capable of holding steel work plumb and properly aligned while field connections are being made, and until lateral force resisting elements are deemed by the Architect to be capable of bracing structure. Temporary bracing shall be adequate to resist lateral forces from wind or seismic prior to the completion of the lateral resisting system.

G. Set bearing and base plates with extreme care. Bring level, to line and grade with leveling plates or by leveling nuts and bolts. Grout solid under plates with a flowable non-shrink grout per Specification Section – CAST-IN-PLACE CONCRETE prior to applying vertical load.

H. Field Assembly: Set structural framing accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Shimming or other adjustments not indicated on drawings shall be approved by the Engineer prior to installation. Level and plumb individual members of the structure within specified AISC tolerances except as noted herein. Column shimming shall be 1/4 inch.

I. All welds shall be full and clean, and conform to AISC and AWS Specifications.

J. Erection Tolerances: Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

1. Individual pieces shall be erected so that the deviation from plumb, level and alignment shall not exceed 1 to 500 plus:
2. The maximum displacement of the centerline of columns adjacent to elevator shafts, from the established column line, shall not be more than 1 inch at any point from the established column line in the first 20 stories.
3. In order to provide a true, flat plane for the exterior elevations, install all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building.
   a. Also, install each vertical member on such grids so that its vertical centerline does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.

4. Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.

3.4 ERECTION, AESS 3

A. Employ special care to handle and erect AESS. Erect finish pieces using nylon straps or chains with softeners such that they are not damaged.

B. Field welding profile, quality, and finish shall be consistent with AESS Category 3.

3.5 REPAIR / RESTORATION

A. Defective Work shall be immediately replaced with proper work. Such replaced Work and the Testing and Inspection for it shall be at the expense of the Contractor. If defects or damages cannot be corrected in the field, the material shall be returned to the shop or new parts furnished, as the Architect directs, and the Contractor shall pay all costs therefor.

1. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780.
2. Primer Coat - On all hot-dip iron or steel that needs repair, provide one primer coat of the following:
   a. Specified: **AERVOE INDUSTRIES, INC** “Zinc Rich Galvanize No. 1141”.
   b. Provide a smooth-flowing, high-solids compound that provides a fast-drying coating that protects ferrous metals in highly corrosive environments. Coating shall be 97% pure zinc metallic flake, which leaves 94% zinc in the dry film.
   c. Overall Dry Film Thickness: 2.0 mil.
3. Finish Coat - On all hot-dip iron or steel that needs repair, provide one finish coat over a properly cured primer coat of the following:
   a. Specified: **AERVOE INDUSTRIES, INC** “Zinc Rich Galvanize No. 1141”.
   b. Provide a smooth-flowing, high-solids compound that provides a fast-drying coating that protects ferrous metals in highly corrosive environments. Coating shall be 97% pure zinc metallic flake, which leaves 94% zinc in the dry film.
   c. Overall Dry Film Thickness: 2.0 mil.

B. Touch-up Primer Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop priming to comply with SSPC-PA1 "Touching Up Shop-Painted Surfaces."

1. Clean and prepare surfaces by SSPC-SP 2 "Hand-Tool Cleaning" or SSPC-SP 3 "Power-Tool Cleaning."

3.6 FIELD QUALITY CONTROL

A. Site Tests:

1. As required by Regulatory Requirements.

B. Tests, inspection:

1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.
4. Tests and inspection of field welding per CBC Table 1705A.2.1. Perform field welding only under supervision of welding inspector.
   a. Welds shall be per CBC Table 1705A.2.1.
   b. Inspection shall be per CBC Table 1705A.2.1.
      1) Welding inspector shall be an AWS Certified Welding Inspector (CWI).

C. Verification of Performance:

1. Certification:
   a. The Contractor shall engage and pay for a registered Civil Engineer or Licensed Land Surveyor to check the alignment, plumbness, elevation, and overall accuracy of the erected framing at appropriate stages during construction and at completion of erection.

b. Civil Engineer or Licensed Land Surveyor shall submit written verification and certification that the entire installation is in accordance with the Contract Documents.

3.7 SCHEDULES

A. Metal Fabrication Schedule should be used as a guide only and is not considered as a complete list. Refer to Drawings for location and details:

1. Miscellaneous backing members, brackets, and supports for work installed by other trades.

2. Fixed Bollard

END OF SECTION

SECTION 05 52 00 – RAILING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 05 12 00 STEEL AND FABRICATIONS
4. 06 10 00 ROUGH CARPENTRY
5. 09 91 00 PAINTING
6. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. AA: Aluminum Association "Specifications for Aluminum Structures."

B. AISC: Cold-Formed Structural Steel: AISI "Specification for the Design of Cold-Formed Steel Structural Members."

C. ASCE: American Society of Civil Engineers "Minimum Design Loads for Buildings and Other Structures."

D. ASTM: American Society of Testing Materials.

1. ASTM A36 Carbon Structural Steel (Standard Specification for)
2. ASTM A47 Ferritic Malleable Iron Castings (Specification for)
3. ASTM A48 Gray Iron Castings (Specification for)
4. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless (Standard Specification for)
5. ASTM A123 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products (Specification for)
6. ASTM A153 Zinc Coating (Hot Dip) on Iron and Steel Hardware (Specification for)
7. ASTM A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip (Specification for)
8. ASTM A312 Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes (Specification for)
9. ASTM A500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes (Standard Specification for)
10. ASTM A501 Hot-Formed Welded and Seamless Carbon Steel Structural Tubing (Standard Specification for)
11. ASTM A554 Welded Stainless Steel Mechanical Tubing (Specification for)
12. ASTM A743 Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application (Specifications for)
13. ASTM B26 Aluminum-Alloy Sand Castings (Specification for)
14. ASTM B209 Aluminum and Aluminum-Alloy Sheet and Plate (Specification for)
15. ASTM B210 Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Specification for)
16. ASTM B221 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Specification for)
17. ASTM B247 Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings (Specification for)
18. ASTM B429 Aluminum-Alloy Extruded Structural Pipe and Tube (Specification for)
19. ASTM B633 Electrodeposited Coatings of Zinc on Iron and Steel (Specification for)
20. ASTM E488 Strength of Anchors in Concrete and Masonry Elements (Test Methods for)

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
B. Product Data.
C. Shop Drawings.
   1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
D. Quality Assurance/Control Submittals:
   1. Test Reports:
      a. Cast-In-Place or Post Installed Anchors.

1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

1.5 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section - WARRANTIES

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Design Performance of Handrails and Railing Systems: Engineer, fabricate, and install handrails and railing systems to withstand the following loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.
   1. Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:
      a. Concentrated load of 200 lbf applied at any point and in any direction.
      b. Uniform load of 50 lbf per linear foot applied horizontally and concurrently with uniform load of 100 lbf per linear foot applied vertically downward.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.
   2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
      a. Concentrated load of 200 lbf applied at any point and in any direction.
      b. Uniform load of 50 lbf per linear foot applied horizontally and concurrently with uniform load of 100lbf per liner foot applied vertically downward.
      c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guardrail Systems: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in the system, including panels, intermediate rails, balusters, or other elements composing the infill area.
    a. Above load need not be assumed to act concurrently with loads on top rails of railing systems in determining stress on guard.
4. Anchors: Cast-in-Place or Post Installed Anchors of type indicated, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete.
    a. As determined by testing per ASTM E488, conducted by a qualified independent testing agency.

B. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in engineering, fabricating, and installing handrails and railing systems to prevent buckling, opening of joints, over stressing of components and connections, and other detrimental effects. Base engineering calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
    1. Temperature Change (Range): 120 deg F, lambent; 180 deg F, material surfaces.
C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
D. Appearance: Metal material shall be free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discoloration, or other imperfections on finished units are not acceptable.

2.2 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.3 STAINLESS STEEL PIPE RAILING SYSTEMS

A. Specified: **JULIUS BLUM & CO., INC**.
B. Stainless Steel: Grade and type designated below for each form required:
    1. Tubing: ASTM A554, Grade MT 304.
    2. Pipe (1.900" O.D.): ASTM A312, Grade Type 304.
    3. Castings: ASTM A743, Grade CF 8 or CF 20.
    4. Brackets: ASTM A167, type as follows:
        a. Specified: **JULIUS BLUM & CO., INC**. “Bracket No. 223, Bracket Height Extender”.
        b. Bracket Accessory: required to provide a 1-1/2" clearance from bottom of handrail to top of horizontal bracket.
C. Stainless Steel Finishes:
    1. Remove or blend tool and die marks and stretch lines into finish.
    2. Grind and polish surface to produce uniform directional, textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
        a. Bright, Directional Polish: Match AISI No. 4 finish.

2.4 STEEL PIPE RAILING SYSTEMS

A. Specified: **JULIUS BLUM & CO., INC**.
B. Steel and Iron: Provide steel and iron in the form indicated complying with the following requirements:
    1. Steel Tubing: Product type (manufacturing method) and other requirements as follows:

a. Cold-Formed Steel Tubing: ASTM A500, Grade A, unless otherwise indicated or required by structural loads.
b. Hot-Formed Steel Tubing: ASTM A501.
c. For exterior installations and where indicated, provide tubing with hot-drip galvanized coating per ASTM A53.

2. Steel Plates, Shapes, and Bars: ASTM A36.
3. Gray Iron Castings: ASTM A48, Class 30.
4. Malleable Iron Castings: ASTM A47, Grade 32510.

C. Iron and Steel Painted Finishes:

1. Galvanizing: Hot-dip galvanize items indicated to be galvanized after fabrication to comply with applicable standard listed below:
   a. ASTM A153 for galvanizing iron and steel hardware.
   b. ASTM A123 for galvanizing iron and steel products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips.
   c. Fill vent and drain holes that will be exposed in the finished work, unless indicated to remain as weep holes, by plugging with zinc solder and filling off smooth.
   d. For galvanized handrails and railing systems, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

2.5 ALUMINUM

A. Aluminum: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

1. Extruded (**Bars**) (**and**) (**Tubing**): ASTM B221, Alloy 6063-T5/T52.
2. Extruded Structural (**Pipe**) (**and**) (**Round Tubing**): ASTM B429, Alloy 6063-T6.
   a. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.
3. Drawn Seamless Tubing: ASTM B210, Alloy 6063-T832.
4. Plate and Sheet: ASTM B209, Alloy 6061-T6.
5. Die and Hand Forgings: ASTM B247, Alloy 6061-T6.
6. Castings: ASTM B26, Alloy A356.0-T6.

2.6 GLASS GUARDRAIL SYSTEM

A. Specified: **FORMS AND SURFACES** “Silhouette Railing System”.

1. Fittings shall be Cast Type 316 Stainless steel with a polished finish.
2. Tubing for handrail and guardrails shall be ADA Compliant, 1.5" O.D., Type 304 stainless steel with a "satin" finish.
   a. Provide offset ADA Handrail in locations and height as shown on the drawings.
3. Mounting and other accessories as shown on the drawings.

B. Patterned Glass Infill:

1. Specified: **FORMS AND SURFACES** “Minneapolis”.
2. 0.5" thick Patterned Glass infill, translucent ceramic-fused tempered glass, in sizes as shown on the drawings, compatible with railing system provided.

2.7 FLOOR SLEEVES AND COVER PLATE SYSTEM

A. Specified: **PORTER ATHLETIC EQUIPMENT CO** “Model #00770-100”.

B. Five (5) inch diameter chrome cover secured with manufacturer's special swivel hinge to prevent removal or theft.

1. Provide manufacturer's special cover key to prevent unauthorized use.

2.8 ACCESSORIES

A. Fasteners: For Anchoring Railings to Other Construction, select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring railing to other types of construction indicated and capable of withstanding design loading.
   1. For stainless steel railings, provide fasteners fabricated from Type 304 stainless steel.
   2. For steel railings and fittings, use plated fasteners complying with ASTM B633, Class Fe/Zn 25 for electro-deposited zinc coating.
   3. Fasteners for Interconnecting Railing Components: Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
      a. Provide concealed fasteners form interconnecting handrail and railing components and for attaching them to other work, except where exposed fasteners are unavoidable or are the standard fastening method for handrail and railing system indicated.

B. Anchors: Cast-in-Place or Post Installed Anchors of type indicated, fabricated from corrosion-resistant materials.

2.9 FABRICATION

A. General: Fabricate handrails and railing systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, post spacing, and anchorage, but not less than that required to support structural loads.

B. Assemble railing systems in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation. Use connections that maintain structural value of joined pieces.
   1. Form changes in direction of railing members as follows:
      a. By bending (unless otherwise indicated by the contract documents).
   2. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
   3. Welded Connections: Fabricate railing systems and handrails for connecting members by welding. For connections made during fabrication, weld corners and seams continuously to comply with the following:
      a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
      b. Obtain fusion without undercut or overlap.
      c. Remove welding flux immediately.
      d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
   4. Non welded Connections: Fabricate railing systems and handrails by connecting members with railing manufacturer's standard concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
      a. Fabricate splice joints for field connection using epoxy structural adhesive where this represents manufacturer's standard splicing method.
   5. Brackets, Flanges, Fittings, and Anchors: Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.
   6. Provide inserts and other anchorage devices to connect handrails and railing systems to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railing systems. Coordinate anchorage devices with supporting structure.

7. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, and steel plate forming bottom closure.
8. For removable railing posts, fabricate slip-fit sockets from steel tube whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height. Provide socket covers designed and fabricated to resist being dislodged.
    a. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from the same metal as railings.
9. Shear and punch metal cleanly and accurately. Remove burrs form exposed cut edges.
10. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing work.
11. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
12. Provide weep holes or another means to drain entrapped water in hollow sections of railing members that are exposed to exterior or to moisture from condensation or other sources.
13. Fabricate joints that will be exposed to weather in a watertight manner.
14. Close exposed ends of handrail and railing members with prefabricated end fittings.
15. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of the railing and wall is 1/4 inch or less.
16. Toe Boards: Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.
17. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and over stressing of substrate.

2.10 FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
    1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering prior to shipment.
    2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and they are assembled or installed to minimize contrast.

2.11 SOURCE QUALITY CONTROL

A. Fabrication and Installation shall be in accordance with approved manufacturers fabrication and installation details and recommendations.

B. Fabrication and Installation shall conform to following general requirements:
    1. All cuts must be free of burns, nicks and sharp edges. Deburr with care so as not to chamfer exposed edges of cuts. All cuts shall be square and accurate for minimum joint gap.
    2. Pre-drill 15/64 inch diameter weep holes in all posts set in concrete or otherwise closed at the bottom, and in all bends and elbows at low points to allow for drainage of the railing system. Weep holes shall be located at the lowest possible elevations and in the plane of the railing membranes. (1/2 to 3/4 inch above post-collar acceptable).
    3. Whenever possible, top rails shall be of a continuous, single un-spliced length and attached to a minimum of three posts, or brackets. Top rail splices and expansion joints must be located within 8 inches of a post support.
    4. Bottom rails shall be of continuous un-spliced lengths between posts.
    5. Posts shall be one continuous length from mounting surface to top rail.
    6. To protect from temperature induced stresses, the pipe railing system shall be provided with proper expansion joints in accordance with approved manufacturers recommendations.

7. All holes shall be drilled and countersunk the proper size required for a tight flush fit of all fastening devices.
8. All railing surfaces that come in contact with other materials that could generate dissimilar material electrolysis shall be painted with a protective coat of asphaltic paint. Care shall be taken to prevent any of the protection from being visible on the finished installation.
9. All trim, accessories, and related items which are required for a complete, finished installation of the Pipe Railing System shall be installed in accordance with approved manufacturers recommendations and details.
10. All fabrication and assembly fastenings on components shall be on the bottom surfaces. No visible mechanical fasteners will be allowed except for mounting bolts at terminal connections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work specified under this specification section.
   2. Coordinate setting drawings, diagrams, templates, instructions, and directions for installing anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, that are to be embedded in concrete as masonry construction. Coordinate delivery of such items to Project site.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.
   5. Fit exposed connections accurately together to form tight, hairline joints.
   6. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required to installing handrails and railing. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.

a. Do not weld, cut, or abrade surfaces of handrails and railing components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.
b. Set posts plumb within a tolerance of 1/4 inch in 12 feet.
c. Align rails so that variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

7. Field Welding: Comply with the following requirements:
   a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   b. Obtain fusion without undercut or overlap.
   c. Remove welding flux immediately.
   d. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
8. Adjust handrails and railing systems prior to anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated but not less than that required by structural loads.
9. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings systems and for properly transferring loads to in-place construction.

B. Layout:
   1. Lines shall be straight and true.

C. Railing Connections:
   1. Non welded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic filler, cement colored to match finish of handrails and railing systems.
   2. Welded Connections: Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact, or use fittings designed for this purpose.
   3. Expansion Joints: Install expansion joints at locations indicated but not further apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of post.

D. Anchoring Posts:
   1. Anchor posts in concrete with pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, solidly fill annular space between posts and sleeve with the following anchoring materials, mixed and placed to comply with anchoring material manufacturer's written directions.
   2. Anchor posts in concrete by forming or core-drilling holes not less than 5 inches deep and 3/4 inch greater than outside diameter of post. Clean holes of all loose material, insert posts, and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written directions.
      a. Non shrink, nonmetallic grout.
   3. Cover anchorage joint with a round flange of same metal as post, attached to post as follows:
      a. Welded to post after placement of anchoring material.
   4. Leave anchorage joint exposed, wipe off surplus anchoring material, and leave 1/8-inch buildup, sloped away form post.
   5. Anchor steel posts to steel with oval flanges, angle type, or floor type as required by conditions, welded to posts and bolted to metal supporting members.
   6. Anchor posts to metal surfaces with oval flanges, angle type or floor type as required by conditions, connected to posts and to metal supporting members as follows:
      a. For stainless-steel railings, weld flanges to post and bolt to metal supporting surfaces.

E. Anchoring Rail Ends:

1. Anchor rail ends into concrete and masonry with round flanges connected to rail ends and anchored into wall construction with post-installed anchors and bolts.
2. Anchor rail ends to metal surfaces with oval or round flanges.
    a. Weld flanges to rail ends.
    b. Connect flanges to rail ends using non-welded connections.
    c. Bolt flanges to metal surfaces.
3. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.

F. Attaching Handrails to Walls:
1. Attach handrails to wall with wall brackets and end fittings. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
3. Secure wall brackets and wall return fittings to building construction as follows:
    a. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
    b. Use type of bracket with predrilled hole for exposed bolt anchorage.
    c. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bot, as applicable.
    d. For hollow masonry anchorage, use toggle bolts with square heads.
    e. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with stud installations to accurately locate backing members.
    f. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support the structural loads.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's field services:
1. Provide the services of a factory-authorized service representative to supervise the field assembly of components and installation of products or systems and related connections specified within this section, and to report the results in writing to the Architect.

B. Inspection:
1. Test Cast-in-Place or Post Installed Anchors of type indicated, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete.
    a. As determined by testing per ASTM E488 conducted by a qualified independent testing agency.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Clean stainless steel by washing thoroughly with clean water and soap, followed by rinsing with clean water.

END OF SECTION

SECTION 06 10 00 – ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to complete all rough carpentry, accessories and other related items necessary to complete the Project as indicated by the Construction Documents unless specifically excluded.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 03 15 14 DRILLED ANCHORS
4. 04 22 00 CONCRETE MASONRY UNITS
5. 05 12 00 STEEL AND FABRICATIONS
6. 06 41 23 MODULAR CASEWORK
7. 07 21 00 INSULATION
8. 07 60 00 SHEET METAL
9. 07 92 00 SEALANTS
10. 08 11 00 METAL DOORS AND FRAMES
11. 08 31 13 ACCESS DOORS AND FRAMES
12. 08 70 00 HARDWARE
13. 09 24 00 CEMENT PLASTER
14. 09 29 00 GYPSUM BOARD
15. 09 50 00 ACOUSTICAL CEILINGS
16. 09 65 19 RESILIENT TILE
17. 09 68 40 CARPET
18. 10 05 00 MISCELLANEOUS SPECIALTIES
19. 10 11 00 VISUAL DISPLAY BOARDS
20. 10 14 00 IDENTIFYING DEVICES
21. 10 21 13 TOILET PARTITIONS
22. 10 28 13 TOILET ACCESSORIES
23. 10 44 00 FIRE PROTECTION SPECIALTIES

1.2 REFERENCE STANDARDS

A. ALSC: American Lumber Standards Committee

B. ANSI: American National Standards Institute

C. APA: The Engineered Wood Association (Formerly the American Plywood Association)

D. ASME: American Society of Mechanical Engineers International

E. ASTM: American Society of Testing Materials

1. ASTM A153 Zinc Coating (Hot Dip) on Iron and Steel Hardware (Specification for)
2. ASTM A307 Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength (Specification for)
3. ASTM A653 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process (Specification for)
4. ASTM C954 Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness (Standard Specification for)
5. ASTM F1667 Driven Fasteners: Nails, Spikes, and Staples (Specification for)

F. AWPA: American Wood Protection Association

G. CABO: Council of American Building Officials

H. FS: Federal Specification

I. ICC: International Code Council

J. NDS: National Design Specification for Wood Construction

K. NIST: National Institute of Standards and Technology
L. PS: Product Standards of the U.S. Department of Commerce
M. RIS: Redwood Inspection Service
N. WCLIB: West Coast Lumber Inspection Bureau
O. WWPA: Western Wood Products Association

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
B. Product Data:
   1. Submit manufacturer's data for Wood-Preservative Treatment.
   2. Submit manufacturer's data for Fire-Retardant Treatment.
   3. Submit manufacturer's data for power driven fasteners, metal-framing connectors, and metal framing anchors.

1.4 QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Material Certificates: Submit Material Certificates of Compliance to Standards and Regulatory Requirements.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with other work being performed.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
   2. Progress: Scheduled by the Contractor during the performance of the work.
      a. Review for proper installation of work progress.
      b. Identify any installation problems and acceptable corrective measures.
      c. Identify any measures to maintain or regain project schedule if necessary.
   3. Completion: Scheduled by the Contractor upon proper completion of the work.
      a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
      b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver undamaged products to project site in manufacturer's sealed containers or bundles with tags and labels intact.
B. Storage and Protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   2. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Dust Control: Perform work in a manner as to minimize the spread of dust and flying particles.
   2. Burning: No burning will be allowed on-site.
   3. Rain: Work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 WARRANTY

A. Contractor's General Warranty: In accordance with Specification Section – WARRANTIES.

B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.

C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 WOOD

A. Douglas Fir - Larch:
   1. Standards and Requirements: In accordance with WCLIB "Standard Grading and Dressing Rules" No. 17, latest edition, and WWPA "Western Lumber Grading Rules," latest edition.
      a. All wood shall be "DRY" and having a moisture content of less than 19 percent at the time of installation, in accordance with WWPA.
      b. Provide wood of S4S unless otherwise noted.
      c. Factory mark each piece of wood with the grade stamp of the grading agency.
   2. Grading and Use Requirements:

	Item	Sizes	Grade	Moisture Max.
b.	Studs	2x	No. 1	19%
c.	Studs	3x, 4x, 6x	No. 1	19%
d.	Sills and Plates	2x	No. 1	19%
e.	Sills and Plates	3x, 4x, 6x	No. 1	19%
f.	Beams	4x, 6x	No. 1	19%
g.	Joists	2x	No. 1	19%
h.	Posts	4x, 6x, 8x	No. 1	19%
i.	Ledgers	2x	No. 1	19%
j.	Ledgers	3x, 4x, 6x	No. 1	19%
k.	Blocking	2x, 3x, 4x, 6x	No. 1	19%
l.	Sheathing/Stripping	up to 1-1/2" thick; 2" and wider	No. 1	19%
m.	Stripping	2x, 3x, 4x, 6x	Construction	19%
n.	Nailers and Grounds	2x, 3x, 4x, 6x	Construction	19%

o.	Furring	2x, 3x, 4x, 6x	Construction	19%
p.	T & G Decking	2x	Select Dex	15%

q. Initial use shall be that point at which screws or other fasteners or the holes for said fasteners are installed into the wood.
r. The Contractor shall use whatever means necessary, including site drying to ensure that the moisture contents listed above are not exceeded.

2.3 PLYWOOD

A. Soft Plywood:
1. Standards and Requirements: In accordance with PS1-19, Group 1 Douglas-Fir and PS2-18.
a. Factory mark each piece of plywood with the APA Grade Stamp.
b. Maximum Moisture Content at Initial Use (Installation) shall be 15 percent.
2. Grading and Use Requirements:
a. Wall, Roof, and Parapet Sheathing:
1) APA Rated Sheathing - Structural 1.
2) Span Rating as required to suit stud or joist spacing.
3) Exposure Durability Classification - Exposure 1.
4) Species Group 1.
5) Grade C-C 3 ply for 1/4 inch thickness and C-D 5 ply for 1/2 and 5/8 inch thickness.
b. Subflooring, Floor Sheathing as underlayment, Equipment Platform Sheathing:
1) APA Rated "Sturdi-Floor."
2) Span Rating as required to suit joist spacing.
3) Exposure Durability Classification - Exposure 1.
4) Species Group 1.
5) Grade C-C plugged.
c. Backing panels for Electrical Equipment.
1) APA Rated Sheathing - Structural 2.
2) Exposure Durability Classification - Exterior.
3) Species Group 1.
4) Grade C-C.
5) Shall be 3/4 inch minimum thickness.
d. Backing panels for Telecommunication Equipment:
1) APA Rated Sheathing - Structural 2.
2) Exposure Durability Classification - Exterior.
3) Species Group 1.
4) Grade A-B.
5) Shall be 3/4 inch minimum thickness.

2.4 PRESERVATIVE TREATMENT

A. Pressure Process: AWPA U1:
B. Preservative Chemicals: Per AWPA U1 Section 4 Table 1 Preservatives for Pressure Treatment processes, Waterborne, Alkali-based (amine/ammonia), acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX).
C. Redry boards after treatment to 19 percent maximum moisture content.
D. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
E. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
F. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.

3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.

G. Field cut treatment: copper naphthenate.

2.5 FIRE RETARDANT TREATMENT

A. Fire Retardant Treat Wood and Plywood with pressure treatment materials that comply with performance requirements of CBC 2303.2.
1. Use Exterior Type.
2. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures when tested by a qualified independent testing agency and is acceptable to Fire and Life Safety authorities.
3. Use treatment that does not promote corrosion of metal fasteners.
4. After treatment, kiln-dry wood to a maximum moisture content of 19 percent.
5. After treatment, dry plywood to a maximum moisture content of 15 percent.
6. Factory mark each treated item with the treatment quality mark of an Independent Inspection Agency.

2.6 ACCESSORIES

A. Fasteners: All types shall comply with standards and dimensions of the latest edition of NDS. All types of fasteners exposed to wet or exterior conditions, in-ground contact, in pressure or preservative treated woods, in concrete or masonry, or in an area of high relative humidity shall be hot-dipped galvanized in accordance with ASTM A153.
1. Nails: Common wire nails or spikes complying with ASTM F1667, and CBC Section 2304.10. Box nails and sinker nails are not permitted. Vinyl coating is permitted on common nails.
2. Bolts: Steel bolts complying with ASTM A307, Grade A, hex head.
   a. Provide hex head nuts complying with ASTM A307, and standard flat washers complying with ANSI/ASME B18.22.1, Type A, Wide pattern.
3. Lag Bolts: Shall comply with ANSI/ASME B18.2.1, hex head.
   a. Provide standard flat washers complying with ANSI/ASME B18.22.1, Type A, Wide pattern.
4. Wood Screws: Shall comply with ANSI/ASME B18.6.1.
   a. Screws for fastening wood to Metal Framing shall comply with ASTM C954.
5. Power Driven Fasteners: Tempered Steel pins with corrosive resistant plating or coating complying with ICC ESR-1539.
   a. Specified: **HILTI FASTENING SYSTEMS**.

B. Metal Framing Anchors: All anchors shall comply with ASTM A653, G60 Coating Designation for hot-dipped zinc-coated steel sheet. Provide structural, commercial, or lock-forming quality as standard with manufacturer for type of anchor indicated.
1. Specified: **SIMPSON STRONG-TIE COMPANY**.
2. Alternate manufacturers:
   a. Manufacturers of Alternative Metal Framing Anchors shall have Model Code Research Evaluation Reports and Published allowable design loads that are determined from empirical data, or by rational engineering analysis, that are demonstrated by comprehensive testing performed by a qualified testing agency acceptable by the Architect or its Designated Design Consultant, and DSA.

C. Metal Timber Framing Connectors: All connectors shall have specific ICC Approval and be fabricated from hot-dipped galvanized steel.
1. Metal Timber Framing Connector specified product manufacturer:
   a. Specified: **SIMPSON STRONG-TIE COMPANY**.
   b. Acceptable alternative manufacturers:

1) Do not substitute connectors manufactured by others than **SIMPSON STRONG-TIE COMPANY** without prior written review by the Architect or its Designated Design Consultant, and DSA.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.
   4. Verify that work under this Section may be performed in strict accordance with the original design and all pertinent codes and regulations.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all materials from damage occurring from work called for under this specification section.

C. Preservative Treatment:
   1. Members requiring pressure treatment:
      a. Sills, Plates, Ledgers, Studs, Joists, Blocking, Nailers and Furring attached or resting on or against concrete or masonry construction.
      b. Pressure treated members cut in the field shall have the cut ends painted with preservative until the wood or plywood absorbs no more preservative.
   2. Members requiring field treatment:
      a. All wood and plywood members at exterior walls within two feet of the ground surface.
      b. Treat all surfaces of the member.
      c. Treat by dipping the required portion of the member into preservative for 15 minutes or paint until the wood or plywood absorbs no more preservative. Wait a minimum of two hours after dipping or painting is complete to incorporate member into project.
      d. Test treat items for compatibility where additional finish coats (stain or paint) may occur.

D. Fire Retardant Treatment:
   1. All wood and plywood members as indicated.
   2. All plywood panels for Telecommunication Equipment.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Selection of wood and plywood pieces:
      a. Carefully select all members.
      b. Select individual pieces so that knots and obvious defects will not interfere with placing bolts, proper nailing, and making proper connections.

c. Cut out and discard all defects which will render a piece unable to serve its intended function.
d. Wood and plywood may be rejected by the Architect or its Designated Design Consultant, and DSA whether or not it has been installed for excessive warp, twist, bow, crook, mildew, fungus, or mold as well as for improper cutting, fitting and treatment when required.

5. All wood and plywood shall be accurately cut to lengths required.
6. All work shall produce joints true, tight, level, plumb, and all members are securely anchored.
   a. Do not shim any framing member.
7. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

B. Layout:
   1. Lines shall be straight and true.

C. Fastening:
   1. Nails:
      a. All nailing shall be as required by CBC Table 2304.10.2 "Fastening Schedule."
      b. Machine nailing may be approved subject to the approval of the Architect or its Designated Design Consultant, and DSA.
         1) The use of machine nailing is subject to a satisfactory job site demonstration for each project. The approval is subject to continued satisfactory performance.
         2) In plywood, if the nail heads penetrate beyond flush with the surface of the sheathing, or if minimum allowable edge distances are not maintained, the performance will be deemed unsatisfactory.
         3) Machine nailing will not be accepted in 5/16" plywood.
      c. Penetration of nails or spikes shall be one-half the length of the nail or spike into the piece receiving the point.
      d. 16d nails shall be used to connect pieces 2" in thickness unless otherwise indicated.
      e. Clinch nails protruding through members.
      f. Bore holes for nails where necessary to prevent splitting.
      g. Use Finish or Casing Nails for finish work.
   2. Lag Bolts:
      a. Lag Bolts shall be screwed into place. No driving is allowed.
      b. For the Shank portion, holes shall be bored the same depth and diameter as the shank. For threaded portion, holes shall be between 60% and 75% of the shank diameter.
      c. Malleable Iron or Steel plate washers shall be used where bolt heads bear on wood or plywood. Washers shall have an area equal to 16 times the area of the bolt.
         1) Steel plate washers shall have a thickness not less than 1/10 the length of the washer's longest side.
         2) Malleable Iron washers shall have a bearing surface for the head equal in diameter to not less that the long diameter of the head.
      d. Tighten all bolts and screws prior to concealing within structure.
   3. Bolts:
      a. Holes shall be 1/16" larger than bolt diameter.
      b. Malleable Iron or Steel plate washers shall be used where bolt head and nuts bear on wood or plywood. Washers shall have an area equal to 16 times the area of the bolt.
         1) Steel plate washers shall have a thickness not less than 1/10 the length of the washer's longest side.
         2) Malleable Iron washers shall have a bearing surface for the head or nut equal in diameter to not less that the long diameter of the head or nut.
      c. Tighten all bolts prior to concealing within structure.
   4. Power Driven Anchors
      a. Fastening shall be accomplished by low-velocity piston-driven power activated tool.
      b. Pins shall have guide washers to accurately control penetration.

5. Expansion Anchors (Post-Installed Concrete Anchors):
    a. Refer to Specification Section - DRILLED ANCHORS.
6. Metal Framing Anchors
    a. Use half-length nails where required or indicated.
7. Metal Timber Framing Connectors
    a. Nailing shall conform to manufacturer’s instructions with a nail provided for each punched hole.

D. Sills:
1. Shall be in long lengths of sizes as indicated.
2. Fasten with a minimum of two (2) anchor bolts per piece and bolt within 9", but not nearer than 6", from the end of piece.
3. Malleable iron or steel plate washers shall be placed under anchor bolt nuts bearing on wood.
4. Set Sill level and true.

E. Studs and Posts:
    a. Shall be full length.
2. Cut members to provide full bearing at ends.

F. Plates:
1. Shall be in long lengths and spliced as indicated.

G. Joists and Beams:
1. Shall be in long lengths and spliced over bearings unless otherwise indicated. Do not overcut.
2. Install with crown side up.
3. Beams or headers indicated to be built-up of two or more joists shall be constructed on the project site using full length members.

H. Blocking:
1. Blocking shall be same thickness and width of studs or joists unless otherwise indicated.
2. Install blocking at all wall, floor, or roof penetrations.
    a. Blocking shall provide surface for fastening applied interior or exterior flashings or flanges.
3. Install blocking at all plywood joints.
    a. Install blocking at plywood edges including crickets and parapet wall bracing.
4. Shall be provided for all fixtures, equipment, casework, toilet partitions, toilet accessories, handrails, visual display boards, identifying devices, finish hardware, flashing, wall and ceiling finishes, and other items as indicated. See also Specification Section - OWNER FURNISHED ITEMS for listing of N.I.C. items that will require blocking coordination.
    a. Coordinate placement of blocking and supports with manufacturer or supplier of items.
5. Fireblocking shall be provided to cut off all horizontal and vertical concealed draft openings in accordance with CBC Section 718.2.
    a. Horizontal Fireblocking in walls shall be typically placed at 4'-0" above finished floor, at 8'-0" above finished floor, at mezzanine floor plane unless otherwise indicated, and at ceiling line plane.
6. Bridging shall be installed in all joist members deeper than 8 inches unless otherwise indicated.
    a. Bridging shall extend the full depth of the joists.
    b. Drill bridging within attics to provide ventilation as indicated.

I. Plywood Sheathing Panels:
1. For panels with different veneer face grades, the exposed face shall always be the higher grade.
2. Space panels 1/8 inch at all edge and end joints, and in accordance with APA.
3. Panels shall be applied with the long dimension (or strength axis) across the framing.
4. Fasten from the field of the panel first and then to the ends and edges to reduce stressing of the panel surfaces.

5. Center all joints over bearing supports.
6. Wall panels shall continue uninterrupted by ceilings or soffits from floor to floor or roof unless otherwise indicated.

J. Sheathing:
1. Shall be in accordance with the following:
a. Wall Sheathing: CBC Section 2304.6 and Table 2304.6.1.
b. Floor and Roof Sheathing: CBC Section 2304.8.
c. Structural Floor Sheathing: CBC Section 2304.8.1.
d. Structural Roof Sheathing: CBC Section 2304.8.2.
e. Lumber Decking: CBC Section 2304.9.

K. Nailers and Grounds:
1. Shall be installed as indicated and where required for attaching other work.
2. Form to shapes indicated.
3. Coordinate locations with other work involved.
4. Provide nailers at all flashing and edge terminations when required by roofing manufacturer for metal and concrete roof decks. When the roof system is required to be Class A use fire-retardant treated wood.
5. Provide permanent Grounds of dressed, pressure-preservative-treated, Key-beveled wood and of thickness required to bring face of ground to exact finish thickness of finish material. Remove temporary grounds when no longer required.

L. Furring and Stripping
1. Shall be installed as indicated and where required to provide fastening material or space for the passage of pipes, conduits, etc. not accommodated including ceiling stripping.

M. Sealant:
1. When indicated, Primer shall be in accordance with sealant manufacturer recommendations.
2. When indicated, Joint Sealer shall be in accordance with Specification Section - SEALANTS.

3.4 CONSTRUCTION

A. Draftstopping:
1. Shall be provided in floor, attic, and ceiling areas in accordance with CBC Section 718.3 and 718.4.

B. Pipes:
1. Frame to avoid cutting or drilling for passage of pipes, ducts, and conduit.
2. Follow criteria as indicated for cutting or drilling. Unusual edge distances and awkward spacing and sizes shall be brought to the Architects attention for remedy.

C. Chimneys and Flues:
1. Keep all framing 2 inches away from chimney or flues in accordance with CBC Section 2304.5.

D. Cant Strips and Crickets:
1. Shape to sizes indicated.
2. Rigidly fasten to construction.
3. Block all joints of plywood panel construction.
4. Form neat and mitered corners.

E. Temporary Enclosures:
1. Provide and maintain all barricades and enclosures required to protect the work in progress.

F. Shoring or Bracing:
1. Shore or brace for temporary support of all work as required during the construction period except any shoring and bracing specified and included under other sections of this Project Manual.

G. Wood Curbs for Equipment:
1. Construct all wood curbs for roof mounted equipment.

2. Provide all miscellaneous blocking, bracing, supports, and other wood items to complete the work.

3.5 FIELD QUALITY CONTROL

A. Site Tests:
   1. As required by Regulatory Requirements.
   2. Project Inspector shall verify by means of a handheld moisture content meter that all wood and plywood supplied at the time of incorporation into structure(s) has met applicable moisture content requirements.
   3. Project Inspector shall test all stud cavity walls to ensure that studs are a maximum of 19 percent moisture content prior to any other construction that encloses the wall cavity.

B. Inspection:
   1. As required by Regulatory Requirements.
   2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
   3. No work shall be without the inspections required by Regulatory Requirements.

3.6 CLEANING

A. Removal of Debris:
   1. Remove all Wood, including form lumber, chips, shavings and sawdust in or on the ground from the areas inside buildings. Do not bury debris in fill.

END OF SECTION

SECTION 06 17 33 – WOOD JOISTS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Wood Joist materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents, and as follows:
   1. All Wood Joists, joist blocking, bridging, etc., for the installation of joists.
   2. Clips, angles, straps, hangers, etc., incidental to installation of joists.
   3. Nails, bolts, washers and other fasteners used for erecting and securing Wood Joists.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 05 12 00 STEEL AND FABRICATIONS
   4. 06 10 00 ROUGH CARPENTRY
   5. 07 21 00 INSULATION
   6. 09 50 00 ACOUSTICAL CEILINGS
   7. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials
   1. ASTM D2559 Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions (Specification for)
   2. ASTM D5055 Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists (Specification for)
   3. ASTM D5456 Evaluation of Structural Composite Lumber Products (Specification for)

B. ICC: International Code Council

C. NDS: National Design Specification for Wood Construction

D. NIST: National Institute of Standards and Technology

E. PS: Product Standard; of the US Department of Commerce

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.
   1. Indicate wood joist material and dimensions and include construction and application details.

C. Shop Drawings.
   1. Submit shop drawings prepared by, or under the supervision of, a registered Civil or Structural Engineer in the State of California. Detail fabrication and installation of the work under this section, as well as procedures, diagrams, and attachment to other units of work. Each Drawing Sheet shall be stamped and signed by said engineer.

D. Quality Assurance/Control Submittals:
   1. Reports:
      a. Submit product ICC Evaluation Reports.
      b. Submit DSA Product Acceptance Report.
   2. Certificates:
      a. Provide document indicating Manufacturing facility has met the approval of an independent ICC Approved Inspection Agency.
      b. Provide document indicating 3 projects of similar size that the proposed installer has successfully completed.
   3. Manufacturer's Field Installation Review Reports:

4. Engineering Calculations:
    a. Submit Engineering Calculations computed, stamped, and signed by a registered Civil or Structural Engineer in the State of California.

1.4 CLOSEOUT SUBMITTALS

A. Warranty in accordance with specification section –WARRANTIES.
B. Project "AS-BUILT" Documents and Project "RECORD" Documents.

1.5 QUALITY ASSURANCE

A. Qualifications:
    1. Material Qualifications:
        a. All materials shall be in accordance with ASTM Requirements, ICC Evaluation Reports, DSA Product Acceptance Report and DSA IR A-5 and manufacturers engineering requirements.
    2. Installer Qualifications:
        a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
    3. Manufacturer/Supplier Qualifications:
        a. Firm experienced in successfully producing and supplying products indicated for this Project, with sufficient capacity to supply required units without causing delay in the work.
        b. Manufacturing facility shall be approved by an independent ICC approved inspection agency.
        c. Capable of providing competent on-site review of product installation and written verification of compliance with installation requirements.
        d. Obtain each type of product through one source from a single manufacturer.
B. Regulatory Requirements:
    1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
        a. DSA IR Division of the State Architect, Interpretation of Regulations.
            1) Including DSA IR 23-9 "Prefabricated Wood I-Joist: 2022 CBC."
C. Meetings:
    1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
        a. Coordinate the work with other work being performed.
        b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
    2. Progress: Scheduled by the Contractor during the performance of the work.
        a. Review for proper installation of work progress.
        b. Identify any installation problems and acceptable corrective measures.
        c. Identify any measures to maintain or regain project schedule if necessary.
    3. Completion: Scheduled by the Contractor upon proper completion of the work.
        a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
        b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:
    1. Products shall be handled in such a manner as to assure that they are free from gouges, scratches and other damage.
B. Acceptance at Site:
    1. Products must be in the approved manufacturer's original packaging with labels indicating brand name, size, and grade.
    2. Damaged products will not be accepted.

C. Storage and Protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Field Measurements: Take and be responsible for field measurements as required. Report any significant differences between field dimensions and the contract document conditions to Architect.
   3. Carefully coordinate work under this Section with that of the structural framing sections and details so that the interface between structural framing and non structural framing shall provide the lines and degree of finish shown and specified.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty:
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section - WARRANTIES

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
   1. Specified: **REDBUILT** “Red-165”.
B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.
   1. Other manufacturer's products complying with these specifications and having equivalent properties and dimensions shall be subject to Architect's and DSA's review upon submission of substantiating data. Structural capacities shall be evaluated by ASTM D5055 and independent structural testing. DSA Product Approval is required for all substitutions as listed in DSA Acceptance of Products IR A-5.

2.2 I-JOISTS

A. Prefabricated in accordance with DSA IR 23-9, ICC Evaluation Service Report ESR-2994, and ASTM D5055.
B. Miscellaneous blocking, bridging, rim joists and web stiffeners, shall be furnished per regulations, references, and standards.
C. Flanges:
   1. Structural Composite Lumber Flanges shall be in compliance with the requirements of ASTM D5456.
D. Webs:

1. Structural panel webs shall be of Oriented Strand Board in compliance with PS2, Exposure 1, or Plywood in compliance with PS1, Exterior Grade.
    a. Oriented Strand Board material of I-Joists shall be stamped with the Brand Name, grade, thickness, mill location, and mill number.

E. Adhesives:
1. Adhesives shall be exterior type and in compliance with ASTM D2559.

2.3 ACCESSORIES

A. Fasteners: Refer to Specification Section – ROUGH CARPENTRY.
B. Metal Framing Anchors: Refer to Specification Section – ROUGH CARPENTRY.

2.4 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:
1. Fabrication shall be in compliance with specified standard and industry specifications and requirements of DSA IR 23-9 and ICC Evaluation Service Report #ESR-2994.
    a. Fabrication shall be in accordance with best practices with adequate plant and equipment and under supervision of properly qualified personnel and at a plant stated in the Listing Report.
    b. Moisture content of components at time of gluing shall not be less than 7 percent nor more than 16 percent.
    c. Depth: Plus or Minus 1/16".
    d. Flange Width: Plus or Minus 1/16".

B. Identification:
1. All joists shall bear a stamp indicating the joist series, ICC-ES Evaluation Report Number, manufacturer's name, plant number, date of fabrication, and independent inspection agency's logo.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:
1. Prior to the execution of the work, inspect the installed work executed under other specification sections which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from damage from work under this specification section.

3.3 ERECTION

A. General:
1. Joists are to be erected and installed in accordance with the drawings and manufacturer’s recommendations. Comply with all manufacturer's written recommendations concerning temporary construction loads and erection bracing.
    a. Temporary construction loads that cause stresses beyond design limits are not permitted. Safety bracing shall be provide by the installer to keep the joists straight and plumb as

required and to ensure adequate lateral support for the individual joists and the entire system until sheathing material has been applied.

b. The Contractor shall give notification to the joist manufacturer's representative, prior to enclosing the joists, to provide an opportunity for review of the installation.

2. In accordance with approved shop drawings.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Use equipment and methods that avoid damages that may impair strength of Wood I-Joists joists. Sharp instruments and unprotected wire rope, chain slings and the like shall not be permitted.
6. Damaged products shall not be installed.

B. Layout:

1. Lines shall be straight and true.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. As required by Regulatory Requirements.
2. Manufacturer's representative shall provide on-site Field Installation Review Report indicating compliance with manufacturer's requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Keep premises free from accumulated waste materials, rubbish and debris resulting from this Work. Upon completion, remove tools, appliances, surplus materials, waste materials, rubbish, debris and accessory items used in or resulting from said Work, and legally dispose of off the site.

END OF SECTION

SECTION 06 41 23 – MODULAR CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Modular Casework materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 03 15 14 DRILLED ANCHORS
4. 04 22 00 CONCRETE MASONRY UNITS
5. 05 12 00 STEEL AND FABRICATIONS (Steel supports for modular casework)
6. 06 10 00 ROUGH CARPENTRY
7. 07 60 00 SHEET METAL
8. 08 70 00 HARDWARE
9. 09 29 00 GYPSUM BOARD
10. 09 65 16 RESILIENT SHEET
11. 09 65 19 RESILIENT TILE
12. 09 68 40 CARPET
13. 09 72 00 WALL COVERINGS
14. 09 91 00 PAINTING
15. 10 05 00 MISCELLANEOUS SPECIALTIES

1.2 DEFINITIONS

A. Refer to NAAWS.

B. Exposed Portions:

1. Face members and edges of cabinets (cabinet fronts), such as face plates, drawer fronts, door fronts, front edge of shelves.
2. Interior faces of cabinet doors.
3. Underside of bottoms of upper cabinets, 48" above finished floor.
4. Cabinet tops:
   a. Under 72" above finish floor.
   b. Visible from upper building level.
5. Interior surfaces (including top, bottom, and front of shelves) of open cabinets or cabinets with glass doors.
6. All surfaces of exposed shelves.
7. All surfaces exposed to view.

C. Semi-Exposed Portions:

1. Cabinet divisions, shelves, insides of drawers, and any other cabinet members which cannot be seen when door or drawers are closed.

D. Concealed Portions:

1. Cabinet framing that cannot be seen, such as web frame members, sleepers, dust panels, toe strips covered with resilient base.

E. Shelving:

1. Top and bottom surfaces. Face surfaces are the front and rear edges.
   a. Ends are the left/right edges as you face the cabinet.
2. The bottom surface material of all Upper Cabinets attached to walls shall be considered a shelf and manufactured as a shelf.

F. Quality Assurance Options:

1. Certified Compliance Program (CCP):
    a. The CCP is an established discipline of quality control, for use in conjunction with the NAAWS, which provides a non-biased means of confirming conformance to a project's drawings and specifications.
    b. Contractor to provide field inspection by WI Director, additional to CCP requirements.
    c. The Woodwork Manufacturer shall have no less than 5 years of production experience, similar to this project, whose qualifications indicate the ability to comply with the requirements of this Section.
    d. The Woodwork Manufacturer must have at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.
2. Monitored Compliance Program (MCP):
    a. The MCP is an established discipline of quality control, for use in conjunction with the NAAWS, which provides a non-biased means of confirming conformance to a project's drawings and specifications,
    b. Includes ongoing review/inspections of the project from its start to certification at completion.
    c. The Woodwork Manufacturer shall have no less than 5 years of production experience, similar to this project, whose qualifications indicate the ability to comply with the requirements of this Section.
    d. The Woodwork Manufacturer must have at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.

1.3 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials
    1. ASTM D635 Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position (Test Method for)
    2. ASTM D1929 Determining Ignition Temperature of Plastics (Test Method for)
    3. ASTM D2843 Density of Smoke from the Burning or Decomposition of Plastics (Test Method for)
    4. ASTM D3763 High Speed Puncture Properties of Plastics Using Load and Displacement Sensors (Standard Test Method for)
    5. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
B. BHMA: Builders Hardware Manufacturers Associates, Inc.
C. NAAWS: "North American Architectural Woodwork Standards," Latest Edition, including latest amendments, by the Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.
D. NEMA: National Electrical Manufacturers' Associates, Publication Number LD3, latest-edition
E. NIST: National Institute of Standards and Technology
F. NWMA: "Industrial Standard" National Woodwork Manufacturer's Association.
G. PS: Product Standard of the U. S. Department of Commerce
H. WI: Woodwork Institute

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
B. Product Data.
    1. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.
    2. Submit 2 copies of Manufacturer's current specifications for Modular Casework including all types of cabinets and accessories included in this section to the Architect for approval prior to fabrication.
C. Shop Drawings.

1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, seam locations, components, and location and size of each field connection.
2. Shop Drawing format in accordance with NAAWS Section 1, Submittals and WI's Certified Compliance Program.
    a. The shop drawings for the modular casework shall comply with and bear the WI CERTIFIED COMPLIANCE LABEL.
    b. Each elevation of casework, each laminated plastic top, and each solid surface top shall bear a WI CERTIFIED COMPLIANCE LABEL.
    c. Indicate spacing of all hardware accessories for Architect's review of layout.
    d. On casework and countertop elevations show the location of backing required for attachment within walls.
    e. Before delivery to the jobsite the woodwork supplier shall provide a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the millwork products being supplied and Certifying that these products fully meet the requirements of the Grade or Grades specified.
    f. At completion of installation the woodwork installer shall provide a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
    g. All fees charged by the Woodwork Institute for their Certified Compliance Program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.

D. Samples.
1. Provide nominal 2" x 3" sample chains of manufacturer's Transparent Wood Finishes to match existing cabinetry.
    a. Coordinate with Specification Section - PAINTING, and submit color samples of manufacturers full color range of transparent finishes for the wood species to match existing.
2. Provide nominal 2" x 3" sample chains of manufacturer's non-premium and premium laminate color selection lines.
    a. Submit color samples of Manufacturer's full color and pattern range (including wood grains) of non-premium and premium priced High Pressure Decorative Laminate to the Architect for color selection prior to fabrication.
        1) See drawings for high pressure decorative laminate color selection.
    b. Submit color samples of high density overlay thermal-fused melamine for color selection by the Architect.
        1) Samples shall be equivalent to SELPLY products, from their full color range selection chain of colors.
    c. Provide finish color selection samples of Pilaster Standard. Specified colors subject to change.
3. Mock-up as described elsewhere in this section.

E. Quality Assurance/Control Submittals:
1. Certificates:
    a. Submit three (3) copies of the following:
        1) Before delivery to the jobsite, the modular cabinetwork supplier shall issue a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the modular cabinetwork products and/or fabrication of products to be furnished for this project shall meet fully all the requirements of the grade or grades specified.
        2) Upon completion of inspection of installation by WI Inspector, a WI CERTIFIED COMPLIANCE CERTIFICATE shall be furnished for the installation.
    b. Submit three (3) copies of a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.

2. Labels:
    a. Each plastic laminate countertop supplied shall bear the WI CERTIFIED COMPLIANCE LABEL.

1.5 QUALITY ASSURANCE

A. Qualifications:
    1. Material Qualifications:
        a. Grades as indicated on the drawings in accordance with the specifications, rules and details or casework of the NAAWS Sections 5 "Finishing," 10 "Casework," and 11 "Countertops," unless the drawings and these specifications modify said standards.
            1) See Appendix" for "Cabinet Design Series" (CDS) Number System used on Modular Casework Schedule.
        b. Laminated Plastic Countertops, Splashes, and Wall Paneling in accordance with NAAWS Section 11 "Countertops."
    2. Installer Qualifications:
        a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
    3. Manufacturer/Supplier Qualifications:
        a. Firm(s) experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
        b. All modular Cabinet Work must be done by a Single Source WI licensed manufacturer and be able to provide a WI Certified Compliance Certificate.
        c. Participation in Woodwork Institute Quality Assurance Program:
            1) If supplier is WI Accredited Millwork Company (AMC) in good standing:
                a) Comply with WI CERTIFIED COMPLIANCE PROGRAM (CCP).
                b) Provide WI Director to inspect installation on-site.
            2) If supplier is not WI Member Licensee in good standing:
                a) Comply with WI MONITORED COMPLIANCE PROGRAM (MCP).

B. Regulatory Requirements:
    1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
        a. CBC All hardware for casework shall meet CBC Section 11B-309.4 and 11B-811.4.
        b. California ARB ATCM California Air Resource Board’s Air Toxics Control Measure for Composite Wood, 17 CCR 93120

C. Mockups:
    1. Prior to fabricating or installing Modular Cabinet Work, construct a mockup to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Provide one lower cabinet with drawer, and one upper cabinet, with all examples of hardware for both lower and upper cabinets.
    2. Provide mock-up of exposed and interior cabinet surfaces with Pilaster Shelf Standard for review and comment prior to fabrication. Color selection of Pilaster may be subject to change.

D. Meetings:
    1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
        a. Coordinate the work with all other related work
        b. identify potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
        c. Review the locations of backing required for casework installation as shown on the casework shop drawings and the Contract Documents.
        d. Review the method of attachment of the backing to the wall system as shown on the Contract Documents.

2. Progress: Scheduled by the Contractor during the performance of the work.
    a. Review for proper installation of work progress.
    b. Identify any installation problems and acceptable corrective measures.
    c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
    a. WI Inspector, Project Inspector, and the Architect shall inspect and identify any problems that may impede issuance of warranties or guaranties.
    b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Hardware products (not already applied) must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Casework products must be free from scratches, gouges, or any other marring or discoloration.
3. Damaged products will not be accepted.

C. Storage and Protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in compliance with PROJECT CONDITIONS below.
    a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
1. Humidity and Temperature: Maintain humidity and temperature in the space to receive products between 45 percent to 65 percent at a temperature of 60 degrees to 90 degrees F. Equilibrium Moisture Content of the wood product conditions shall be maintained between 8 percent and 12 percent. Maintain these requirements for four (4) days minimum prior, during, and following installation in accordance with manufacturer's written recommendations. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and the turn-over of the building or facility to the Owner.

1.8 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 1 Year.
1. In accordance with manufacturer's written standard warranty.

C. Installer's Warranty: 1 Year.
1. In accordance with the terms of the Specification Section - WARRANTIES

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 CABINET MATERIALS

A. Exposed Materials:
   1. General:
      a. In accordance with NAAWS Section 4 - Sheet Products.
      b. Minimize seams.
   2. Laminate Systems:
      a. High Pressure Decorative Laminate:
         1) Specified: **WILSONART** “Type CLS”.
      b. Decorative Laminate:
         1) Horizontal Surfaces:
            a) Specified: **WILSONART** “Post-formed Grade HGP (0.042")”.
         2) Vertical Surfaces:
            a) Specified: **WILSONART** “Grade VGP (0.027")”.
            b) Pattern direction: Vertical, unless otherwise noted.
      c. Edgebanding:
         1) Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 0.5 mm thick elsewhere. Color to match adjacent material.
   3. Wood Veneer Systems:
      a. Match existing: Species, cut, and grade to match existing modular casework.
      b. New construction: Premium grade match, uniform color, "well matched."
      c. Edgebanding:
         1) Typical: Rigid PVC extrusions, coordinate color with wood veneer finish, 3 mm thick at doors and drawer fronts, 0.5 mm thick elsewhere. Color to match adjacent material.
         2) Music Cabinet Construction: Rigid PVC extrusions, coordinate color with wood veneer finish, 5 mm thick at doors and drawer fronts, 0.5 mm thick elsewhere. Color to match adjacent material.

B. Semi-Exposed Materials:
   1. Cabinet Liner:
      a. Low Pressure Thermal-fused:
         1) **AMERICAN LAMINATE, PANELAM, or ROSEBURG FOREST PRODUCTS**.
      b. Complying with requirements of ISO 4586, Grade CLS.
   2. Edgebanding:
      a. Rigid PVC extrusions, through color with satin finish.
         1) Typical: 0.5 mm thick.
         2) Front edge of shelves and all edges of drawers: 3 mm.

C. Concealed Materials:
   1. Medium Density Fiberboard (MDF): ANSI A208.2.
      a. Grade 130.
      b. Grade 155.
   2. Particleboard: ANSI A208.1, Grade M-2.
      a. 44-50 lb Industrial Grade core.
      b. Thickness Swell max: 5.5 percent.
   3. Veneer Core Hardwood Plywood (VCHP):
      a. No internal voids.
      b. MDF cross bands to limit telegraphing of core grain is acceptable.

2.3 COUNTERTOP MATERIALS

1. Solid Surface:
   a. Solid Surfacing: **E.I.DuPONT.**
   b. Decorative synthetic marble of solid (mineral and acrylic filled) Methyl Methacrylate.

2.4 PLASTIC FABRICATIONS

A. General:
   1. Rate of Burning (ASTM D635). Material must attain CC1 Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.
   2. Self-Ignition Temperature (ASTM D1929). Material must have a Self-ignition temperature greater than 650 deg F.
   3. Density of Smoke (ASTM D2843). Material must have a smoke density less than 75 percent.
   4. Flame spread and Smoke developed testing (ASTM E84). Material must be able to meet a level of Class A (Flame spread less than 25 and smoke less than 450) at thickness of 1 inch.
   5. Room Corner Burn Test (NFPA 286). Material must meet Class A criteria at 1/4" thickness as described by the latest International Building Code.
   6. Extent of Burning (UL 94). Must submit UL card.
   7. Impact strength. Minimum impact strength test as measured by ASTM D3763 of 20 ft. lbs. (for durability, shipping, installation, and use).
   8. Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004 at 1/8" thickness.
   9. UPITT Test for Combustion Product Toxicity: Product must be recorded as "not more toxic than wood."

2.5 FASTENERS

A. Per NAAWS.

B. Corrosion resistant fasteners throughout the assembly of modular casework.

C. Countersunk Finishing Washer: surface-mounted, beveled washer with a shallow concave shape, designed to sit flush with the surface, providing even pressure distribution and a smooth, clean finish around fasteners.

D. Confirmat screws.

2.6 FABRICATION

A. General:
   1. In accordance with NAAWS Section 10 - Casework, Custom Grade, as amended by the Contract Documents.
   2. Interface Style, Frameless: Flush Overlay.
   3. Seismic Force Requirements - The types of construction approved by WI that meet CBC Title 24 seismic force requirements are: Lock Joint, Dowled, Dowled / Screwed Construction, Rabbeted Construction, Confirmat Screws, Fully Plowed-in Back, and Backs Screwed on in rabbeted ends, tops, and bottoms. The exact method for seismic force construction is available from WI.
   4. Construct openings and backing as required for work done under Division 22 PLUMBING (sinks, plumbing, etc.) and Division 26 ELECTRICAL (outlets, switches, wiring, etc).
      a. Exposed Edges: All exposed edges shall be sealed; including sink cut-outs and bottom edges of front edges.
   5. Cabinets ganged together or attached to the wall shall be attached with countersunk screws to prevent binding of shelves when provided later.
   6. Any vertical or horizontal plane surface less than four (4) foot wide and ten (10) foot long shall be faced with one continuous sheet with the intent to minimize the number of seams throughout the work, in compliance with NAAWS Section 8 "Wall Surfacing."
   7. Exposed ends, panels, and back panels shall flush out with face of doors and drawer fronts.

B. Cabinets:
   1. Cabinet box:

a. Bottoms and Ends of Cabinets: 3/4-inch particleboard.
b. Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard.
c. Backs of Cabinets: Particleboard.
   1) Concealed Backs: 1/4" minimum.
   2) Exposed Backs: 1/2" minimum.

2. Filler Strips:
   a. Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.
3. Shelving System:
   a. All shelving must be manufactured according to NAAWS for Schools, Hospitals and Library or Book Shelving. 50 lbs./SF.
   b. Shelf Support System:
      1) Metal Shelf Standards:
         a) Surface mount with screws.
         b) Shelves shall be full widths of openings, flush with inside face of cabinet doors, and dadoed around shelf standards to prevent movement during seismic events.
      2) Bored Hole Shelf Rest Systems:
         a) 5mm diameter holes drilled approximately 8 mm deep, 32 mm o.c.
         b) The front and rear row of holes shall be 37 mm from the front and rear edge of the cabinet.
         c) Provide full cabinet height holes at 32 mm o.c. in each row to allow maximum flexibility of the user to arrange shelves.
      3) Provide four clips for each shelf.
   c. Shelves: Veneer Core Hardwood Plywood.
      1) Span less than 25-inches: 3/4-inch.
      2) Span greater than 25-inches: 1-inch.
      3) Library shelves of any span: 1-inch thick.
4. Doors:
   a. Doors: 11/16 inch core, 3/4 inch thick finished.
      1) Core material: MDF grade 130.
   b. Large doors: 1 inch core, 1-1/16 inches thick finished.
      1) Large doors are more than 48 inches high and more than 24 inches wide.
      2) Core material: MDF grade 155.
   c. Stiles and Rails of Glazed Doors: 3/4 inch thick.
      1) Core material: Particleboard.
   d. Hinges:
      1) Let in 1/8 inch reveals for institutional hinges.
      2) Up to 48" high Doors: 3 hinges unless otherwise indicated on the drawings.
      3) 48" to 80" high Doors: 4 hinges unless otherwise indicated on the drawings.
      4) Door higher than 80": 5 hinges unless otherwise indicated on the drawings.
5. Drawers:
   a. Drawer Fronts: 3/4-inch Particleboard.
   b. Drawer Sides and Backs: 1/2-inch Veneer-Core Hardwood Plywood.
      1) Joined using Confirmat Screws in lieu of dowels.
   c. Drawer Bottoms: 1/2-inch Veneer-Core Hardwood Plywood glued and dadoed into front, back, and sides of drawers.
   d. File Drawers / Lateral File Drawers:
      1) Sides: 3/4-inch Veneer-Core Hardwood Plywood.
      2) Bottoms: 5/8 inch Veneer-Core Hardwood Plywood.
      3) Sides and bottoms shall be secured using 2-inch Confirmat screws.
   e. Security Panels: 1/2-inch Veneer-Core Hardwood Plywood.

1) Provide Security Panels above and below all locking drawers.

6. All drawers and doors shall be locked, keyed alike in each room and with building masters and grand master.
   a. Each room shall be keyed alike:
      1) Provide 4 keys per lock.
      2) Provide 6 master keys.

C. Countertops:
1. General: In accordance with NAAWS Section 11 -- Countertops, as amended by the Contract Documents.
2. Laminate Countertops:
   a. Standard: In accordance ISO 4586.
   b. Strength: 3/16 inch maximum deflection with 150 pound load at midspan.
   c. Surface Material: Plastic Laminate.
   d. Backing Material: Cabinet Liner.
   e. Core: 3/4-inch Particleboard.
   f. Front Edge: Self-edge build-up with drip groove edge.
   g. Front Edge: Seamless waterfall with drip groove edge.
   h. Back Splash: 6 inch integral cove splash, unless otherwise indicated on the drawings.
   i. End Splash: 6 inch butt end splash, unless otherwise indicated on the drawings.
   j. Top of Splash: Square Edge.
   k. Exposed Edges: All exposed edges shall be sealed; including sink cut-outs & bottom edges of front edges.
3. Solid Surface:
   a. Solid Surface thickness: 1/2 inch at counter and back splash.
   b. Core: Veneer-Core Plywood - see drawings for thickness required.
   c. Front Edge: Build up with drip groove edge.

D. Fabrications:
1. Solid Surface:
   a. Various locations: Thickness as noted on drawings.

2.7 HARDWARE

1. See schedule at the end of this section for typical cabinet hardware.
2. Hardware shall be furnished and installed as required to provide a complete casework installation for overlay construction, unless noted otherwise.
3. Provide metal strike at locks.
4. Finish: BHMA 626 (26D), unless otherwise noted.

2.8 COUNTERTOP SUPPORTS

A. Steel Support Angle and Base Plate:
1. Single-piece construction: All welded ground smooth, flush and level.
2. Finish: Galvanized.
3. Angle material to be A36 (Fy=36ksi).
4. Plate material to be A36 (Fy=36ksi).
5. All welding to conform to NAAWS and shall be done by certified welders.
6. All work shall conform to the latest edition of the American Institute of Steel Construction.

B. Specified: **RAKKS** (EH Series Counter Support Brackets):
1. EH-1818 for counter depths up to 25"; suitable for surface mounted conditions.
2. EH-1824 for counter depths up to 30"; suitable for surface mounted conditions.
3. EH-1818FM for counter depths up to 25"; suitable for flush mounted conditions.
4. EH-1824FM for counter depths up to 30"; suitable for flush mounted conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual, which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work specified under this specification section.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
      a. Provide experienced, factory trained craftspeople under manufacturers direct supervision.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. The entire installation shall present a first class, workmanlike appearance, without open joints, tool marks or other blemishes, and subject to the Architect's approval.
   5. Edges of cutouts, subject to excessive moisture, shall be sealed with a color-toned (for verification), water-resistant sealer before trim or sink rims are installed.

B. Layout:
   1. Set plumb, level, and to true lines as shown on the drawings.
   2. Filler panels and scribe strips or moldings, as required, shall be properly scribed to adjacent work and securely attached to cabinets as indicated on the drawings.

C. Anchorage:
   1. The backs of the cabinets shall be secured to the wall backing.
   2. Refer to the Drawings for the backing and anchorage details.

D. Cabinet Bases:
   1. Toe Kick: Cabinet base shall be set back from the face of the cabinet 3-inches, or as indicated
   2. Cabinet sides: Cabinet shall be set 3/8-inch back from the face of the cabinet.

3.4 FIELD QUALITY CONTROL

A. Inspection:
   1. Schedule WI inspection with a minimum of 7 days notice of planned installation.

2. Schedule inspections and notify the Architect, Owner's Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 ADJUSTING

A. Test and adjust carpentry hardware. Replace damaged or malfunctioning controls and equipment.

3.6 CLEANING

A. Clean in accordance with Specification - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. In accordance with manufacturer's written instructions and recommendations.
   3. Finish shall be clean and ready for the application of any additional finishes.

3.7 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.8 SCHEDULES

A. Hinges:
   1. Specified: **ROCKFORD PROCESS**.
      a. #374 for 3/4" side panel x 3/4" thicknesses.
      b. #376 for 3/4" side panel x 13/16" thicknesses.
   2. Institutional Hinges for Overlay doors, 2-3/4" five knuckle with hospital tips and 2-5/8" extended side panel wing:

B. Pulls:
   1. Specified: **JAMISON** “SWP4-26D”.
   2. Steel Wire "U" Shaped - 4" centers, 1-1/4" Projection from face of drawer or door.

C. Locks:
   1. Locks, Hinged Doors and Drawers for Overlay Construction:
      a. Specified: **COMP X NATIONAL** “#C8053”.
      b. Alternate: **OLYMPUS LOCK, INC.** “#DCN”.
      c. Provide compatible strike.
   2. Locks, Hinged Doors and Drawers for Overlay Construction:
      a. Specified: **OLYMPUS LOCK, INC.** “#DCN as required”.
      b. Alternate: **COMP X NATIONAL** “#C8053”.
      c. Provide compatible strike.

D. Drawers:
   1. Drawer Slides up to 24 inches Wide:
      a. Pencil Drawers:
         1) 65 lb capacity, full extension, lever disconnect:
            a) Specified: **ACCURIDE** “2632”.
            b) Alternate: **KNAPE AND VOGT** “4400”.
      b. General Purpose Drawers:
         1) 100 lb capacity, full extension, rail mount disconnect:
            a) Specified: **ACCURIDE** “7432”.
            b) Alternate: **KNAPE AND VOGT** “8400”.
      c. File Drawers:
         1) 150 lb capacity, full extension, rail mount disconnect:

a) Specified: **ACCURIDE** “4032”.
b) Alternate: **KNAPE AND VOGT** “8500”.

2. Drawer Slides over 24 inches Wide:
   a. Pencil Drawers:
      1) 100 lb capacity, full extension, push latch disconnect:
         a) Specified: **ACCURIDE** “3732”.
         b) Alternate: **KNAPE AND VOGT** “8400”.
   b. General Purpose Drawers:
      1) 150 lb capacity, full extension, rail mount disconnect:
         a) Specified: **ACCURIDE** “3641”.
         b) Alternate: **KNAPE AND VOGT** “8500”.
   c. File Drawers:
      1) 200 lb capacity, full extension, rail mount disconnect:
         a) Specified: **ACCURIDE** “3642”.
         b) Alternate: **KNAPE AND VOGT** “8800”.
3. File Frames for File Drawers & Lateral File Drawers.
   a. Specified: **COMPX TIMBERLINE** “File Frame System”.

E. Shelf Supports:
1. Adjustable Shelf Supports (zinc die-cast nickel plated supports):
   a. Specified: **HETTICH** “#1 005 767”.
   b. Alternate: **HAFELE** “#282.24.720”.
2. Adjustable Shelf Pilaster Standard and Shelf Supports:
   a. Specified: **KNAPE & VOGT** “#255 – WH / BRN”.
   b. 19-gage x 5/8" wide x 3/16" high.
      1) Epoxy-Coated White at interior cabinet surface locations.
      2) Brown at exposed cabinet surface locations.
   c. Shelf Supports:
      1) Specified: **KNAPE & VOGT** “#239 ZC (Zinc Coated)”.
3. Adjustable Shelf Supports (zinc die-cast nickel plated supports) for glass shelves:
   a. Specified: **HETTICH** “#1 010 564”.

F. Miscellaneous Hardware:
1. Magnetic Catcher:
   a. Specified: **AMEROCK** “#BP9783-AL”.
   b. Alternate: **KNAPE AND VOGT** “#918-AL”.
   c. Alternate: **EPCO** “592”.
2. Wardrobe Clothes Pole:
   a. Specified: **KNAPE AND VOGT** “Pole, 1-1/16"O.D., I.D. 29/32" SS tubing : #KV660”.
   b. Specified: **KNAPE AND VOGT** “Wall Supports per tube length #KV734 and #KV735”.
3. Tote Trays: High impact polystyrene with cardholder, 4-1/4 x 12-3/4 x 18-3/4 inch size.
4. Joint Closure:
   a. Specified: **PEMKO** “#313AN”.
5. Coat Hooks (Cast aluminum wardrobe hook):
   a. Specified: **IVES** “#E IVSP581A3”.
6. Exposed Fasteners: When exposed fasteners are used, provide zinc chromate coated oval head, self-tapping phillips screws with grommet finishing washers, same finish as screws.
7. Cabinet Catch (only when indicated on the drawings)
   a. Specified: **STANLEY** “#CD34”.
8. Grommets, Cable Managers and Cabinet Vents:

a. Provide grommets, cable managers and cabinet vents in various sizes, finishes and shapes, as indicated on the drawings and as otherwise required for a complete installation.
b. Specified: **DOUG MOCKETT & COMPANY, INC** “S/S-3 Grommet” .
c. A partial listing is provided below (for other listings, see the drawings):
    1) Specified: Wire Manager “#WN-2A”.
    2) Specified: Hair Dryer Holder at Printer Counter “#HD-1”.

END OF SECTION

SECTION 07 21 00 – INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Insulation, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 05 12 00 STEEL AND FABRICATIONS
5. 06 10 00 ROUGH CARPENTRY
6. 07 60 00 SHEET METAL
7. 08 11 00 METAL DOORS AND FRAMES
8. 09 24 00 CEMENT PLASTER
9. 09 29 00 GYPSUM BOARD
10. 09 50 00 ACOUSTICAL CEILINGS
11. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM C208 Cellulosic Fiber Insulating Board (Specification for)
2. ASTM C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method (Test Method for)
3. ASTM C518 Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus (Test Method for)
4. ASTM C533 Calcium Silicate Block and Pipe Thermal Insulation (Specification for)
5. ASTM C578 Rigid, Cellular Polystyrene Thermal Insulation (Specification for)
6. ASTM C665 Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing (Specification for)
7. ASTM C1289 Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board (Standard Specification for)
8. ASTM D1261 Effect of Grease on Copper (Standard Test Method for)
9. ASTM D1621 Compressive Properties of Rigid Cellular Plastics (Test Method for)
10. ASTM D1622 Apparent Density of Rigid Cellular Plastics (Standard Test Method for)
11. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
12. ASTM E136 Behavior of Materials in a Vertical Tube Furnace at 750 degrees C (Test Method for)

B. MIMA: Mineral Insulation Manufacturers Association

C. NFPA: National Fire Protection Association

D. TIMA: Thermal Insulation Manufacturers Association

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

1. Product Data on materials and accessories.

C. Quality Assurance/Control Submittals:

1. Manufacturer's Written Instructions:
   a. Submit three (3) copies of manufacturer's written instructions.

1.4 CLOSEOUT SUBMITTALS

A. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. In accordance with California Quality Standards.

B. The R values for the insulation materials shall be in accordance with "The Standard Mineral Wool Building Insulation" latest Edition of the MIMA.

C. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
    a. ASTM: American Society for Testing and Materials
    b. CDPH: California Department of Public Health, “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers”

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage of Materials:

1. All Materials shall be delivered and stored in original unopened packages with manufacturer's name and contents legibly indicated. Materials shall be stored in a dry place, and protected from damage.

1.7 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 1 Year.

1. In accordance with manufacturer's written standard warranty.

C. Installer's Warranty: 1 Year.

1. In accordance with the terms of the Specification Section - WARRANTIES

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 THERMAL BLANKET

A. Specified: **OWENS CORNING**

1. Alternate: **CERTAINTEED**
2. Alternate: **JOHNS MANVILLE**

B. Construction in accordance with the following:

1. Type I: Unfaced, Glass-Fiber Blanket Insulation: ASTM C665, Type I; ASTM E84, Flame spread: <25, Smoke-developed: < 50; passing ASTM E136, for combustion characteristics.
    a. Unless otherwise noted, blankets without vapor-retarder membrane coverings, used in Interior partitions not subject to moisture.
2. Type II: Kraft-faced, Glass-Fiber Blanket Insulation: ASTM C665, Type II (non-reflective faced), ASTM E84 Class C (faced surface not rated for flame propagation); Category I (membrane is a vapor barrier).

a. Unless otherwise noted, this type of insulation should only be used in conditions not "subject to view" (enclosed cavities) or in attics where a finished ceiling is provided and the attic is not used as a return air plenum.

3. Type III: Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C665, Type III (reflective faced), ASTM E84 Class A (faced surface with a foil-scrim or foil-scrim-kraft facing)
   a. Unless otherwise noted, this product shall be used when the attic (although enclosed by a finished ceiling) is used as a return air plenum, or used in "exposed-to-view" exterior and interior walls and ceilings or attics subject to moisture and fire-rated conditions.

C. Thermal Resistance (R) values required (minimum) for blanket insulation, unless otherwise indicated on the drawings:
   1. Roof Blanket Insulation: R-30.
   2. Wall Blanket Insulation: R-19.
   3. Floor Blanket Insulation: R-30.
   4. Attic Spaces: All attic spaces shall have continuous insulation of the proper type and with a minimum thermal resistance "R" value of R-30 for insulation only. Where attic spaces have vertical elements above ceilings, these shall be insulated as part of the attic space to R-30 minimum.

D. Thickness: No more than will fit into the space available without compressing. Where insulation is confined between finishes, which would compress the material, high efficiency insulation shall be used to provide the required resistance value.

2.3 SOUND BLANKET

A. Specified: **OWENS CORNING** “Ecotouch Sound Attenuation Batts”.
   1. Alternate: **CERTAINTEED**
   2. Alternate: **JOHNS MANVILLE**

B. Sound Attenuation Batts, unfaced, 2-1/2" batts for wood or metal frame construction, complying with ASTM C665, Type I, and ASTM E136.

C. Surface Burning: ASTM E84, Flame spread: <25, Smoke developed: <50.

2.4 DRAFT STOP

A. Specified: **THERMAFIBER** ”Thermafiber”.

B. Safing Insulation, 2" minimum to 4" thick, as required on the drawings. Provide manufacturer's written recommended fasteners as required for the specific installation requirements.
   1. Surface Burning: ASTM E84,
      a. Unfaced Safing Insulation: Flame Spread: 15, Smoke Developed: 0.
      b. Foil Faced Safing Insulation: Flame Spread: 25, Smoke Developed: 5.

2.5 RIGID BOARD

A. Foundation
   1. Specified: **DOW CHEMICAL COMPANY** “Styrofoam”.
   2. 3/4" thick " square edge, rigid board insulation.
      a. Per ASTM C578, Type IV with an average R-Value of 5.0 per inch when tested at 75 degree F mean temperature, and per ASTM C518.
      b. Provide manufacturer's written recommended fasteners and adhesive for substrate conditions.

B. Wall Board:
   1. Specified: **SIKA** RMAX "ECOMAXCI FR."
      a. Alternate: **ATLAS**.
      b. Alternate: **HUNTER**.
      c. Alternate: **JOHNS MANVILLE CORPORATION**.
      d. Alternate: **TREMCO**.
   2. Polyisocyanurate with front and back aluminum foil-facers.
   3. Rigid Polyisocyanurate: ASTM C1289, Type I, Class 1.

4. Compressive Strength: ASTM D1261, 25 psi.
5. R Value: ASTM C518, 6.0 per inch.
6. Fire Propagation: NFPA 285, Assembly pass.
7. Surface Burning: ASTM E84, Faced, Flame Spread: <25; Smoke Developed: <450.

C. Roof Board:

1. Specified: **SARNAFIL** “Sarnatherm ISO”.
    a. Alternate: **ATLAS**.
    b. Alternate: **HUNTER**.
    c. Alternate: **JOHNS MANVILLE CORPORATION**.
    d. Alternate: **TREMCO**.
2. Polyisocyanurate foam core with fiber reinforced felt facers.
3. Rigid Polyisocyanurate: ASTM C1289, Type II, Class 1, Grade 2, 20 psi.
4. LTTR R Value: ASTM C1289, 8.6 per 1.5 inches.
5. Surface Burning: ASTM E84, Flame Spread: <75; Smoke Developed: <450.

2.6 FOAMED-IN-PLACE INSULATION

A. Specified: **DOW CHEMICAL** “Great Stuff Pro”.

B. Low Pressure Type: Semi-flexible soft, single-component polyurethane sealant, to CAN/ULC-S710.1, and having the following properties:

1. Core Density: ASTM D1622, 1.7 pcf.
2. Surface Burning: ASTM E84, Flame spread: 10, Smoke developed: 20.
3. Color: Yellow.
4. Cure Time: Approximately 12 hours.
5. Tack Free Time: 6 - 9 minutes.
6. Applicator: Gun applied.

2.7 ACCESSORIES

A. Staples:

1. Hammer type.

B. Wire:

1. Sixteen (16) gage line wire.

C. All other materials such as fasteners (i.e. insulation netting, line wires, stick-pins), and retainers not specifically described, but required to complete the work, shall be as recommended by approved manufacturer, and installed by the Contractor. Contractor shall choose the appropriate fastener or system for the cavity space or area to be insulated without letting the insulation sag.

D. Poultry Netting:

1. Specified: As distributed by **INSULATION MATERIALS**.
2. 2" hexagonal, 20 gage galvanized in rated assemblies.

E. FSK Tape:

1. Specified: **VENTURE TAPE** as distributed by **INSULATION MATERIALS** “#1525CW.”

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. All building(s) shall have a complete thermal envelope of thermal blanket or rigid board insulation.
    a. Do not install insulation until the construction has progressed to the point that inclement weather will not damage or wet the insulation material.
    b. Install in accordance with manufacturer's written recommendations.
    c. Insulation shall fit snugly between framing members without voids. Fully insulate all areas between all framing members, cutting and fitting as required.

d. Attach insulation to inside face of framing members.
   1) Wood Framing: Friction fit to keep from falling down within wall cavity. Attach with Hammer Staples at 6 inches on center with minimum staple penetration of 3/8 inch when insulation has a membrane facing.
   2) Metal Framing: Friction fit to keep from falling down within the cavity and use line wire across metal studs. Omit wire and spot tape with FSK Tape when insulation has a membrane facing.

e. Vapor-Retarder Membrane: Shall be continuous and without unnecessary joints.
   1) At roof structure and exterior walls, after securing the insulation facing flanges, provide FSK Tape over all of the insulation facing butt joints and all overlapping facing flanges, so as to create a continuous vapor-retarder membrane at underside of the roof deck and inside of walls.
   2) Patch all tears, rips and holes in the vapor-retarder membrane.

f. Cut and fit insulation material around pipes, conduits and outlet boxes, as necessary to maintain the full integrity of the insulation.

B. At Roof Framing:
   1. Install thermal roof blanket Insulation between all exterior roof framing members.
      a. Wood Framing: Attach wire to framing with staples with minimum staple penetration of 5/8 inch.
      b. Metal framing: Attach with line wires perpendicular to framing at 12 inches on center.

C. At Wall Framing: Install thermal wall blanket insulation between all exterior wall framing members.

D. At Floor Framing: Install thermal floor blanket insulation between all exterior floor framing members.

E. Sound Insulation:
   1. Install sound attenuation batts between all interior wall framing members.
   2. Install sound attenuation batts between all floor framing members.

F. Draft Stop Insulation:
   1. Install Draft Stop Insulation where required.

G. Rigid Board Insulation:
   1. Install per manufacturer's written recommendations.
   2. Wall Board: Tape all edges as part of the rigid board system.

END OF SECTION

SECTION 07 60 00 – SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Sheet Metal materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 05 12 00 STEEL AND FABRICATIONS
5. 06 10 00 ROUGH CARPENTRY
6. 06 41 23 MODULAR CASEWORK
7. 07 21 00 INSULATION
8. 07 92 00 SEALANTS
9. 08 11 00 METAL DOORS AND FRAMES
10. 09 24 00 CEMENT PLASTER
11. 09 91 00 PAINTING
12. 10 05 00 MISCELLANEOUS SPECIALTIES

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip (Specification for)
2. ASTM A653 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process (Specification for)
3. ASTM B32 Solder Metal (Specification for)
4. ASTM B209 Aluminum and Aluminum-Alloy Sheet and Plate (Specification for)
5. ASTM B749 Lead and Lead Alloy Strip, Sheet, and Plate Products (Specification for)
6. ASTM D4586 Asphalt Roofing Cement, Asbestos Free (Specification for)

B. DOD: Department of Defense

C. LIA: Lead Industries Association

D. NRCA: National Roofing Contractors Association

E. SMACNA: Sheet Metal and Air Conditioning Contractor's National Association, Architectural Sheet Metal Manual; and Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines (“Kitchen Guidelines”).

F. SSPC: The Society of Protective Coatings

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Shop Drawings.

1. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.

1.4 CLOSEOUT SUBMITTALS

A. In accordance with Specification Sections in Division One:

B. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Work shall be in accordance with Standards and details set forth in latest edition of the SMACNA Manual and Specifications unless indicated otherwise.
      b. The roofing manufacturer and installer selected for this project will select the roof flashing material and detailing for all roof penetrations compatible with the roofing system used and the warranties required. The schedule for roofing penetrations at the end of this section and the details contained within the drawings are minimum standards required for this project.
   2. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements: In accordance with Specification Section - REGULATORY REQUIREMENTS.

1.6 PROJECT CONDITIONS

A. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.7 WARRANTY

A. Contractor's General Warranty: In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 5 Years.
   1. In accordance with Specification Section - WARRANTIES.

C. Installer's Warranty: 5 Years.
   1. Workmanship and Materials Warranty:
      a. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.
      b. The subcontractor shall warranty to maintain the roof flashing in a watertight condition for the period of years specified from the date of acceptance and shall be responsible for the repair of any failure that is the result of defects in materials and workmanship.
      c. The subcontractor shall obtain from the Roofing Installer and the General Contractor a co-endorsement of the Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 SHEET METALS

A. Steel Sheet: ASTM A653, Zinc-Coated, Commercial quality with 0.20 percent copper, G-90 hot-dip galvanized, mill phosphatized where indicated for painting; 0.0359 inch thick (20 gauge) minimum, except as otherwise indicated.

B. Lead Sheet: ASTM B749, Type L51121, copper-bearing sheet lead, minimum 4 lb/sq. ft. (0.0625 inch thick) minimum for burning (welding) unless otherwise indicated.

C. Aluminum Sheet: ASTM B209, Alloy 3003, temper H14, AA-C22A41 clear anodized finish.
   1. Gauge: 0.063 inches.
   2. Prepare anodized finish for application of primer and finish coats as indicated on the drawings.

D. Stainless-Steel Sheet: ASTM A167, Type 304, soft annealed, with No. 4 finish, except where harder temper is required for forming or performance; minimum 0.0625 inch thick (16 gauge), unless otherwise indicated.

2.3 REGLETS

A. Specified: **FRY REGLET CORPORATION**.

B. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

C. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

D. Plaster Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

E. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.

F. 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.

G. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
   1. Material: Galvanized steel, thickness matching material being installed, unless otherwise noted.

2.4 ACCESSORIES

A. Solder:
   1. For galvanized steel: ASTM B32, Grade Sn50, used with rosin flux.
   2. For stainless steel: ASTM B32, Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a noncorrosive rosin flux over tinned surfaces.

B. Stainless Steel Welding Rods:
   1. Type recommended in writing by stainless-steel sheet manufacturer for type of metal sheets furnished

C. Fasteners:
   1. Same material as sheet metal or other non-corrosive metal as recommended by sheet metal manufacturer, unless otherwise indicated on the drawings.
      a. Match finish of exposed heads with material being fastened.

D. Electrolytic Insulation:
   1. Asphalt Mastic:
      a. SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.
   2. Other electrolytic insulation materials:
      a. Asphalt impregnated felt, neoprene or EPDM rubber.

E. Sealants shall be in accordance with Specification Section - SEALANTS.
   1. Mastic Sealant:
      a. Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
   2. Elastomeric Sealant:
      a. Generic type recommended by sheet metal manufacturer and fabricator of components being sealed.

3. Epoxy seam sealer:
    a. 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.

F. Adhesives:
1. Type recommended by sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of sheet metal.

G. Metal Accessories:
1. Provide sheet metal clips, straps, anchoring devices, screens, mesh, and similar accessory units as required for installation of work, matching or compatible with material being installed; noncorrosive; size and thickness matching material being installed.

H. Roofing Cement: ASTM D4586, Type I, Verify with roofing material utilized for this project as being compatible with materials and roofing manufacturer's warranty requirements.

I. Gutter Sealing System:
1. Primer: Suitable for metal gutter metal type and compatible with Coatings and Fabrics.
2. Base, Intermediate and Finish Layer Coating:
3. Base Layer Fabric: Polyester Fabric compatible with primer and coatings.

J. Penetration Flashing:
1. Specified: **GCP** “VYCOR V40”.
    a. Alternate: FORT-I-FIBER “Fort-I-Flash 40”.
    b. Alternate: TYVEK “FlexWrap and Straight Flash”.
2. Self-Adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A, 40 mil. minimum thickness, in 9 inch and 12 inch widths as is appropriate for the barrier application.

K. Ice And Water Shield:
1. Specified: **GCP** “ICE and WATER SHIELD HT”.
    a. Alternate: **CARLISLE COATINGS & WATERPROOFING** “CCW WIP 400”.

2.5 FABRICATION

A. Sheet Metal Fabrication Standard: Fabricate sheet metal to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
1. Comply with details shown to fabricate sheet metal that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
2. Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
3. Seams:
    a. Fabricate nonmoving seams in sheet metal with "Drive Cleat" or "Lock" seams.
4. Expansion Provisions:
    a. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.
    b. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
    c. Gutter Expansion control and design, unless otherwise indicated on the drawings:
        1) Ends of a gutter shall occur no more than 50 feet apart with at least one downspout in between, and gapped in accordance with Chapter 1, Table 1-7.
        2) Adjacent ends shall be telescoped or enclosed with covers in a manner to accommodate expansion as indicated in Chapter 1, Fig. 1-5 to 1-7 and 1-10.
5. Sealed Joints:

a. Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

6. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
7. Conceal fasteners and expansion provisions where possible.
   a. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
8. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
   a. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.6 FINISHES

A. Galvanized Repair Paint:
   1. Specified: **RECTORSEAL**.
B. Shop Finishing:
   1. All exterior galvanized sheet metal, unless specified otherwise, shall have all surfaces, except surfaces receiving roofing felt, properly cleaned and prepared and then painted with one coat Galvanized Metal Primer prior to installation.
   2. Galvanized Metal Primer:
      a. Specified: **DEVOE COATINGS PAINT** “4020PF DEVGUARD”.
   3. Galvanized repair paint: High-Zinc-Dust-Content, in accordance with SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
   3. Prime substrates as required by manufacturer's written instructions and recommendations.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.
   5. Structurally reinforce and anchor work as required.
   6. Work shall be weather and water tight as required.
   7. Where dissimilar metals come into surface contact, cover surface in contact with electrolytic insulation.
   8. Immediately following installation, and prior to roofing application, the metal will be primed with a quick drying primer compatible with roofing system installed and in compliance with roofing manufacturer's warranty requirements.

B. Layout:
   1. Lines shall be straight and true.
   2. Field mitered joints shall be neat, true to line, and water tight.
   3. Fastening: In accordance with approved shop drawings.
   4. Sealants: Seal all joints with sealant.

C. Assistance:
   1. Installation shall be in direct consultation and review of roofing system manufacturer where applicable.

D. Penetration Flashing:
   1. Apply Penetration Flashing in conjunction with Water Barriers, Metal Accessories and all other related work.
   2. Install Penetration Flashing at all openings and penetrations at all exterior walls and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e., Toilets, Showers, Lockers, Kitchens, etc.).
   3. Install Penetration Flashings with Water Barriers, Metal Accessories and all other related work in "shingle" or "weatherboard" fashion.
   4. Penetration Flashings shall be installed as required in CBC Sections 1404.4 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination of Sheet Metal Systems.
      a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
      b. When an object extends through the Sheet Metal System, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
   5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Finish shall be clean and ready for the application of any additional finishes.

3.5 SCHEDULES

A. Architectural Sheet Metal Items: Items visible from the interior occupied spaces and from all exterior viewing positions. Fabrication of all Architectural Items shall provide a fully finished appearance on all visible surfaces. Fabrication shall be soldered or welded joints and ground smooth. Solid flat head riveted joints may be used if necessary, but limited in use and must be indicated on the shop drawings by the fabricator, and accepted by the Architect. The use of sheet metal screws, pop rivets, or bolts are not be permitted. All joints between section shall be uniformly gapped with a maximum of 1/16" and splice backing shall be centered on the joint.

B. Utility Sheet Metal Items: Items not visible from the interior occupied spaces nor from exterior viewing positions. Fabrication of all Utility Items shall be in accordance with SMACNA Standards and shop practices.

C. Sheet Metal Schedules are not considered as a complete list. Refer to Drawings for locations of all conditions requiring sheet metal items.

D. Multiple types of material are specified for various items in the Schedules. Verify with roofing manufacturer as to which material shall be used to be compatible to the roofing material provided and to satisfy roofing warranty requirements.

E. Materials gauges specified for Items in the Schedules are minimum and shall be provided unless otherwise noted on the Drawings.

F. Schedule's Remarks / SMACNA No., 6th Edition, and are references of the standards for fabrication. Refer to Drawings for configurations and other fabrication requirements of sheet metal items.

G. Architectural Sheet Metal Items

ARCHITECTURAL **SHEET METAL ITEMS**					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Parapet Cap	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4A or Fig. 3-4G with E-1 and E-4 edge styles, as indicated on drawings. Provide J9 "Drive Cleat" joints, typical.
Cap Coping	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4G with E-4 edge style, as indicated on drawings. Provide J9 "Drive Cleat" joints, typical.
Drip Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover. Provide J2 "Butt & Backup Plate" joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Counter Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover with 3/4" hemmed drip. Provide J2 "Butt & Backup Plate" joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Opening Heads, Jambs & Sill Flashing	Metal Frames	Steel	22	Shop	Weld and Grind smooth all joints
Opening Heads, Jambs & Sill Flashing	Aluminum Windows	Alum	0.0253	Match Aluminum Window Finish.	Seal all joints.
Opening Heads, Jambs & Sill Flashing	Storefront	Alum	0.0253	Match Storefront Finish.	Seal all joints.
Opening Heads, Jambs & Sill Flashing	Curtain Wall	Alum	0.0253	Match Curtain Wall Finish.	Seal all joints.
Wall Penetration Flashing	Exterior Wall	Steel	22	Shop	Similar to Chapter 6, Figures 6-36, 37, 38 & 39.
Scuppers	Parapet Wall	Steel	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.
Gutters	Exterior	Steel	18	Shop	Chapter 1, Fig. 1-1. Provide expansion joints similar to Fig. 1-7. Solder overflow and downspout outlets.
Gutters	Concealed	Stainless Steel	18	Shop	Chapter 1, Fig. 1-1. Provide expansion joints similar to Fig. 1-7. Solder overflow and downspout outlets. Continuous welds.
Conductor Head	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-25. Solder downspout outlet.
Down Spouts	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-31, 1-32A or B. Provide Fig. 1-35B or J hangers.
Fascia Panels	Exterior	Steel	18	Shop	Weld and grind smooth all joints.
Color Band	Exterior	Steel	18	Shop	Weld and grind smooth all joints.

ARCHITECTURAL **SHEET METAL ITEMS**					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Panels					

H. Utility Sheet Metal Items

UTILITY **SHEET METAL ITEMS**					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
Clips & Cleats	Various Conditions	Steel	22	Shop	
Parapet Boot Flashing	Parapet Cap & Cap Coping	Steel	18	Shop	Solder all joints. Minimum 4" under finish and min. 4" cover.
Counter Flashing	Various Conditions	Steel	22	Shop	Minimum 4" under finish and min. 4" cover with ¾" hemmed drip. Provide J2 "Butt & Backup Plate" joints with 1/16" gap. Fabricate Transition pieces and End Caps.
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "ST" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "STX" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Structural Support Flashing	Roof Penetration	Steel	18	Shop	Chapter 4, Similar to Figures 16A or B or C if welded or soldered, and grind smooth.
Vent Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Fig. 4-15B.
Pipe or Conduit Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, similar to Figure 4-15C.
Multiple Pipe or Conduit Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop Or Shop	Chapter 4, similar to Figure 4-15A or 4-15B.
Insulated Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.
Mechanical Flue Pipe Flashing	Roof Penetration	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.
Manufactured Curb Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Hatch Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Ventilating Units Flashing	Roof Penetration	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Scuppers	Parapet Screens	Steel.	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.
Roof Splash Pans	Roof	Steel.	22	Shop	Chapter 1, Fig. 1-36, 2-rib corrugation section..
Valley Flashing	Metal Panel Roof	Steel.	22	Shop	Chapter 6, Similar to Fig. 6-6 or Fig. 1-21 or Fig. 1-23, Detail 10, or Fig. 6-9, Detail 7 and

UTILITY **SHEET METAL ITEMS**					
ITEM	**LOCATION**	**MAT.**	**GA.**	**FINISH**	**REMARKS / SMACNA NO., 6th Edition**
					Chapter 4, Fig. 4-10.
Built-in Gutter	Metal Panel Roof	S.S.	16	Shop	Chapter 1, similar to Fig. 1-4 or Fig. 1-21 or Fig. 1-23. Provide expansion joint similar to Fig. 1-8. Weld and grind smooth all joints.
Louver Screens	Louvered Openings	Steel.	14	Shop	Chapter 7, Fig. 7-7A or B. Provide 12 gauge (0.105) 3 x 3 welded wire mesh.
Plumbing Sheet Metal	Various Plumbing Conditions	Steel.	22	Shop	Refer to Plumbing Drawings and Specifications.
Mechanical Sheet Metal	Various Mechanical Conditions	Steel.	22	Shop	Refer to Mechanical Drawings and Specifications.
Electrical Sheet Metal	Various Electrical Conditions	Steel.	22	Shop	Refer to Electrical Drawings and Specifications.
Roof and Overflow Drain Pans	Roof	Lead	#4	Shop	See Details.
Mechanical, Large Flue Flashing	Roof Penetration	Steel	22	Shop	Chapter 4, Detail 4-14A.

END OF SECTION

SECTION 07 84 00 – FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Firestopping (a.k.a. Through-Penetration Firestop Systems) materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 03 30 00 CAST-IN-PLACE CONCRETE
4. 04 22 00 CONCRETE MASONRY UNITS
5. 05 12 00 STEEL AND FABRICATIONS
6. 06 10 00 ROUGH CARPENTRY
7. 07 21 00 INSULATION
8. 09 24 00 CEMENT PLASTER
9. 09 29 00 GYPSUM BOARD
10. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
11. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
2. ASTM E119 Fire Tests of Building Construction and Materials (Test methods for)
3. ASTM E814 Latex Sealants (Specification for)

B. UL: Underwriters Laboratory Inc.

1. Fire Resistance – Volume 2A.
2. Fire Resistance – Volume 2B.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.

B. Product Data.

1. Provide the manufacturer's full-line of products showing the UL Number listings and the products associated for each UL Number Listing.
    a. The installer shall pick from the manufacturer selected for this Project the appropriate firestopping system from the manufacturer's full-line product catalog and compile a record of each penetration indicating compliance with the firestopping UL Number used.

C. Shop Drawings:

1. For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.
    a. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each firestopping system configuration for construction and penetrating items.

1.4 QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Design Data.

B. Product Test Reports: From a qualified testing agency indicating firestopping system complies with requirements, based on comprehensive testing of current products.

C. Certificates:

1. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's) and are nontoxic to building occupants.
2. Product Certificates: Signed by manufacturers of firestopping system products certifying that products furnished comply with requirements.

D. Manufacturer's Written Instructions.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
   1. Record Documents shall consist of the compilation of actual firestopping UL Numbers used along with the comparable Manufacturer's Product associated with that UL Number, indicating the actual location of the firestopping installation within this project.

B. Warranty in accordance with Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. All products shall have UL Number Listings and be approved and listed by the California State Fire Marshal.
   2. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
   3. Manufacturer/Supplier Qualifications:
      a. Manufacturer shall demonstrate a full-line of firestopping products capable of meeting the conditions associated with the scope of this Project, that have UL numbers and be approved and listed by the California State Fire Marshal.
      b. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
   4. In accordance with Specification Section - REGULATORY REQUIREMENTS.

1.7 DELIVERY, STORAGE, AND HANDLING

1. Packing, shipping, handling, and unloading:
   a. Products shall be individually wrapped.
   b. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted.
2. Acceptance at Site:
   a. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   b. Damaged products will not be accepted.
3. Storage and protection:
   a. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

2. Ventilate firestopping per firestopping manufacturers' written instructions by natural means or, where this is inadequate, forced air circulation.
3. Existing Conditions:
   a. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   b. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.9 SEQUENCING AND SCHEDULING

A. Notify Owner's inspection agency at least one (1) week in advance of firestopping installations; confirm dates and times on days preceding each series of installations.

B. Do not cover up firestopping installations that will become concealed behind other construction until Owner's inspection agency and authorities having jurisdiction have examined each installation.

1.10 WARRANTY

A. Contractor's General Warranty: In accordance with Specification Section – WARRANTIES.

B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.

C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section - WARRANTIES:

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide only products that when securely installed are capable of maintaining their integrity when subjected to the time-temperature curve of CRSC, Table 12-7-3A. System hourly ratings indicated on the drawings include wall, ceiling, floor or roof:
   1. Firestopping F-ratings: ASTM E814, not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated and UL 479.
   2. Firestopping T-ratings (in addition to F-ratings): ASTM E814, where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas.
   3. Joint sealants with fire-resistance: ASTM E119, with hose stream test, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
   4. Firestopping systems exposed to view, traffic, moisture, and physical damage: Products that after curing do not deteriorate when exposed to these conditions both during and after construction.
   5. Surface burning: ASTM E84, Class A, Flame-spread <25, Smoke-developed <450.
   6. "L" Rating where penetrating Smoke Barrier for Walls & Floors, per CBC 714.5, and CBC 714.4 for penetrations in smoke barriers and meeting the requirements of UL 1479 for air leakage.

2.2 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
   1. Specified: **3M FIRE PROTECTION PRODUCTS**.
      a. Alternate: **A/D FIRE PROTECTION SYSTEMS INC.**
      b. Alternate: **HILTI CONSTRUCTION CHEMICALS, INC.**
      c. Alternate: **SPECIFIED TECHNOLOGIES INC.**

B. Compatibility: Provide firestopping systems from only one manufacturer per penetration protective, with the substrates, and provide firestopping systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating firestopping systems, under conditions of service and application, as demonstrated by firestopping system manufacturer based on testing and field experience.

C. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.3 FIRESTOPPING OF FIRE-RATED CONSTRUCTION

A. Provide systems or devices listed in the UL Fire Resistive Directory under categories XHBN for Joint Systems and XHEZ for Firestops, providing those products conform to the construction type, penetrate type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. Systems or devices must be asbestos-free.

B. In addition, products must withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the UL system or device, and designed to perform this function.

2.4 CONSTRUCTION-GAP FIRESTOPPING OF FIRE-RATED CONSTRUCTION

A. Provide products from the manufacturer listed in the Systems and Applications Schedule at the end of this section for the following conditions (if applicable):

B. Firestopping at construction gaps between edges of floor slabs and exterior wall construction (Perimeter Fire Containment Systems).

C. Firestopping at construction gaps between tops of partitions and underside of structural systems (Joint Systems).

D. Firestopping at construction gaps between tops of partitions and underside of ceiling or ceiling assembly (Joint Systems).

E. Firestopping of control joints in fire-rated masonry partitions.

F. Firestopping of expansion joints not indicated by another proprietary expansion system manufacturer.

2.5 SMOKE-STOPPING AT SMOKE PARTITIONS

A. Through-penetration smoke-stopping: Provide any system or devices complying with the requirements for firestopping in fire-rated construction listed in the Systems and Applications Schedule at the end of this section, provided that the system includes the specified smoke seal or will provide a smoke seal.

B. Construction-gap smoke-stopping: Provide any system or devices complying with the requirements for construction-gap firestopping in fire-rated construction listed in the Systems and Applications Schedule at the end of this section, provided that the system includes the specified smoke seal or will provide a smoke seal.

2.6 ACCESSORIES

A. Provide components for each firestopping system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by firestopping system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

B. Permanent forming/damming/backing materials, including the following:

1. Slag-/rock-wool-fiber insulation.
2. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
3. Fire-rated form board.
4. Fillers for sealants.

C. Temporary forming materials.

D. Substrate primers.

E. Collars.

F. Steel sleeves.

G. Identification Labels: Provide pressure-sensitive, self-adhesive, preprinted vinyl labels, with the following information on the labels:

1. The words: "Warning--Firestopping System--Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Firestopping system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Firestopping system manufacturer's name.
6. Installer's name.

2.7 FILL MATERIALS

A. General: Provide firestopping systems containing the types of fill materials indicated in the Firestopping System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

I. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

J. Safing Insulation: 2" minimum to 4" thick Safing Insulation, as required on the drawings. Provide manufacturer's recommended fasteners as required for the specific installation requirements.

1. Specified: **THERMAFIBER**
2. Surface burning characteristics: ASTM E84:
   a. Unfaced Safing Insulation: Flame Spread Index 15, Smoke Developed Index 0.
   b. Foil Faced Safing Insulation: Flame Spread Index 25, Smoke Developed Index 5.

K. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

L. Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (laitance, form-release agents from concrete, oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
   3. Primers: Prime substrates where recommended in writing by firestopping system manufacturer using that manufacturer's written recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
   4. Masking Tape: Use masking tape to prevent firestopping systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 MIXING

A. For those products requiring mixing before application, comply with firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

3.4 INSTALLATION

A. General:
   1. All firestop system installers shall be certified in writing for each firesafing and firestopping assembly by the product manufacturer.
   2. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   3. In accordance with approved submittals.
   4. In accordance with Regulatory Requirements.
   5. Set plumb, level, and square.
   6. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

7. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
    a. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
8. Install fill materials for firestop systems by proven techniques to produce the following results:
    a. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
    b. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
    c. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
9. Identification Labels:
    a. Attach labels (see Part 2) permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems.

3.5 FIELD QUALITY CONTROL

A. Site Tests:
    1. As required by Regulatory Requirements.
B. Inspection:
    1. As required by Regulatory Requirements.
    2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
    3. No work shall be without the inspections required by Regulatory Requirements.
    4. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements at no cost to the Owner.

3.6 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
    1. Clean any soiled surfaces immediately.
    2. Finish shall be clean and ready for the application of any additional finishes.
    3. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by firestopping system manufacturers and that do not damage materials in which openings occur.

3.7 PROTECTION

A. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

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3.8 SCHEDULES

FIRESTOPPING SYSTEM SCHEDULE Firestop Systems Are Listed Using the Alpha-Alpha-Numeric Identification System Published in UL's Fire Resistance Directory, Vol. 2						
TYPE OF PENETRANT	CONSTRUCTION					
	FLOOR PENETRATION SYSTEMS (First Alpha Component = C or F)			WALL PENETRATION SYSTEMS (First Alpha Component = C or F)		
	Concrete Floors with a minimum Thickness Less Than or Equal to 5 inches	Concrete Floors with a minimum Thickness Greater Than 5 inches	Framed Floors	Concrete or Masonry Walls with a minimum Thickness Less Than or Qual to 8 inches	Concrete or Masonry Walls with a minimum Thickness Greater Than 8 inches	Framed Walls
NO PENETRATING ITEMS	C-AJ-0001-0999 OR F-A-0001-0999	C-BJ-0001-0999		C-AJ-0001-0999 C-BJ-0001-0999 OR W-J-0001-0999		W-L-0001-0999
METALLIC PIPE, CONDUIT, OR TUBING	C-AJ-1001-1999 OR F-A-1001-1999	C-BJ-1001-1999 C-BK-1001-1999 OR F-B-1001-1999	F-C-1001-1999	C-AJ-1001-1999 C-BJ-1001-1999 OR W-J-1001-1999	C-BK-1001-1999 OR W-K-1001-1999	W-L-1001-1999
NON-METALLIC PIPE, CONDUIT, OR TUBING	C-AJ-2001-2999 OR F-A-2001-2999	C-BJ-2001-2999 OR F-B-2001-2999	F-C-2001-2999	C-AJ-2001-2999 C-BJ-2001-2999 OR W-J-2001-2999		W-L-2001-2999
ELECTRICAL CABLES	C-AJ-3001-3999 OR F-A-3001-3999	C-BJ-3001-3999 OR F-B-3001-3999	F-C-3001-3999	C-AJ-3001-3999 C-BJ-3001-3999 OR W-J-3001-3999		W-L-3001-3999
CABLE TRAYS WITH ELECTRICAL CABLES	C-AJ-4001-4999 OR F-A-4001-4999	C-BJ-4001-4999		C-AJ-4001-4999 C-BJ-4001-4999 OR W-J-4001-4999	W-K-4001-4999	W-L-4001-4999

FIRESTOPPING SYSTEM SCHEDULE Firestop Systems Are Listed Using the Alpha-Alpha-Numeric Identification System Published in UL's Fire Resistance Directory, Vol. 2						
INSULATED PIPES	C-AJ-5001-5999 OR F-A-5001-5999	C-BJ-5001-5999	F-C-5001-5999	C-AJ-5001-5999 OR W-J-5001-5999		W-L-5001-5999
MISC. ELECTRICAL PENETRANTS	C-AJ-6001-6999 OR F-A-6001-6999			C-AJ-6001-6999		W-L-6001-6999
MISC. MECHANICAL PENETRANTS	C-AJ-7001-7999 OR F-A-7001-7999		F-C-7001-7999	C-AJ-7001-7999 OR W-J-7001-7999		W-L-7001-7999
GROUPINGS OF PENETRATIONS	C-AJ-8001-8999 OR F-A-8001-8999	C-BJ-8001-8999	F-C-8001-8999	C-AJ-8001-8999 C-BJ-8001-8999 OR W-J-8001-8999		W-L-8001-8999
For each location where a fire-resistance-rated floor or wall assembly is penetrated, provide a UL-listed through penetration firestop system selected from the applicable UL number range listed above that complies with this Specification Section - FIRESTOPPING, and is suitable for the penetration conditions indicated for the Project.						

END OF SECTION

SECTION 07 92 00 – SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all sealant materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
4. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM C719 Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle) (Test Method for)
2. ASTM C834 Latex Sealants (Specification for)
3. ASTM C919 Use of Sealants in Acoustical Applications (Practice for)
4. ASTM C920 Elastomeric Joint Sealants (Specification for)
5. ASTM C1193 Use of Joint Sealants (Standard Guide for)
6. ASTM C1311 Solvent Release Sealants (Standard Specification for)
7. ASTM D1056 Flexible Cellular Materials – Sponge or Expanded Rubber (Specification for)
8. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
9. ASTM E90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements (Test method for)
10. ASTM E814 Latex Sealants (Specification for)

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product data from manufacturers for each joint sealant product required.

C. Shop drawings:

1. Provide full details of all sealants and accessories proposed for use for approval by the Architect. All materials and products proposed shall be compatible with each other and with the substrates and adjacent wall colors, and shall be non-staining and non-bleeding. Submit an affidavit from the manufacturer confirming the acceptance of the use of the selected products in the manner and on the substrates proposed.

D. Samples.

1. Samples for initial selection purposes in form of manufacturer's bead samples, consisting of strips of actual products showing full range of colors (standard, premium and custom) available, for each product exposed to view.
    a. Provide color chips of adjacent wall surface colors; to be used in evaluating the sealant color samples.

E. Quality Assurance/Control Submittals:

1. Provide UL Assembly Classification appropriate for each fire rated penetration.
2. Certificates:
    a. Submit three (3) copies of certificates.
        1) Certification by each joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.

2) Certified test reports for elastomeric sealants on aged performance as specified, including hardness stain resistance, adhesion, cohesion or tensile strength, elongation, low temperature flexibility, compression set, modulus of elasticity, water absorption, and resistance (aging, weight loss, deterioration) and heat and exposure to ozone and ultra violet light. Adhesion data shall include long-term adhesion characteristics of all adhesion surfaces including silicone, aluminum and glass coatings and long term weathering test on the silicone on contact with similar materials.
3) Certificate of Installation: Signed by the installer and sealant manufacturer stating that sealant installed complies with specifications, and that installation methods comply with manufacturer's printed instructions for each condition of installation and use on the project. The sealant installer shall have no less that five years of continuous experience in installing the specified products. Their experience shall include similar work to this subject project. In addition, the manufacturers will provide written approval of the material installers.

3. Manufacturer's Written Instructions:
   a. Submit three (3) copies of manufacturer's written instruction

1.4 CLOSEOUT SUBMITTALS

A. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.
   2. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   3. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units and colors without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. AAMA American Architectural Manufacturer's Association
         1) AAMA 800-92 - "VOLUNTARY SPECIFICATIONS AND TEST METHODS FOR SEALANTS.
      b. ASTM American Society for Testing and Materials.
         1) ASTM C1193 - "STANDARD GUIDE FOR USE OF JOINT SEALANTS."
      c. CA-CHPS California High Performance Schools
      d. GANA Glass Association of North America, 1997 Edition of the Glazing Manual, and the most recent Edition of the Sealant Manual.
      e. SCAQMD South Coast Air Quality Management District, Rule 1168.
      f. SWRI Sealant Waterproofing Restoration Institute - Types of standards as found in Chapter III "Sealants: The Professionals' Guide."

C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with all other related work.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.
    a. Review for proper installation of work progress.
    b. Identify any installation problems and acceptable corrective measures.
    c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
    a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
    b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. 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.
    1. Comply with the Sealant Requirements of the GANA Glazing Manual and GANA Sealant Manual.
B. Store and handle materials in compliance with manufacturer's written recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.
    1. Store sealant containers in a protected location in accordance with their manufacturer's printed instructions until their use.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
    1. Apply materials within manufacturer's written recommended surface and ambient temperature ranges.
    2. Apply materials when working joints are most likely to be normal size.
    3. Do not install sealants under adverse weather conditions, or when temperatures are beyond manufacturer's written recommended limits.
        a. Proceed with the installation only when forecasted weather conditions are favorable for proper sealant cure, and development of early bond strength. Allow a minimum of three days after rain.
        b. Where joint width is affected by ambient temperature variations, install sealants only when temperatures are in the lower third of manufacturer's written recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at low temperatures.

1.8 WARRANTY

A. Contractor's General Warranty:
    1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Warranty: 10 Years.
    1. In accordance with Specification Section - WARRANTIES.
    2. Manufacturer shall warrant exterior joint sealant after substantial completion of work.
C. Installer's Warranty: 5 Years.
    1. Sealant Contractor shall warrant sealants against defective materials and workmanship after substantial completion of work.
    2. Warranty shall further state that installed sealants are warranted against the following:
        a. Water leakage through sealed joints.
        b. Adhesive or cohesive failure of sealant.
        c. Staining of adjacent surfaces caused by migration of primer or sealant.
        d. Chalking or visible color change of the cured materials.
    3. The installer shall make repairs during the warranty period at no cost to the Owner.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide elastomeric sealants for exterior applications that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.

B. Provide sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water-resistant and cause no staining or deterioration of joint substrates.

2.2 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

C. Compatibility: Provide 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.

1. Colors: Provide color of exposed sealants to comply with the following:
    a. Sealant colors shall match adjacent wall color.
    b. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

2.3 ELASTOMERIC SEALANT STANDARD

A. Chemically curing elastomeric sealants (Silicones, Urethanes, and Acrylics) that comply with ASTM C920, and other requirements indicated on each Elastomeric Joint Sealant listed, including those requirements referencing ASTM C920, classifications for Type, Grade, Class, and Uses.

1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant listed, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at time of installation.

B. Silicone Sealants

1. One-Part Neutral Cure Silicone Sealant:
    a. Specified: **PECORA** “#890”.
        1) Continual immersion in water conditions,
            a) Specified: **PECORA** “Dynatred”.
        2) If the water contains a chlorine content of 5ppm, then use:
            a) Specified: **PECORA** “Synthacalk GC2+”.
    b. Acceptable alternate manufacturers for 1) only above:
        1) Alternate: **BONDAFLEX** “Sil 290”.
        2) Alternate: DOW PERFORMANCE SILICONES “#790”.
        3) Alternate: **SONNEBORN** “Sonolastic 150 or Sonolastic 150 VLM”.
2. One-Part Acid-Curing Silicone Sealant:
    a. Specified: **PECORA** “#860”.
        1) Alternate: **BONDAFLEX** “Sil 100 GP”.
        2) Alternate: DOW PERFORMANCE SILICONES “#999-A”.
        3) Alternate: **SONNEBORN** “Omniplus”.
3. One-Part Mildew-Resistant Silicone Sealant:
    a. Specified: **PECORA** “Color, white #345; Color as selected #898”.
        1) Alternate: **BONDAFLEX** “Sil 100 WF”.

2) Alternate: DOW PERFORMANCE SILICONES “#786”.
3) Alternate: **SONNEBORN** “Omniplus”.

C. Urethane Sealant:
1. One-Part Gun Grade Urethane Sealant:
a. Specified: **PECORA** “Dynatrol I-XL”.
1) Alternate: **BONDAFLEX** “Pur 25 or Pur 25 Tex”
2) Alternate: SIKA “Sikaflex 1a or Sika Textured”
3) Alternate: **SONNEBORN** “NP1 Smooth or X1 Textured”.
4) Alternate: **VULKEM** “#116”.
2. Multi-Component Gun Grade Urethane Sealant:
a. Specified: **PECORA** “Dynatred”.
1) Alternate: **BONDAFLEX** “Pur 2 NS”.
2) Alternate: SIKA “Sikaflex 2c NS”.
3) Alternate: **SONNEBORN** “NP2”.
3. Multi-Component Gun Grade Urethane Sealant (Fast Curing):
a. Specified: **PECORA** “Dynatred”.
1) Alternate: **BONDAFLEX** “Pur 2 NS”.
2) Alternate: SIKA “Sikaflex 2c NS”.
3) Alternate: **SONNEBORN** “NP2 with manufacturer's accelerator”.
4) Alternate: **VULKEM** “#227”.
4. One-Part or Multi-Component Gun Grade Urethane Sealant (Security Sealant) :
a. Specified: **PECORA** “Dynaflex”.
1) Alternate: **BONDAFLEX** “Pur 2 NS”.
2) Alternate: SIKA “Sikaflex 2c NS TG”.
3) Alternate: **SONNEBORN** “Ultra”.
5. One-Part Pourable Self-Leveling Urethane Sealant:
a. Specified: **PECORA** “Urexpan NR-201 or Dynatred”.
1) Alternate: **BONDAFLEX** “Pur 35 SL”.
2) Alternate: SIKA “Sikaflex 1c SL”.
3) Alternate: **SONNEBORN** “Sonolastic SL 1”.
4) Alternate: **VULKEM** “#45”.
6. Multi-Component Pourable Self-Leveling Urethane Sealant (Fast Curing):
a. Specified: **PECORA** "Urexpan NR-200".
1) Alternate: **BONDAFLEX** "Pur 2 SL"
2) Alternate: SIKA "Sikaflex 2c SL"
3) Alternate: **SONNEBORN** "Sonolastic SL 2"
4) Alternate: **VULKEM** "#245/255"

D. Acrylic Emulson Sealant: ASTM C834, accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.
1. Specified: **PECORA** “AC-20”.
a. Alternate: **BONDAFLEX** "Sil-A 700".
b. Alternae: **SONNEBORN** "Sonolac".

2.4 BUTYL SEALANT

A. One-part, non-sag, solvent-release-curing, polymerized butyl sealant: ASTM C1311, formulated with minimum of 75 percent solids to be nonstaining, paintable, and have a tack-free time of 24 hours or less.
1. Specified: **PECORA** "BC-158".
a. Specified: PTI (by **H.B. FULLER**) "#707".

2.5 GLAZING TAPE SEALANTS

A. Butyl Glazing Tape:
   1. Specified: **PECORA** "Extru-Seal".
   2. Alternate: TREMCO, INC. "440 Tape".

B. Butyl Pressure Glazing Tape:
   1. Specified: **PECORA** "Dyna-Seal".

2.6 ACOUSTICAL SEALANT

A. Non-drying, non-bleeding and non-hardening butyl sealant: ASTM C834, and the following requirements:

B. Specified: **PECORA** “Exposed or Fire Rated areas AC-20 FTR, Concealed areas AIS-919”.
   1. Alternate: **BONDAFLEX** "Sil-A 700".
   2. Alternate: **OSI** "GRABBER #GSCS”.
   3. Alternate: **TREMCO INC.** “834”.
   4. Alternate: **W.W. HENRY** "#413".

C. Effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E90.

D. Fire rated conditions: ASTM E84, Class B, Flame spread: 53, Smoke developed: 117.

2.7 FIRESTOP PILLOWS / BAGS

A. Reusable, heat-expanding pillows / bags: UL Classified systems, Glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
   1. Use in Fire-Rated Assemblies where penetration holes are too large for caulk, in accordance with approved UL Classified assemblies:
   2. Specified: **HEVI-DUTY** / **NELSON** "Putty Pads".

2.8 FIRESTOP SEALANTS

A. Per ASTM E814, and ANSI/UL 1479 Classified systems.
   1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
   2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.
   3. Firestop Sealants: Use in designated Fire-Rated Assemblies in accordance with approved UL Classified Assemblies.
   4. Specified: **HILTI**.
   5. Alternate: **3M**.
   6. Alternate: **PECORA**.

2.9 ACCESSORIES

A. Tape: Solvent-free, butyl-based tape sealant with a solids content of 100 percent formulated to be nonstaining, paintable, and nonmigrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.
   1. Specified: **EMSEAL CORP.** "Emseal".

B. Pre-compressed Foam: Preformed, pre-compressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in pre-compressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:
   1. Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, and compatible with joint substrates and other sealants.
   2. Impregnating Agent: Manufacturer's standard.
   3. Density: Manufacturer's standard.
      a. Backing: Pressure-sensitive adhesive factory applied to one side with protective wrapping.

4. EIFS preformed paintable Urethane Tape:
5. Specified: **SIKA** "Sikaflex PUR Tape System".

C. Backing Rods (Joint Sealant Backing):
1. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
2. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
   a. Open-cell polyurethane foam.
   b. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
   c. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
   d. Any material indicated above.
3. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing: ASTM D1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
4. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
5. Acoustical Sheet Caulking for junction boxes:
   a. Specified: **LOWRY** "Electrical Box Sealer".
   b. Alternate: **TREMCO INC.** "Sheet Caulking".

D. Miscellaneous Materials:
1. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealant-substrate tests and field tests.
2. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
3. Masking Tape: Non-staining, nonabsorbent material compatible with sealants and surfaces adjacent to joints. Use the type of masking tapes available that is compatible to the substrate being masked without damaging the surface material of finish when removed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which, affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
   3. Remove laitance and form release agents from concrete.
   4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealants.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
   1. Masking Tape: Use the appropriate masking tape (type selected to the substrate so as not to mar the surface it is protecting) where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION

A. General:
   1. Comply with joint sealant manufacturer's written installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Sealant Installation Standard: Comply with recommendations of ASTM C1193, for use of sealants as applicable to materials, applications, and conditions indicated.
      a. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919, as applicable to materials, applications, and conditions indicated.
      b. Use Urethane Sealants at painted joints.
      c. Use Silicone Sealants at exposed, non-painted joints.
      d. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
         1) Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability
            a) Do not leave gaps between ends of joint fillers.
            b) Do not stretch, twist, puncture, or tear joint fillers.
            c) Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
         2) Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
      e. Installation of Sealants: 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.

1) For normal moving joints not subject to traffic: Fill joints to a depth equal to 50% of joint width, but not less than 1/4" deep or more than 1/2" deep. In no case shall the applied sealant width exceed the sealant depth.
2) Assure that the *bond line* surface is a minimum of 1/4" wide. Install approved backer material at a proper depth to provide sealant bead profiles as detailed on approved shop drawings. Backer material shall be of appropriate size and shape and shall be compressed between 25% and 50% when installed.
3) Backer material may not be modified in-lieu of using the properly dimensioned material. Install, when required a polyethylene, or other approved, bond backer tape to provide sealant bead profiles as detailed on approved shop drawings.

f. Do not allow sealants, primers, or other compounds to overflow, spill or migrate into voids of adjacent construction.
g. Remove excess sealant spillage promptly as this work progresses. Clean adjacent surfaces by recommended means to remove sealant, but not damage the surfaces. Remove all cartons and debris from the site as the work progresses and at the end of each work day. Joints shall be prepared and sealed on the same working day.
h. Tooling of Non-sag Sealants: 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.
    1) Concave joint configuration per Figure 5A in ASTM C1193, unless otherwise indicated.
    2) Flush joint configuration per Figure 5B in ASTM C1193, where indicated.
        a) Use masking tape to protect adjacent surfaces of recessed and tooled joints.
    3) Recessed joint configuration per Figure 5C in ASTM C1193, of recess depth and at locations indicated.
i. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's written directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's written recommendations.
j. Acoustical Sealant Applications:
    1) Acoustical sealant to form an airtight seal at all penetrations and perimeter of sound-rated partitions, floors and ceilings. Comply with requirements of specification section titled Gypsum Board. Use backer-rod where gaps to be sealed exceed 3/8 inches.
    2) Sheet caulking to seal the back and sides of all junction boxes (4 gang and smaller) recessed in acoustically-rated partitions.
    3) Acoustical sealant as a continuous bead along gypsum board face layer at all head and sill conditions of sound-rated partitions and around the perimeter of resilient ceilings.
k. Firestop Sealants: In accordance with applicable UL Classified numbers compatible with products provided.

3.4 CLEANING

A. Clean in accordance with Specification - PROJECT CLOSEOUT.
    1. Clean any soiled surfaces immediately.
    2. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated sealants immediately so that and installations with repaired areas are indistinguishable from original work.

3.6 SEALANT SCHEDULES

A. Sealants: Description of joint construction and location where sealant is typically applied

B. One-Part Neutral Cure Silicone Sealant:
   1. Exterior and interior joints in vertical surfaces of concrete and masonry.
   2. Between concrete masonry and stone.
   3. Between metal and concrete, mortar, and stone.
   4. Interior and exterior perimeter joints of metal frames in exterior walls.
   5. Exterior overhead joints.
   6. Use the applicable sealant for continual immersion in water applications, such as swimming pools, fountains and cooling towers – USDA Approved.

C. One-Part Acid-Curing Silicone Sealant:
   1. Exposed joints within glazed curtain wall framing systems, skylight framing systems, and aluminum entrance framing systems, if applicable.

D. One-Part Mildew-Resistant Silicone Sealant:
   1. White Grout Joints: Provide white silicone sealant material to match adjacent white grout joints in interior joints in vertical surfaces of ceramic tile in toilet rooms, showers, and kitchens.
   2. Colored Grout Joints: Provide colored silicone sealant material to match adjacent colored grout joints in interior joints in vertical surfaces of ceramic tile in toilet rooms, showers, and kitchens.

E. One-Part Gun Grade Urethane Sealant:
   1. Exposed joints in pre-cast, masonry, window frame perimeters and similar types of construction joints.

F. Multi-Component Gun Grade Urethane Sealant:
   1. Control joints and window and door perimeters.

G. Multi-Component Gun Grade Urethane Sealant (Fast Curing):
   1. Plaza Decks.

H. One-Part or Multi-Component Gun Grade Urethane Sealant (Security Sealant):
   1. Control joints and window and door perimeters where sealant is exposed to physical abuse.

I. One-Part Pourable Self-Leveling Urethane Sealant:
   1. Exterior and interior joints in horizontal surfaces of concrete.
   2. Exterior and interior joints in horizontal surfaces between metal and concrete, mortar, stone, and masonry surfaces.

J. Multi-Component Pourable Self-Leveling Urethane Sealant (Fast Curing):
   1. For use when walking surfaces require use within 24 hours of application without damage to joint surfaces.
   2. Exterior and interior joints in horizontal surfaces of concrete.

K. Acrylic-Emulsion Sealant:
   1. Paintable joints for the following surfaces expected to receive field painting:
      a. Interior joints in vertical and overhead surfaces at perimeter of elevator door frames and door frames (not requiring security grade sealant).
      b. Interior joints in gypsum board, plaster, concrete, and concrete masonry.
      c. All other interior field paintable joints not indicated otherwise.

L. One-Part Butyl Sealant:

1. Primarily used for glazing seals where little or no movement is expected.

M. Acoustical Sealant:

1. Joints to control dust, air, smoke and sound transmission, including under all exterior wall sill plates placed on top of Cast-In-Place Concrete slabs.

N. Firestop Sealants:

1. In fire-rated walls, compatible with wall ratings and in accordance with applicable penetration types in walls and floors, and in accordance with UL Classified numbers.

END OF SECTION

SECTION 08 11 00 – METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to fabricate and install all Custom Metal Doors, Panels, Metal Frame materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 03 15 14 DRILLED ANCHORS
4. 04 22 00 CONCRETE MASONRY UNITS
5. 05 12 00 STEEL AND FABRICATIONS
6. 06 10 00 ROUGH CARPENTRY
7. 07 60 00 SHEET METAL
8. 07 92 00 SEALANTS
9. 08 70 00 HARDWARE
10. 08 80 00 GLASS
11. 09 24 00 CEMENT PLASTER
12. 09 29 00 GYPSUM BOARD
13. 09 65 16 RESILIENT SHEET
14. 09 65 19 RESILIENT TILE
15. 09 68 40 CARPET
16. 09 72 00 WALL COVERINGS
17. 09 91 00 PAINTING
18. 10 05 00 MISCELLANEOUS SPECIALTIES
19. 10 14 00 IDENTIFYING DEVICES
20. 10 26 00 WALL PROTECTION

1.2 DEFINITIONS

A. Minimum Thickness: Base metal thickness without coatings.

B. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI / NAAMM-HMMA.

C. Glazing Molding: Portion of the assembly retaining glazing materials or in-fill panels in a hollow metal door containing the integral glazing stop, or to which a glazing stop is attached.

D. Glazing Stop: A formed metal section used to secure glazing in a door or frame.

E. Prepared Opening: Existing opening or wall constructed prior to installation of frames.

1.3 REFERENCE STANDARDS

A. ANSI: American National Standards Institute

B. ASTM: American Society of Testing and Materials

1. ASTM A153 Zinc Coating (Hot Dip) on Iron and Steel Hardware (Specification for)
2. ASTM A501 Hot-Formed Welded and Seamless Carbon Steel Structural Tubing (Standard Specification for)
3. ASTM A653 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process (Specification for)
4. ASTM A666 Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar (Specification for)
5. ASTM A1008 Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable (Standard Specification for)

6. ASTM A1011 Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength (Specification for)
7. ASTM C143 Slump of Hydraulic-Cement Concrete (Test method for)
8. ASTM C476 Grout for Masonry (Specification for)
9. ASTM C665 Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing (Specification for)
10. ASTM C764 Mineral Fiber Loose-Fill Thermal Insulation (Standard Specification for)
11. ASTM C1029 Spray-Applied Rigid Cellular Polyurethane Thermal Insulation (Standard Specification for)
12. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
13. ASTM E119 Fire Tests of Building Construction and Materials (Test methods for)
14. ASTM E136 Behavior of Materials in a Vertical Tube Furnace at 750 degrees C (Test Method for)

C. AWS: American Welding Society

D. HMMA: Hollow Metal Manufacturers Association (Division of NAAMM)

E. NAAMM: National Association of Architectural Metal Manufacturers

F. NFPA: National Fire Protection Association

G. NILECJ: National Institute of Law Enforcement and Criminal Justice

H. UL: Underwriter's Laboratory, Inc.

I. USSG: U.S. Standard Gages

J. WH: Warnock Hersey International

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - Submittal Procedures.
   1. Contractor shall check all drawings and verify all dimensions, including wall thickness, in the field prior to fabrication.
   2. Contractor shall verify that shop drawings include all required materials and material clearances.

B. Product Data:
   1. Include construction details, material descriptions, core descriptions, label compliance, fire-resistance ratings, temperature-rise ratings, and finishes for each type of product indicated.
      a. Provide information indicating all the Structural Properties of the steel materials.

C. Shop Drawings:
   1. Include the following information:
      a. Elevations of each door design and frame configuration.
      b. Details of doors, including vertical and horizontal edge details.
      c. Frame details for each frame type, including dimensioned profiles.
      d. Details and location of reinforcement and preparations for hardware.
      e. Details of each different wall opening condition.
      f. Details of anchorages, joints, field splices, and connection.
      g. Details of accessories.
      h. Details of moldings, removable stops, and glazing.
      i. Details of louvers, including sizes and location in doors, where required.
      j. Details of conduit and preparations for power, signal, and control systems.
   2. Provide a Schedule, prepared by or under the supervision of supplier for doors, panels, and frames using same reference numbers for details and openings as those on the Drawings.
      a. Coordinate with door hardware schedule.
   3. Provide setting drawings, templates, and directions for installing anchorage, including sleeves, concrete inserts, anchors, bolts, and items with integral anchors for installation coordination.
   4. Manufacturer's printed instructions for preparation, installation and care requirements for installers and inspecting authorities.

D. Samples:
   1. Provide typical frame joint section and sample showing typical edge condition specified.
   2. Factory applied color: manufacturer's full range of factory applied color finishes for selection.
   3. When Stainless Steel is indicated, provide samples of 3 inches by 5 inches for each type of exposed finish required.
      a. Frames: Provide fabrication samples of profile and corner joints.
      b. Doors: Provide fabrication sample of corner showing vertical edges and top.

E. Quality Assurance/Control Submittals:
   1. Design Data:
   2. Test Reports:
      a. Product Test Reports based on evaluation of comprehensive test performed by a qualified testing agency, for each type of fire-rated metal door, panel, and frame assembly.
      b. Water Tightness Test Reports.
   3. Certificates:
      a. Oversized Construction Certification.
      b. Installer Certification for Temperature Rise Fire Rated Framing System.

1.5 CLOSEOUT SUBMITTALS

A. General Construction Warranty.

B. Workmanship and Materials Warranty.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Fire-Rated Door and Frame Assemblies shall be labeled by an DSA/FLS approved agency and shall comply with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and UL 1784 "Air Leakage Test for Door Assemblies."
      b. Oversized Door Assemblies required to be fire rated and exceeds the limitations of labeled assemblies, a certificate of inspection shall be furnished by an approved testing agency in lieu of an Oversized Fire Door Label.
   2. Installer Qualifications:
      a. Installer shall be experienced and shall have successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Installer(s) shall have participated in mock-up installation that was successfully tested for water tightness.
   3. Manufacturer/Supplier Qualifications:
      a. Manufacturer/Supplier shall have successfully produced/supplied products similar to that required for this Project, and shall have sufficient production/supply capacity to produce/supply required units without causing delay in the work.
      b. Manufacturers must be members of the HMMA, who have been engaged for at least two years in the production for sale of swing steel doors and frames on a national basis.
         1) All doors and frames shall be manufactured and supplied by the same manufacturer.
      c. Manufacturer/Supplier of Temperature Rise Fire Rated Framing System shall provide experienced mechanics familiar with this type of specialized work.

B. In accordance with Specification Section - Regulatory Requirements.

C. Certifications:
   1. Oversized Construction Certification for Fire-Rated Door Assemblies shall state that the door conforms to the requirements of the design, materials and construction, but has not been subjected to the fire test.

2. Manufacturer of Temperature Rise Fire-Rated Framing System shall certify the Installer, in writing, as qualified to install manufacturer's systems in accordance with manufacturer's warranty requirements.

D. Mock Ups:
1. Provide Mock-Ups prior to application of the final layer of the finished exterior wall material and prior to installation of any exterior wall cavity and interior materials.
2. Metal Frame Assembly:
a. Mock-Ups shall be of each type of opening assembly in every type of exterior wall assembly in which an opening occurs, shall integrate all other related work assemblies and shall be representative of the intended end use configuration.
1) Provide a Mock-Up with a minimum opening size of 24 inches square for window opening.
b. Mock Ups will be used for establishing construction sequence, and installation requirements of materials, and creating water tight assemblies.
c. Mock-Ups may become part of the completed Work upon successful testing for water tightness.
3. Installation:
a. The Project Inspector, the Architect, Contractor’s Superintendent and Sub-contactor's Superintendent shall observe the installation of materials.
b. Installation crew for the Mock-Ups shall be the installers of the metal frame systems for this project and installers, as necessary, of other related work assemblies.
c. Mock Ups shall include the installation of integral flashing, glazing, louvers, sheet metal flashing, sealants, water barriers and penetration flashing of exterior material systems and other materials of related work that makes the openings watertight.
d. Failed Mock Ups shall be removed and the assembly reinstalled until the water tightness test is successful.

E. Meetings:
1. Pre-Installation: Scheduled by Contractor prior to the start of work.
a. Coordinate the work with all other related work.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
b. Establish protection procedures to maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Doors and Frames shall be palletized, wrapped, or crated to provide protection during transit and Project-Site storage. Do not use non-vented plastic.
a. Provide additional protection to prevent dents, scratches and other damage.

B. Acceptance at Site:
1. Do not deliver doors and frames to project site until Installer is ready and the site conditions will accommodate the installation of frames.
2. Damaged products will not be accepted.

C. Storage and Protection:
1. Storage and protection shall be in accordance with NAAMM-HMMA 840 Standard, "Installation and Storage of Hollow Metal Doors and Frames."

2. Store Doors and Frames under cover at Project Site. Stored on level platforms, minimum six (6) inches above ground, allowing air circulation under stacked units.
    a. Doors and Frames shall be placed in the up-right position, spaced by blocking to allow ventilation between units.
    b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Existing Conditions:
    1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
    2. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
        a. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions for the fabrication of custom frames. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.9 WARRANTY

A. Contractor's General Warranty:
    1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Warranty: 1 Year.
    1. Doors and Frames in accordance with manufacturer's written standard warranty:
C. Manufacturer’s Temperature Rise Rated Framing System Warranty: 5 Years upon project completion and acceptance.
    1. In accordance with warranty against defective workmanship and materials.
D. Installer's Warranty: 4 Years.
    1. Issue to the Owner a warranty against defective workmanship and materials.
        a. In accordance with the terms of the Specification Section - WARRANTIES.
        b. Warranty shall include the responsibility for the repairs of any failure that is the result of defects in materials and workmanship.
        c. Warranty shall certify that the installation of all exterior Metal Doors and Frames were done in accordance with the method and procedures established with the successful Mock-Up for water tightness.
        d. The Warranty shall be co-endorsed by the General Contractor, the Metal Door and Frame Material Manufacturer, the Metal Door and Frame Installer and Glazing Installer.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

A. Metal Door and Frame Assemblies:
    1. All Doors shall be Custom per NAAMM-HMMA Standards for Hollow Metal Doors.
    2. All Frames shall be Custom per NAAMM-HMMA Standards for Hollow Metal Frames.
B. Fire Rated Assemblies:
    1. Door and Frame Assemblies shall be custom in accordance to NAAMM-HMMA Standards for Fire-Rated Hollow Metal Doors and Frames and shall comply with all of the requirements for Doors and Frames.
    2. Conform to the requirements of CBC, Chapter 7 "Fire and Smoke Protection Features".
        a. Fire-Rated Door Assemblies shall comply with NFPA 252 "Standard Methods of Fire Tests of Door Assemblies" and UL 10C "Positive Pressure Fire Tests for Door Assemblies."

b. Fire-Rated Window Assemblies shall comply with NFPA 257 "Fire Testes for Fire Window Assemblies and Glass Block Assemblies," NFPA 80 "Standard for Fire Doors and Other Opening Protectives," and UL 9 "Fire Tests of Window Assemblies."
c. Fire-Rated Door Assemblies shall also meet the requirements for a Smoke and Draft Control Door Assembly, complying with UL 1784 "Air Leakage Tests for Door Assemblies."
d. Fire-Rated Doors and Frames shall be labeled by an DSA/FLS approved agency and shall comply with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and UL 1784 "Air Leakage Test for Door Assemblies."

3. All Fire-Rated Doors are to be positive latching and self or automatic closing in accordance with NFPA 80 "Standard for Fire Doors and Other Opening Protectives."
4. All Fire-Rated Assemblies shall be provided with approved gasketing material, so installed as to provide a seal where the door meets the stop on both sides and across the top.
   a. Continuous Hinges, Seals, etc. shall not obscure ratings of doors or door frames.

C. Exterior openings:
1. Windows and Doors installed in exterior walls shall conform to the testing and performance requirements of CBC Section 1709A.5.

2.2 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Specified: **SECURITY METAL PRODUCTS CORPORATION**.
1. Alternate: **CURRIES COMPANY**.
2. Alternate: **METAL MANUFACTURING CO, INC**.
3. Alternate: **STILES CUSTOM METAL, INC**.

C. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.3 MATERIALS

A. Cold-Rolled Steel Sheet: Commercial Steel (CS), ASTM A1008, Type B. Steel shall be suitable for exposed to view applications.

B. Hot-Rolled Steel Sheet: Commercial Steel (CS), ASTM A1011, Type B. The steel shall be pickled and oiled, free of scale, pitting, coil-breaks or other surface defects.

C. Metallic-Coated Steel Sheet: Commercial Steel (CS), ASTM A653, Type B. The steel shall have a minimum G60 (Z180) zinc (galvanized) or A60 (ZF 180) zinc-iron-alloy (galvannealed) coating designation.

D. Stainless Steel Sheet: ASTM A666.

E. Inserts, Bolts and Fasteners: Hot-dip galvanized, ASTM A153.

F. Grout:
1. Concrete Walls: ASTM C476, maximum slump of 4 inches, per ASTM C143.
2. Masonry Walls: Mortar comply with Specification Section - CONCRETE MASONRY UNITS.

G. Insulation:
1. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing): consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density: with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E136, for combustion characteristics.
   a. Fire Rated Doors and Frames: Provide insulation that provides fire protection and/or temperature rise ratings as indicated.
2. Expanded Foam Insulation suitable for injection into frame cavity.
   a. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

3. Exterior Doors: Provide core with thermal polyisocyanurate insulation cores.
4. Exterior Door Frames: Solidly packed mineral insulation.
5. Insulation for Miscellaneous work:
    a. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

I. Sealants: Comply with Specification Section – SEALANTS.
    1. Sealants shall be compatible with glazing and frames.

2.4 INTERIOR DOORS

A. NAAMM-HMMA 861 Standard "Guide Specifications for Commercial Hollow Metal Doors and Frames".

B. Design shall be custom seamless hollow construction in the flush type variations as indicated.

C. Thickness: 1-3/4 inch.

D. Face Sheets: Cold-Rolled Steel Sheets; 18 gage minimum.

E. Core: Vertical Cold-Rolled Steel Stiffened; 22 gage minimum.
    1. Insulate spaces between stiffeners to full height.

F. Top and Bottom Edges: 16 gage minimum.
    1. Close with continuous recessed and flush filler channels.
    2. Additional flush filler channel at top and flush filler channel at bottom edges, unless recess channel at bottom is required for hardware.
    3. Fabricated channels from same material as face sheets.

G. Jamb Edges: 16 gage minimum.
    1. Reinforce with continuous "U" channels fabricated from same material as face sheets.

H. Astragals: 14-gage minimum.
    1. Fabricated from same material as face sheets.

I. Hardware Reinforcements:
    1. Reinforcing Plates shall be fabricated from the same material as the face sheets in the minimum thickness as follows:
        a. Hinges and Pivots: 7-gage.
        b. Continuous Hinges: 14-gage.
        c. Mortise Hardware: 10-gage.
        d. Locks, Exit Devices, Flush Bolts, Concealed Holders, Concealed Hardware or Surface-Mounted Closures: 12-gage.
        e. Pull Plates, Bars and all other Surface-Mounted Hardware: 16-gage.

J. Glazing Moldings and Stops:
    1. Fabricate from the same material as the door face sheets.
        a. Interior Doors: 20-gage minimum.

K. Door Louvers:
    1. NAAMM-HMMA Standard 810 "Hollow Metal Doors".
    2. Fabricate from the same material as the door face sheets.
    3. Internal Channels: 16-gage minimum.
    4. Vanes: 18-gage minimum.
    5. Reinforcement: 0.25inch x 1.5 inch minimum.
    6. Non-Rated Doors:
        a. Provide sightproof louver of stationary vanes of inverted "Y" Type blade construction with a 30 percent free area, unless noted otherwise.
    7. Fire-Rated Doors:

a. Movable vanes closed by actuation fusible link and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.

2.5 EXTERIOR DOORS

A. NAAMM-HMMA Standard 862 "Guide Specifications for Commercial Security Hollow Metal Doors and Frames," Class IV Door in accordance with NILECJ-STD-0306.00.

B. Design shall be custom seamless hollow construction in the flush type variations as indicated.

C. Thickness: 1-3/4 inch.

D. Face Sheets: 14 gage minimum.

1. Metallic-Coated Steel Sheets with zinc-iron-alloy (galvannealed) coating designation.

E. Core: Vertical Cold-Rolled Steel Stiffened; 18 gage minimum.

1. Insulate spaces between stiffeners to full height.

F. Top and Bottom Edges: 12 gage minimum.

1. Close with continuous recessed and flush filler channels fabricated from same material as face sheets.
2. Additional flush filler channel at top and flush filler channel at bottom edges, unless recess channel at bottom is required for hardware.
3. Fabricated from same material as face sheets.

G. Jamb Edges: 12 gage minimum.

1. Reinforce with continuous "U" channels fabricated from same material as face sheets.
2. All channels shall be galvanized at exterior doors.
3. Astragals shall be fabricated from same material as face sheets: 14-gage minimum.

H. Hardware Reinforcements:

1. Exterior Doors: Reinforcing Plates shall be fabricated from the same material as the face sheets in the minimum thickness as follows:
   a. Hinges and Pivots: 1/4" plate.
   b. Continuous hinges: 14-gage.
   c. Mortise Hardware: 7-gage.
   d. Locks, Exit Devices, Flush Bolts, Concealed Holders, Concealed Hardware or Surface-Mounted Closures: 12-gage.
   e. Pull Plates, Bars and all other Surface-Mounted Hardware: 12-gage.
2. Interior Doors: Reinforcing Plates shall be fabricated from the same material as the face sheets in the minimum thickness as follows:
   a. Hinges and Pivots: 7-gage.
   b. Continuous Hinges: 14-gage.
   c. Mortise Hardware: 10-gage.
   d. Locks, Exit Devices, Flush Bolts, Concealed Holders, Concealed Hardware or Surface-Mounted Closures: 12-gage.
   e. Pull Plates, Bars and all other Surface-Mounted Hardware: 16-gage.

I. Glazing Moldings and Stops:

1. Fabricate from the same material as the door face sheets.
   a. Exterior Doors: 16-gage minimum.
   b. Interior Doors: 20-gage minimum.

J. Door Louvers:

1. NAAMM-HMMA Standard 810 "Hollow Metal Doors".
   a. Fabricate from the same material as the door face sheets.
   b. Internal Channels: 12-gage minimum.
   c. Vanes: 12-gage minimum.
   d. Reinforcement: 0.25inch x 1.5 inch minimum.
   e. Insect Screens: 12-gage minimum.
2. Non-Rated Doors:

a. Provide sightproof louver of stationary vanes of inverted "Y" Type blade construction with a 30 percent free area, unless noted otherwise.

3. Fire-Rated Doors:
   a. Movable vanes closed by actuation fusible link and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated.

2.6 INTERIOR FRAMES

A. NAAMM-HMMA 861 Standard, "Guide Specifications for Commercial Hollow Metal Doors and Frames".

B. Custom seamless hollow construction in the variety of configurations as indicated.

C. Interior Frames shall be fabricated from Cold-Rolled Steel Sheets.
   1. Openings 4'-0" or less: 16-gage minimum.
   2. Openings greater than 4'-0": 14-gage minimum.

D. Glazing Stops: fabricate from the same material as frames; 20-gage minimum.

E. Internal Frame Stiffeners shall be fabricated from the same material as Frames.
   1. Head of Frames: 12-gage.

F. Internal Reinforcing Tabs: fabricated from the same material and gage thickness as Frame.

G. Hardware Reinforcements:
   1. Reinforcing Plates shall be fabricated from the same material as the Frame in the minimum thickness as follows:
      a. Hinges and Pivots: 7-gage full width of frame x 10".
      b. Continuous Hinges: 14-gage full width of frame x entire frame length.
      c. Strike Hardware: 12-gage.
      d. Flush Bolts: 12-gage.
      e. Closers: 12-gage.
      f. Surface-Mounted Hardware: 12-gage.
      g. Hold-Open Arms: 12-gage.
      h. Surface Panic Devices: 12-gage.

H. Grout Guards: Grout Guards shall be fabricated from the same material as the Frame in minimum 22-gage thickness.

I. Frame Anchors:
   1. Frame Anchors shall be fabricated from Cold-Rolled Steel Sheets or Hot-Rolled Steel Sheets, unless indicated otherwise.
      a. Masonry Wall: not less that 2" wide x 10" long Anchors.
         1) Non Grouted Frames: 16 gage T-Strap Anchors.
         2) Grouted Frames: 16 gage perforated Adjustable Strap and Stirrup Anchors.
            a) Wire Loop Anchors of 0.156" diameter steel wire may be used at non-fire-rated frames that are fully grouted.
      b. Concrete Walls: 16 gage Pour In Place Anchors.
      c. Wood Stud Frame Walls: 18 gage Wood Stud Anchors.
         1) Anchor shall be not less than 2" wide x 10" long.
      d. Metal Stud Frame Walls: 18-gage Metal Channel Stud Anchors.
      e. Jamb Base: 14-gage Fixed or Adjustable Floor Anchors.
      f. Floor Base: 16 gage Existing Wall Anchors.
         1) Where indicated: 16 gage Fixed Mullion Anchors.
      g. Prepared Openings: 16-gage Existing Wall Anchors.
         1) Where indicated: 16 gage continuous Rough Buck Anchors.

J. Fasteners:
   1. Screws, bolts, washers, shields, spacers and other similar fastening devices:
      a. Provide stainless steel vandal resistant screws when outside exterior face glass stops are indicated.

b. Furnish and install as required by frame installer.
c. Provide Stainless Steel fasteners at Stainless Steel Frames.

2.7 EXTERIOR FRAMES

A. NAAMM-HMMA Standard 862 "Guide Specifications for Commercial Security Hollow Metal Doors and Frames".
B. Custom seamless hollow construction in the variety of configurations as indicated.
C. Exterior Frames shall be fabricated from Metallic-Coated Steel Sheets with zinc-iron-alloy (galvannealed) coating designation.
   1. All Opening sizes: 12-gage minimum.
D. Glazing Stops fabricate from the same material as Frames.
   1. Exterior Frames: 16-gage minimum.
E. Internal Frame Stiffeners shall be fabricated from the same material as Frames.
   1. Head of Frames: 12-gage.
F. Internal Reinforcing Tabs: fabricate from the same material and gage thickness as Frame.
G. Hardware Reinforcements:
   1. Exterior Frames: Reinforcing Plates shall be fabricated from the same material as the Frame in the minimum thickness as follows:
      a. Hinges and Pivots: 1/4" plate full width of frame x 10".
      b. Continuous Hinges: 14-gage full width of frame x entire frame length.
      c. Strike Hardware: 7-gage.
      d. Flush Bolts: 7-gage.
      e. Closers: 7-gage.
      f. Surface-Mounted Hardware: 7-gage.
      g. Hold-Open Arms: 7-gage.
      h. Surface Panic Devices: 7-gage.
H. Grout Guards: Grout Guards fabricated from the same material as the Frame in minimum 22-gage thickness.
I. Frame Anchors:
   1. Fabricate from Metallic-Coated Steel Sheets, unless indicated otherwise.
      a. Masonry Wall: not less than 2" wide x 10" long Anchors.
         1) Non Grouted Frames: 14 gage T-Strap Anchors.
         2) Grouted Frames: 14-gage perforated Adjustable Strap & Stirrup Anchors.
            a) Wire Loop Anchors of 0.156" diameter steel wire may be used at non-fire-rated frames that are fully grouted.
      b. Concrete Walls: 14-gage Pour In Place Anchors.
      c. Stud Frame Walls: 16-gage Combination Wood/Steel Stud Anchors.
         1) Anchor shall be not less than 2" wide x 10" long.
      d. Jamb Base: 14-gage Fixed Floor Anchors.
      e. Floor Base: 14-gage Existing Wall Anchors.
         1) Where indicated: 14 gage continuous Rough Buck Anchors.
      f. Prepared Openings: 14-gage Existing Wall Anchors.
         1) Where indicated: 14 gage continuous Rough Buck Anchors.
J. Fasteners:
   1. Screws, bolts, washers, shields, spacers and other similar fastening devices:
      a. Furnish and install as required by frame installer.
      b. Outside exterior face glass stops: Stainless steel vandal resistant screws.
      c. Stainless Steel Frames: Stainless Steel fasteners.

2.8 TEMPERATURE RISE DOORS AND FRAMES

A. Performance Requirements:

1. Fire Rating: [**60,**][**90,**][**120**] minutes
2. Window Wall Assemblies: Frame Certification, ASTM E119, NFPA 252 "Standard Methods of Fire Tests of Door Assemblies," NFPA 257 "Fire Tests for Fire Window Assemblies and Glass Block Assemblies," UL 263 "Fire Test of Building Construction and Materials," and UL 9 "Fire Tests of Window Assemblies."
3. Testing Laboratory: Fire Tests shall have been conducted by an approved independent testing laboratory, similar to Warnock Hersey International or Underwriter's Laboratories, Inc.
4. Fire resistance rated Wall/Door Assembly shall have a neat, finished appearance with minimum joints at decorative corner intersections.

B. Specified Temperature Rise Fire-Rated Framing System:
   1. Specified: **TECHNICAL GLASS PRODUCTS** “Fire Frames Heat Barrier Series”.

C. Temperature Rise Fire Rated Framing System Components:
   1. Steel: Internal tube steel framing per ASTM A501. Formed steel retainers galvanized per ASTM A653.
   2. Glazing Stops (Beads): Extruded steel.
   3. Insulation:
      a. Specified: **Promatect-H** “Mineral Wool Fire Stop Insulation”.
   4. Fasteners: All fasteners shall be zinc-plated steel.
   5. Framing Covers:
      a. Extruded aluminum alloy 6063-T5 (standard) or aluminum alloy 5052 when anodized.
   6. Glazing Accessories:
      a. Calcium Silicate Setting Blocks.
      b. Approved Glazing Gaskets, Compound and Tapes:
         1) EPDM glazing gaskets
         2) Close cell PVE tape
         3) Pure silicone sealant. Intumescent tape.
      c. All other accessories necessary for a complete installation.
   7. Door Hardware:
      a. Temperature Rise Rated Framing Doors: manufacturer furnish hardware for specified rating.
         1) Hardware shall be per the door manufacturer's standard recommended and approved hardware.
         2) Cylinders and keying: Coordinate with Specification Section - HARDWARE.
         3) All Hardware shall be BHMA Certified.

D. Temperature Rise Rated Framing System Fabrication:
   1. Steel Frame: Profiled steel tubing permanently joined with steel bolts.
      a. Pre-weld frame assemblies.
      b. When necessary, splice frames too large for shop fabrication or shipping or to fit in available building openings.
      c. Knock-down door perimeter frames are not permitted.
   2. Insulation: Insulate framing system against effects of fire, smoke and heat transfer from either side. Insulate profiled steel tubing using a shell construction that incorporates Mineral Wool Fire Stop Insulation intermediate interlayer.
   3. Glazing Stops (Beads): Fabricate with dimensions recommended by manufacturer to securely hold glazing material in place.
   4. Fasteners: Type recommended by manufacturer.
   5. Prepare steel door assemblies for field mounting of hardware.

2.9 FABRICATION

A. Shop Assembly:
   1. General:
      a. NAAM-HMMA Standard 850 "Fire-Rated Hollow Metal Doors and Frames."

b. Fabricate to the required size and profiles by accurately forming, welding edges straight, sharp and true. Corner bends shall be true and straight and of minimum radius for the gage of metal used.
c. All finish work shall be strong, rigid and neat in appearance with corners, hairline joints and surfaces free from warp, wave, buckle, tool marks, surface imperfections or other defects.
d. Welding to conform to applicable standards of AWS for high grade finished metal fabrication. All exposed welds shall be ground, filled and dressed smooth with no voids, tool marks, surface imperfections or ridges showing to make them invisible and provide a smooth flush surface.
e. Assemblies shall be shop fabricated and permanently assembled before shipment.
    1) Where shipping limitations so dictate, frames for large openings shall be fabricated and prepared in section designated for assembly in the field and clearly identified.

2. Metal Door Fabrication:
    a. General:
        1) NAAMM-HMMA Standard 810 "Hollow Metal Doors".
        2) All doors shall be of the types and sizes required and shall be fully welded seamless construction with smooth surfaces without visible joints of seams on exposed faces or edges.
        3) Glazed Lites shall be factory cut openings in doors.
        4) Provide weep-hole openings in the bottom of exterior doors to permit the escape of entrapped moisture.
    b. Face Sheets: Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door.
    c. Core: Stiffeners shall extending full-door height and spanning the full thickness of the interior space between door faces.
        1) Space Stiffeners no more than 6" apart and securely attached to both face sheets by spot welds spaced a maximum of 5" o.c..
        2) Solidly pack cavities the entire height of door with mineral-fiber insulation.
            a) Fire Door Cores: As required to provide fire-protection and temperature-rise ratings as indicated.
    d. Top and Bottom Edges: Closing Channels shall extend the full width of the door at top and bottom edges.
        1) All doors shall have recessed Closing Channels, spot welded to both faces. When left exposed, fill all gaps with epoxy sealer and filler, sand smooth with no tool marks or surface imperfections.
        2) All doors shall have flush-filler Closing Channels in addition to recessed Closing Channels. Channels shall be continuously welded and ground smooth with no marks at all doors.
            a) Flush-filler Closing Channel shall be omitted at bottom edge when recess channel is required for hardware.
    e. Jamb Edges: Reinforcing Channels shall extend the full height of the door.
        1) Edge profiles shall be provided on both vertical edges of doors as follows:
            a) Single-Acting Swing Doors: beveled 1/8" in 2".
            b) Double-Acting Swing Doors: rounded on 2-1/8" radius.
        2) Astragal: Flat x 1-1/2 inch, continuous welded to panel, ground smooth with no tool marks or surface imperfections. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
            a) Provide overlapping astragal on one leaf of pairs of doors where required for fire-performance rating or where indicated.
            b) At exterior doors, provide overlapping astragal at strike. Cope astragal around strike plate.

f. Hardware Reinforcements: Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware contractor.
   1) Where surface-mounted hardware is to be applied, doors shall have reinforcing plates only under the face of door.

g. Glazing Moldings and Stops: Provide glazing moldings and stops to secure glazing material and louvers. Moldings and stops shall be flush with face sheets of door. Use the same trim profile on all Fire-Rated and Non Fire-Rated Openings.
   1) Fixed Glazing Moldings shall be securely welded to both face sheets of door.
   2) Removable Glazing Stops shall be channel shaped and have mitered hairline corner joints. Drill and dimple stop for countersinking and concealment of fasteners spaces equally at 9" o.c. maximum and a maximum of 2" from ends. Snap-on attachments will not be permitted.
   3) Metal surfaces underneath the glazing stops and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a with a rust inhibitive primer prior to installation in the door.
   4) Coordinate depth and rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

h. Louvers: Flush opening with all welded construction.
   1) Internal channels securely welded to the inside of both face sheets of door.
   2) Provide vertical reinforcement at midpoint when louver width exceeds 18" inches.

3. Metal Frame Fabrication:
   a. General:
      1) NAAMM-HMMA Standard 820 "Hollow Metal Frames”.
      2) All frames shall be welded units of the sizes and profiles indicated and shall be of seamless hollow construction with smooth surfaces without visible joints of seams on exposed faces or edges.
      3) Metal Frame Spreaders shall be temporarily attached at bottom of all open frames for shipping and storage.
   b. Frame Sections: All frames are to be rolled and brake formed with integral nailing flanges, back bends, faces, rabbits, stops, and soffits, unless indicated otherwise.
      1) Provide 3 ½ inch wide integral Nailing Flanges at exterior frames. The flange shall be continuous all around the frame at head, jambs and wall sills without gaps at the corner joints. Coordinate flange length with height of concrete curb.
      2) Punch and Dimple frames at attachment points for countersinking and concealment of all through the frame anchorage fasteners.
   c. Frame Joints:
      1) Perimeter Corners: Head, Jamb and Wall Sills Members shall be saw-mitered and fully (continuously) welded along entire joint from the throat or the unexposed side at Flanges, Returns, Faces, Rabbet, Stops, and Soffits.
      2) Perimeter Butts: Entire joint shall be fully (continuously) welded along entire joint at Flanges, Returns, Faces, Rabbet, Stops, and Soffits from the throat or the unexposed side of the frame.
         a) Interior Frames: Continuously weld only the Faces. Rabbits, Stops and Soffits shall to be tightly fitted and appear as a hairline seams.
         b) Vertical Mullions members shall extend through Floor Sill Members to floor. Floor Sill Members Stops are to be notched.
      3) Internal Flush and Indented Butts: Vertical Mullions Members shall be continuous, butt to Head and Sill Members and extend through Horizontal Rail Members. Vertical Mullion Stops are to be notched at Head and Sill Members and the Horizontal Rail Stops are to be notched to Vertical Member. Continuously weld only the Faces.
         a) Exterior Frames: Body Putty continuously along entire joint at returns, rabbets, stops, and soffits creating a water tight joint. Sand flush and smooth with no voids or ridges.

b) Interior Frames: Rabbits, Stops and Soffits shall to be tightly fitted and appear as a hairline seams.

d. Alignment and Reinforcing Tabs: Provide internal alignment and reinforcing tabs at each joint of field splices with a minimum overlap of 2".
e. Internal Frame Stiffeners: Provide additional continuous steel "U" Channel extending the full width of frame and shall be factory welded into head of frame.
   1) Grouted Frames with openings greater than 4'-0" width.
   2) Frames with openings greater than 12'-0" in width.
f. Hardware Reinforcements: Frame shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware contractor.
   1) Where surface-mounted hardware is to be applied, frames shall have reinforcing plates only under face of frame.
g. Grout Guards: Provide at all hardware preparations, tapped mounting holes, glazing stop screws, silencers, and electrical box preparations on frames that are to be grouted.
   1) Weld guards to inside of frame at throat.
h. Glazing Stops: Provide channel shaped removable Glazing Stops to secure glazing material or panels. Glazing Stops shall be continuous and have butted hairline corner joints.
   1) Coordinate stop depth and rabbit width between fixed and removable stops with type of glazing and type of installation indicated.
      a) Stop Depth: 5/8" depth minimum.
   2) Drill and Dimple stops for countersinking and concealment of fasteners uniformly spaced at 9 inches o.c. maximum and not more that 2 inches maximum from each corner.
   3) Metal surfaces underneath the glazing stops and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a with a rust inhibitive primer prior to installation in the door.

4. Frame Anchors:
   a. Coordinate the type of frame anchors with the type of frame insulation or grout being used so that the frame is fully packed with no voids.
   b. All Frame Anchors shall be securely welded to the throat at inside of frames.
   c. Frame Anchor Spacing: All Frame Anchors at head, jamb and sill shall be placed a maximum of 8" from frame corners, and ends, with the remainder of the anchors to be equally spaced, not to exceed a maximum of 24" o.c. for all walls types unless indicated otherwise.
      1) Masonry Walls: The spacing of anchors shall be equally spaced, not to exceed a maximum of 24" on center. Total number of anchors provided on each jamb shall be not less than the following:
         a) Frames up to 7'-6" height: 4 anchors.
         b) Frames 7'-6" to 8'-0" height: 5 anchors.
         c) Frames over 8'-0" height provide 5 anchors plus 1 additional anchor for each 2' - 0" or fraction thereof in height over 8'-0".
      2) Stud Framed Walls: The spacing of anchors shall be equal spaced, not to exceed a maximum of 18" on center. Total number of anchors provided on each jamb shall be not less than the following:
         a) Frames up to 4'-0" height: 4 anchors.
         b) Frames 4'-0" to 7'-6" high: 5 anchors.
         c) Frames 7'-6" to 8'-0" height: 6 anchors.
         d) Frames over 8'-0" height provide 6 anchors plus 1 additional anchor for each 2'-0" or fraction thereof in height over 8'-0".
      3) Jamb Base: Provide floor anchors for each jamb and mullion that extends to floor.

a) When conditions do not permit the use of a floor anchor, an additional jamb anchor shall be substituted at a location not to exceed 8" from the base of the jamb.

4) Floor Base: When conditions do not permit the use of Existing Wall Anchors at floor sill members, provide continuous rough buck for frame anchorage.

5. Rubber Door Silencers: Except on weather/sound strip or fire gasket doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
   a. Single Swing Door Frames: Provide and install 3 at strike jamb.
   b. Double Swing Door Frames: Provide and install 4 at head.

B. Fabrication Tolerances:
   1. General: Clearances and Tolerances shall be in accordance with NAAMM-HMMA Standard 862 for Exterior Assemblies and NAAMM-HMMA Standard 861 for Interior Assemblies.

2.10 FINISHES

A. Shop Priming:
   1. After fabrication, all tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities.
   2. Clean and chemically treat (phosphatize) the metal to insure maximum paint adhesion in preparation for primer paint.
   3. Apply rust-inhibitive primer paint to all surfaces, minimum dry thickness of 0.7 mils. Manufacturer to provide primer for prolonged exposure that are compatible with substrate and field-applied coatings.
      a. Coordinate primer used with field-applied paint finishes that are indicated and specified.
      b. Shop Primer shall not be considered as a substitution for any primer required as part of the field-applied paint finishes.
      c. Rust-inhibitive primer shall be fully cured before packaging and shipment.

B. Shop Finishes:
   1. Factory-applied Paint Finish:
      a. Temperature Rise Rated Framing: Apply manufacturer’s standard powder coating finish system complying with AAMA [**2603**][**2604**][**2605**].
         1) Comply with manufacturer’s written instructions for surface preparation including pretreatment, application, and minimum dry film thickness.
         2) Applied to factory-assembled frames before shipping.
         3) Color and Gloss: Color as selected by Architect from Manufacturer’s full range of colors.
   2. Exposed Metal Finishes:
      a. Stainless Steel Finish: Comply with NAAMM HMMA 802 Manufacturing of Hollow Metal Doors and Frames "Finishes for Stainless Steel." Refer to NAAMM’s "Metal Finishes Manual" for recommendations relative to applying and designating stainless steel finishes.
         1) Unpolished Finish: No. 2B, bright cold rolled finish.
         2) Polished Finishes:
            a) No. 6 Soft Satin Finish, low reflectivity and produced by Tampico brushing the No. 4 finish using a medium abrasive.
            b) No. 8 Most Reflective Finish, produced by polishing with successively finer abrasive, then budding with a very fine buffing compound until free of grit lines caused by preliminary grinding.
         3) All grained finishes applied to frames and jambs shall be vertical. Finishes applied to the frame header and sills shall be horizontal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:
   1. Prior to the installation of the work under this specification section, examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work under this specification section.
   2. Temperature Rise Rated Framing System:
      a. Openings shall be plumb, square and within allowable tolerances recommended by manufacturer. Maximum 3/8" shim space at all walls.
   3. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
   4. Report conditions detrimental to performance of the work under this specification section. Proceed with installation only after unsatisfactory conditions have been corrected.
   5. Installation of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Protection:
   1. Protect all adjacent surfaces from damage from work under this specification section.
B. Surface preparation:
   1. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling and dressing, as required to repair area smooth, flush and invisible on exposed faces.
   2. Prior to installation, All frames with temporary spreaders removed, shall be checked for size, and swing, and corrected to installation tolerance for squareness, alignment, twist and plumbness. Securely brace frames and maintain installation tolerances within the following limits.
      a. Opening Width: Plus 1/16-inch, minus 1/32 inch, measured from rabbet to rabbet at top, middle and bottom of frame.
      b. Opening Height: Plus 1/16-inch, minus 1/32 inch, measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extension at each jamb and cross the head.
      c. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
      d. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
      e. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines and perpendicular to plane of wall.
      f. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
   3. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General:
   1. Install metal doors and frames plumb, rigid, properly aligned and securely fastened in place; comply with NAAMM-HMMA Standard 840, "Installation and Storage of Hollow Metal Doors and Frames."
   2. Install in accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.

3. Install Fire-Rated and Smoke-Control Assemblies in accordance with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and NFPA 105 "Standard for the Installation of Smoke Door Assemblies and Other Openings."

B. Frames:
   1. Set frames accurately in position, plumbed, aligned, and temporarily braced secure, until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
      a. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
      b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
         1) At exterior frames, Body Putty smooth entire joint continuously along returns, rabbets, stops, and soffits creating a watertight joint. Sand flush with no voids or ridges.
   2. Solidly insulate within the throat of all non-grouted exterior and interior frames for the full depth, width and length of frame.
      a. Provide fire-rated mineral fiber insulation as required to provide fire-protection and temperature-rise ratings as indicated at Fire Rated Assemblies.
      b. Inject expanding foam insulation as required.
   3. Jamb Base: Secure in place frame anchors to floor with post-installed expansion anchors.
   4. Floor Base: Secure frames in place with post-installed expansion anchors to floor. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
   5. Masonry and Concrete Walls: Coordinate installation of frames to allow the solidly fill the space between frames and masonry or concrete with grout. Take precautions, grout in lifts and brace frames, to ensure that frames are not deformed or damaged by grout forces.
      a. Field apply bituminous coating to backs of all frames that are filled with grout.
      b. Install door silencers in frames before grouting.
   6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
   7. Stud Frame Walls: Secure frames in place with screw fasteners at frame anchors to wall framing.
   8. In-Place Stud Frame Walls: Secure frames in place with screw fasteners at frame anchors to wall framing. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
   9. Frame and Wall Joints: Provide joint sealants to maintain watertight and airtight continuous seals that aesthetically join dissimilar materials without causing staining or deterioration of joint substrates. Application of sealants shall be in strict compliance with manufacturer's instructions.
      a. Provide integral color sealants at exterior joints and paintable sealants at interior joints.
      b. Clean out joint between frames and masonry or concrete to a depth of 3/4 inch. Fill with rod and sealants.
   10. Field-apply compatible and paintable sealant at all frame joints that are exposed to the exterior for the full depth of the frame at returns, rabbits, stops and soffits.

C. Doors: Fit doors accurately in frames, within clearances specified below. Shim as necessary.
   1. Non-Fire-Rated Doors:
      a. Between door and frame at jambs and head, 3/16 inch maximum.
      b. Between edges of pairs of doors, 3/16 inch maximum.
      c. Door Sill Clearances: Coordinate with threshold conditions and floor materials.
         1) Between bottom of door and top of threshold, 3/8 inch maximum.
         2) Between bottom of door and floor with no threshold, 3/4 inch maximum.

2. Fire-Rated and Smoke-Control Doors: Install doors with clearances according to NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and NFPA 105 "Standard for the Installation of Smoke Door Assemblies and Other Openings."
    a. Between bottom of door and floor covering surface, 1/2 inch maximum.

D. Glazing Stops:
1. Coordinate and comply with installation requirements for all glazing indicated and specified.
2. Secure Glazing Stops to frames and doors with corrosion resistant countersunk flat or oval-head machine screws.
    a. All exterior screws (head, jamb and sills) shall be attached with a bed of sealant at the penetration point into the frame for a positive seal against water intrusion.
    b. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
3. All exterior stops shall receive a full bed of sealant at back channel leg for the full length of opening, during final glazing installation for positive seal against water intrusion.
    a. Coordinate sealants with the requirements of the glazing specified.

E. Temperature Rise Rated Framing System:
1. Install per Manufacturer's written instructions.
2. Set continuous sill members and flashing in full sealant bed to produce watertight installation.
3. Firmly pack perimeter of framing system to rough opening with mineral wool fire safing / fire stop insulation or appropriately rated intumescent sealant.
4. Do not install damaged frames or chipped glazing units.
5. Install plumb and true. Limit out of plumb or true to 1/8 inch in 10'-0" in any dimensions.
6. Fasteners: Type and spacing as recommended by manufacturer.
7. Install glazing in strict accordance with fire resistant glazing material manufacturer's specifications.
    a. The glazing material perimeter shall be separated from the perimeter framing system with approved flame retardant glazing tape.
    b. The glazing panels shall be caulked continuously around the edge to the tube steel frame utilizing neutral cure silicone.
    c. Set glass using calcium silicate, or setting blocks.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.
2. Mock-Up Assemblies:
    a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
        1) The Project Inspector, the Architect, Contractor's Superintendent and Sub-contractor's Superintendent shall visually inspect for water penetration.
        2) A Thermal Imagining process conducted by a Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
        3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.
    b. Reports:
        1) Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-Up Assemblies tested.

B. Inspection:
1. Notification: Schedule all inspections. Notify the Architect, Project Inspector and any regulatory agencies of the time at least 48 hours prior to the inspection.
2. Regulatory Requirements: No work shall be excepted without the required inspections being performed.

3.5 ADJUSTING

A. Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operation condition. Coordinate with hardware suppliers for function and use.

B. Remove and replace defective work, including work that is warped, bowed, or otherwise unacceptable.

3.6 CLEANING

A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
   1. Immediately clean all adjacent surfaces from all foreign materials.
   2. Immediately remove grout, sealants and any foreign materials from bonding to metal doors and frames.
   3. In accordance with manufacturer's instructions and recommendations.

B. Metal Doors and Frames finishes shall be clean and ready of application of any additional finishes after installation.
   1. Prime-Coat Surfaces: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
   2. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
   3. Stainless Steel Surfaces: Scratched and marred surfaces (including field welding) shall be cleaned and promptly be finished smooth. Refinish to match original finish.

C. Temperature Rise Rated Framing System: Limit repair and touch-up to minor repair of small scratches. Use only manufacturer's recommended products.
   1. Repairs shall match original finish for quality, material and view.
   2. Repairs and touch-up shall not be visible from a distance of 5 feet, Owner and Architect to approve.

3.7 PROTECTION

A. Protect and maintain conditions that ensures the work is without damage or deterioration until the time of Completion has been executed.
   1. Maintain in a manner acceptable to manufacturer's and installer's warranty.

END OF SECTION

SECTION 08 31 13 – ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all materials, labor, equipment and services necessary to furnish and install Equipment Access Doors, accessories and other related items necessary to complete Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 06 10 00 ROUGH CARPENTRY
4. 08 11 00 METAL DOORS AND FRAMES
5. 09 24 00 CEMENT PLASTER
6. 09 29 00 GYPSUM BOARD
7. 09 91 00 PAINTING

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
2. Submit manufacturer's standard color range for selection by the Architect.

C. Shop Drawings.

1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

B. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.

C. Project Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.

D. Warranty in accordance with Specification Section - WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
2. Manufacturer/Supplier Qualifications:
   a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. In accordance with Specification Section - REGULATORY REQUIREMENTS.

C. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   a. Coordinate the work with other work being performed.

b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.5 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section - WARRANTIES:

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 ACCESS DOORS

A. Specified: **MILCOR** INCORPORATED, INC. “Style AP, DW, AT, K or M Access Door.”
B. Design shall match material conditions present in each specific location.
C. In Cement Plaster locations, provide not less than 16 gage frames with a minimum of 24 gage expanded or perforated metal wings designed to finish flush with plaster.
D. Size: Refer to Architectural, Plumbing, Mechanical, and Electrical Drawings.
E. Material: Steel Frame and Door.
F. Operation: Manual
G. Lock: Key operated cylinder lock
H. Finish: Shop Primed, unless otherwise noted.
   1. In Shower, Toilet, or Locker Rooms all exposed portions shall be brushed stainless steel.
I. Fire Rating: To match wall or ceiling assembly in which doors are located in accordance with Underwriters Laboratories ratings.
   1. Continuous Hinges shall not obscure rating of doors and frames.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

2. Coordinate access doors with related items specified under other Sections to ensure proper and adequate interface of work. Particular attention is called to all Plumbing, Mechanical, and Electrical Specifications and drawings and the full cooperation required with that subcontractor's needs and work.

3.2 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

END OF SECTION

SECTION 08 70 00 – HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Building Hardware materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 05 12 00 STEEL AND FABRICATIONS
4. 06 10 00 ROUGH CARPENTRY
5. 06 41 23 MODULAR CASEWORK
6. 07 92 00 SEALANTS
7. 08 11 00 METAL DOORS AND FRAMES
8. 09 91 00 PAINTING
9. 10 05 00 MISCELLANEOUS SPECIALTIES

1.2 DEFINITIONS

A. AFF: Above Finished Floor.

B. LABEL: Shall mean "FIRE DOOR ASSEMBLY" as defined in CBC Section 702.

C. LDW: Less Door Width.

D. NRP: Non Removable Pin.

E. POT: Path of Travel (as defined by DSA/ACS and the CBC).

1.3 REFERENCE STANDARDS

A. ADA-S: Americans with Disabilities Act 2010 Standards.

B. ASAHC: American Society of Architectural Hardware Consultants.

C. ASTM: American Society of Testing Materials

1. ASTM E283 Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimum (Test method for)

D. BHMA: Builders Hardware Manufacturers Association.

E. DHI: Door and Hardware Institute.

F. HMMA: Hollow Metal Manufacturer's Association.

G. NFPA: National Fire Protection Association.

H. UL: Underwriter's Laboratories.

I. WH: Warnock Hersey.

1.4 COORDINATION

A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.

1. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field-verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.5 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Coordination Drawings:

1. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.

C. Product Data.

1. Submit manufacturer's technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish (including any custom colors), and other information necessary to show compliance with requirements.
2. Provide Key Control System submittal for review prior to fabrication or ordering. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled

D. Shop Drawings – (Hardware Schedule):

1. Submit shop drawings (Hardware Schedule) showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work. Include the following information:
    a. Type, style, function, size and finish of each Hardware Item.
    b. Name and manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of each hardware set cross-referenced to indications on the drawings both on the floor plans and in door and frame (opening) schedule as prepared by the Architect.
    e. Explanation of all abbreviations, symbols, and codes contained in schedule.
    f. Mounting locations for hardware.
    g. Door and frame sizes and materials.
    h. Keying information.
2. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
3. Furnish as-built/as-installed schedule with close-out documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information.

E. Quality Assurance/Control Submittals:

1. Certificates:
    a. Submit three (3) copies of certificates.
    b. Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.
        1) Provide a statement on the certificate that all hardware has been furnished in accordance with the Contract Documents.
        2) Provide a statement on the certificate that all hardware has been installed correctly and in proper working order.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

B. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.

C. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.

D. Warranty in accordance with Specification Section - WARRANTIES.

1.7 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
      b. Firm must be a recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project, and that employs an experienced Architectural Hardware Consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
         1) Responsible for detailing, scheduling and ordering of finish hardware.
         2) Supplier shall meet with the Owner to finalize keying requirements and to obtain final instructions in writing.
         3) Stock parts for products supplied and be capable of repairing and replacing hardware items found defective within warranty periods.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CBC General Requirements:
         1) Buildings on a K-12 Public School Campus shall be provided with locks which allow doors to classrooms and any room with an occupant load of five or more persons to be locked from the inside per CFC 1010.1.11 and CBC 1010.2.8.2.
            a) Locks shall conform to the specification and requirements of CFC Section 1010.2.
            b) Exceptions include doors which are normally locked from the outside, relocatable moved within the same campus, and reconstruction projects.
         2) Adjust closers so that beginning from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum, per CBC Section 11B-404.2.8.1.
         3) Where Flush Bolts occur in the POT, they shall be Automatic Flush Bolts (accessible).
         4) Lever handles shall return to within 1/2 inch off door face.
         5) Hand-activated hardware shall be mounted between 34" to 44" AFF; lever-type hardware, panic bars, push-pull activating and lever for thumb-turn dead bolt hardware shall comply with CBC Section 11B-308 Reach Ranges and 11B-404.2.7 Door and Gate Hardware.
            a) All hand activated hardware shall be easy to operate with one hand, without tight grasping, pinching, or twisting of the wrist to operate; the force required to activate operable parts shall be 5 pounds maximum, per CBC 11B-309.4.
         6) Force for pushing or pulling doors shall be a maximum of 5 lbs at exterior and interior doors per CBC Section 11B-404.2.9.
         7) Thresholds in the POT shall be in conformance with CBC Section 11B-404.2.5.
         8) All rated doors are to be positive latching and self-closing.
         9) All 20-minute rated assemblies shall be provided with approved gasketing material so installed to provide a seal where the door meets the stop on both sides and across the top.

10) Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
    a) Where emergency exit devices are required on fire-rated doors, (with supplementary marking on door's UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware."
11) Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

C. Certificates:
    1. Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.

D. Meetings:
    1. Pre-installation Conference: Scheduled by the Contractor prior to the start of work.
        a. Review hardware schedule, products and installation procedures.
        b. Review Owner's keying standards.
        c. Coordinate the work with all other related work.
        d. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
    2. Progress Meetings: Scheduled by the Contractor during the performance of the work.
        a. Review proper installation of work progress.
        b. Identify any installation problems and acceptable corrective measures.
        c. Identify any measures to maintain or regain project schedule if necessary.
    3. Final Inspection: Scheduled by the Contractor upon proper completion of the work.
        a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
        b. Maintain installed work until the Notice of Substantial Completion has been executed.

E. Meetings:
    1. MEETING 1 - PRE-INSTALLATION MEETING.
        a. Scheduled by the Contractor prior to the start of work.
        b. To be held with the Contractor, Trade Contractor(s), Designer and FUSD personnel.
        c. Review hardware schedule, products, and installation procedures.
        d. Review Owner's keying standards.
        e. Provide a plan for coordinating the work with all other related work.
        f. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
        g. Review specific FUSD hardware requirements.
        h. Review schedule for FUSD to deliver FUSD supplied components.
    2. MEETING 2 - 10% PROGRESS MEETING:
        a. Scheduled by the Contactor at 10% of the performance of the work.
        b. To be held with the Contractor, Trade Contractor(s) and the FUSD Lock Personnel.
        c. Contractor to notify FUSD Project Manager and FUSD Lock Personnel at (559) 457-3331
        d. FUSD Lock Personnel will examine all installed hardware for proper function and installation.
        e. Scheduled by the Contractor during the performance of the work.
        f. Review proper installation of work progress.
        g. Identify any installation problems and acceptable corrective measures.
        h. Identify any measures to maintain or regain project schedule if necessary
    3. MEETING 3 - 70% PROGRESS MEETING:
        a. Scheduled by the Contactor at 70% of proper completion of the work.
        b. To be held with the Contractor, Trade Contractor(s), Designer and the FUSD Lock Personnel.

c. Contractor to notify FUSD Project Manager and FUSD Lock Personnel at (559) 457-3331.
d. FUSD Lock Personnel will examine all hardware for proper function and installation.
e. Inspect and identify problems.
f. Establish method and procedures to maintain protections while progressing to project completion.
g. Inspect and identify problems that may impede issuance of warranties or guaranties.
h. Maintain installed work until the Notice of Substantial Completion has been executed.

4. MEETING 4 - FINAL REVIEW
   a. Scheduled by the Contactor at 100% completion of the work.
   b. To be held with the Contractor and Designer as part of the Final Review.
   c. Refer to the Punch List Certificate.
5. PUNCH LIST CERTIFICATE:
6. Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds the requirements, is completely installed, lubricated, adjusted, inspected and is otherwise complete.
   a. The Certificate shall be furnished upon the request for Final Review and included into the O/M Manuals.
   b. The letter shall include in the title "Punch List Certificate" and include the Contractor / Trade Contractor description of the inspections performed and any issues observed and addressed.
7. KEYING FOR ALL LOCKS
   a. All keying to be as directed by the District.
   b. Construction Keying for Interior locks: 0-Bit keyed by Hardware Supplier with keying information provided by FUSD and installed by Contractor.
   c. Construction Keying for Exteriors locks: I/C Cores #23-030 and construction keys shall be furnished by FUSD Key/Lock Department.
   d. At the time of final acceptance of work, FUSD will remove construction I/C Cores and key door to new system.
   e. All District issued keys and construction keys issued to the Contractor or Sub Contractor must be returned to the Key Shop before the release of the retention money, no exceptions.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped.
   2. Packaging of door hardware shall be the responsibility of the supplier.
      a. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule.
         1) Two or more identical sets may be packaged in same container.
   3. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted at final inspection.

B. Acceptance at Site:
   1. Products shall be labeled also with model numbers, catalog numbers, function and finish, identification related to final hardware schedule, and include basic installation instructions with each item or package.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

2. Provide secure lock-up for door hardware delivered to the Project, but not yet installed.
    a. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.9 CHANGES IN THE WORK:

A. Should changes be made in the Finish Hardware, the Hardware Supplier shall credit the District with the full purchase price. No restocking charge will be permitted or allowed.

1.10 WARRANTY

A. FUSD requirements for Guarantee.
    1. Refer to the F.U.S.D. General Conditions and Requirements for Contract Close-out.
B. Contractor's General Warranty:
    1. In accordance with Specification Section - WARRANTIES.
C. Manufacturer's Warranty:
    1. In accordance with manufacturer's written standard warranty.
    2. Closers: 10 Years.
    3. Electronic Closers: 2 Years.
    4. Exit Devices: 10 Years.
    5. All other hardware: 10 Years.
D. Installer's Warranty: 1 Year.
    1. In accordance with the terms of the Specification Section – WARRANTIES.

1.11 POST CONSTRUCTION SERVICES.

A. 90-Days after the "Notice of Completion" the Contractor (and trade contractor) shall adjust all hardware.
B. 11-Moths after the "Notice of Completion" the Architect, and Contractor (and trade contractor) shall hold a review of all hardware. Replacing and adjusting any hardware that is subject to the provisions of the warranty.

1.12 MAINTENANCE

A. Extra Materials:
    1. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 SUBSTITUTIONS

A. The District has established District Standardized Products. Refer to FUSD Resolution 18-08.
B. For products not subject to the District Standardized Products, written approval of District will permit substitutions for materials specified. Refer to Fresno Unified School Districts General Conditions and General Requirements, Substitutions, for procedure.

2.3 MATERIALS

A. Base Metals: Produce hardware units of basic metal and forming method indicating using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified within this specification section for applicable hardware units for finish designations indicated.

B. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

C. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.

D. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.

1. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely.

2.4 HINGES

A. General:

1. Specified: **HAGER.**
    a. Alternate: **STANLEY**.
2. Templates: Provide only template-produced units.
3. Provide Phillips flat-head screws complying with the following requirements:
    a. For metal doors and frames, install machine screws into drilled and tapped holes.
    b. Finish screw heads shall match surface of hinges or pivots.

B. Butt:

1. Provide hinge pins as follows:
    a. Out-Swing Exterior Doors: Nonremovable pins.
    b. Out-Swing Corridor Doors with Locks: Nonremovable pins.
    c. Interior doors: Nonrising pins.
    d. Tips: Provide flat button and matching plug, finished to match leaves.
2. Provide the number of hinges indicated, but not less than the following guidelines:
    a. Doors with heights up to 60 inches: 2 Hinges.
    b. Door with heights 61 to 90 inches: 3 Hinges.
    c. Doors with heights 91 to 120 inches: 4 Hinges.
    d. For doors with heights more than 120 inches, provide four hinges, plus one additional hinge for every 30 inches of door height greater than 120 inches.
3. Hinges shall be sized in accordance with the following:
    a. Height:
        1) Doors up to 41" wide: 4-1/2 inches.
        2) Doors 42" to 48" wide: 5 inches.
    b. Width: Sufficient to clear frame and trim when door swings 180 degrees.

C. Pivot:

1. Pivots shall be high strength forgings and castings with precision bearings for smooth operation. Positive locking vertical adjustment mechanism to allow installer to precisely position the door and balance the load.

D. Continuous:

1. Specified: **MARKAR**.
    a. Alternate: **PEMKO.**
2. Continuous hinges shall be UL rated as required.

3. Continuous hinges shall not obscure fire-rating labels of doors or door frames.

2.5 CYLINDERS AND KEYING

A. Lock Cylinders:
   1. **SCHLAGE** "D" Series.
      a. Alternate: **FALCON LOCK.** "T" Series.
      b. Alternate: **BEST LOCK** "9K" Series.
   2. Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.

B. Keying:
   1. Review the keying system with the Owner and provide the type required (Master, grandmaster or great-grandmaster), either new or integrated with the Owner's existing keying system.
      a. The Owner's existing Grandmaster System is "Classic" Schlage Keyways:
         1) [**C**][**CE**][**E**][**F**].
      b. Equip locks with cylinders for construction-core pin tumbler inserts. Provide only temporary inserts for the construction period, and remove these when directed.
         1) Provide final cores and keys prior to Architect's initial punch list.
   2. Key Blanks: Provide Standard "6" pin bow key blank; tag to identify.
   3. Provide keys manufactured from nickel silver only.
   4. Supply keys and blanks as follows:
      a. Supply 2 cut change keys for each different change key code.
      b. Supply 1 uncut key blank for each change key code.
      c. Supply 6 cut master keys for each different master key set.
      d. Supply 4 uncut key blanks for each master key set.
   5. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
      a. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."

C. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4" diameter steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller. Strike alloy deadbolt with reinforcer and two 3" long screws. ANSI A156.5, 1992 Grade 1 certified.

2.6 KEY CONTROL SYSTEM

A. Specified: **KEY CONTROL SYSTEMS, INC.**
   1. Alternate: **TELKEE INC.**

B. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended in writing by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.
   1. Provide hinged-panel type cabinet for wall mounting, or multiple-drawer type cabinet. Coordinate location with the Architect. Provide submittal for review before fabrication or ordering.

2.7 LOCKS, LATCHES, AND BOLTS

A. Specified: **IVES**.
   1. Alternate: **GLYNN-JOHNSON.**
   2. Alternate: **TRIMCO**.

B. All doors shall be operable from within, without the use of a key by merely rotating the latching handle.

C. All doors in areas used by students shall be self-releasing type, operable from within without the use of a key or special knowledge or effort.

D. Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.

E. Lock Protectors:
   1. Lock astragals shall be provided with internally threaded fasteners for flat head machine screws. No hex head or carriage bolt fasteners will be permitted.
   2. Must be through bolted to door.

F. Provide 5/8-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on fire rated fire openings.
   1. Provide 1/2-inch minimum throw of latch for other bored and preassembled types of locks
   2. Provide 3/4-inch minimum throw of latch for mortise locks.
   3. Provide 1-inch minimum throw for all dead bolts.

G. Provide flush bolt heads a minimum of 1/2 inch diameter rods of brass, bronze, or stainless steel with minimum 12-inch-long rod for doors up to 7'-0" in height.
   1. Provide longer rods as necessary for doors exceeding 7'-0" in height.
   2. Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
   3. Manual Flush Bolts only permitted on storage or mechanical openings as scheduled.
   4. Provide dust-proof strikes at openings using bottom bolts.

H. Provide keyed dogging devices on doors equipped with exit devices.
   1. Do not provide keyed exit devices on fire rated doors equipped with exit devices.

I. Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts.

J. Locksets and Latchsets in Acoustical Doors And Frames require a 3-3/4" backset; verify and coordinate.

K. All egress doors shall comply with AB 211 (2009-2010).

2.8 EXIT / PANIC DEVICES

A. Specified: **VON DUPRIN** "98" Series, cylinder dogging, trim ANSI Function 03 #990NL-R.
   1. Alternate: **PRECISION** "1100" Series, cylinder dogging, trim ANSI Function 03 #17C.

B. Panic hardware shall comply with CCR Title 24, Part 12, Chapter 12-10-302 (a).
   1. The release mechanism shall be so designed that a horizontal force of 15 lbs. or less will actuate the release bar and latches applied in the direction of travel.

C. No surface mounted vertical rods are allowed.

D. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 standards.

E. Device shall bear UL label for fire and or panic as may be required.

F. Removable Mullions:
   1. Removable with single turn of building key, and securely reinstalled without need for key.
   2. All removable mullions shall be steel or aluminum clad steel whether or not the opening is fire-rated or not.

G. No manual Flush Bolts on egress doors.

2.9 PUSH / PULL UNITS

A. Specified: **IVES**.
   1. Alternate: **TRIMCO**.

B. Provide manufacturer's standard exposed fasteners for installation, thru-bolted for matched pairs but not for single units.

2.10 DOOR CONTROL DEVICES

A. Specified: **LCN**.
   1. Alternate: **NORTON**

B. Door closer cylinders shall be of high strength cast iron construction with double heat-treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation.
   1. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory.
   2. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.

C. Except as otherwise specifically indicated, comply with manufacturer's written recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.
   1. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.
   2. Effort to operate shall conform to CBC Section 11B-404.2.9 accessibility requirements as follows:
      a. Exterior/Interior doors 5.0 pounds maximum.
         1) The Authority having Jurisdiction may increase the maximum effort to operate Fire Doors to achieve positive latching, but not to exceed 15 lbs maximum.

D. Where manual closers are indicated for doors required to be accessible, provide adjustable units complying with ANSI A 117.1 and CBC Section 11B-404.2.8 provisions for door opening force and delayed action closing.

E. Where combination door closers and holders are indicated, provide units designed to hold door in an open position under normal usage and to release and close door automatically under fire conditions.
   1. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts.
   2. When indicated, provide integral smoke detector device in combination door closers and holders complying with UL 228, Second Edition.

F. Provide gray resilient parts for exposed bumpers.

G. Closures indicated for use on Acoustical Doors and Frames shall allow for a minimum 1/2" up-down movement due to the Cam-Lift hinges.

H. Floor Closers shall be equipped with compression springs, cam and roller operating mechanism and a one piece spindle-cam for maximum operating performance and longevity.

2.11 DOOR CONTROL DEVICES

A. Specified: **IVES**.
   1. Alternate: **GLYNN-JOHNSON CORP**.
   2. Alternate: **TRIMCO**.

2.12 ASTRAGALS

A. Specified: **REESE**.
   1. Alternate: **HAGER.**

2.13 KICKPLATES

A. Specified: **IVES**.
   1. Alternate: **TRIMCO**.

B. Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.

C. Fabricate edge trim of stainless steel to fit door thickness in standard lengths or to match height of protection plates.

D. Fabricate protection plates not more than 1-1/2 inches less than door width on hinge side and not more than 1/2 inch less than door width on pull side by height indicated.
   1. Protection plates shall be stainless steel, 0.050 inch (18 gage).

2.14 DOOR STOPS

A. Specified: **IVES**.
   1. Alternate: **TRIMCO**.
B. Coordinate the installation of backing in walls with the door supplier, aligned with the top and bottom of doors.
C. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
D. All Floor Stops shall be installed within four (4) inches maximum from the face of wall, bollard or partition.
E. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
F. At all Toilet Room Partition Doors, provide stops at adjacent walls or partitions. Stops shall be aligned with the top and bottom of Toilet Partition Doors, and shall be installed on both the Door and the adjacent wall or partition.
   1. Specified: **McMASTER-CARR**
   2. Provide neoprene spring rubber rod, 1-1/2" diameter. Polish exposed surfaces. Secure with Stainless Steel Fasteners.

2.15 SEALS

A. Specified: **PEMKO**
   1. Alternate: **NATIONAL GUARD**.
B. Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled.
   1. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
   2. Provide silicone gasket at all rated and exterior doors, in accordance with ASTM E283.
C. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
D. Provide silencers for hollow metal frames, 3 for single doors, 2 for pairs of doors.
   1. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.16 THRESHOLDS

A. Specified: **PEMKO**
   1. Alternate: **NATIONAL GUARD**.
B. Provide standard metal threshold unit of type, size, and profile as shown or scheduled.
C. Exterior Doors: Provide units not less than 4 inches wide, formed to accommodate change in floor elevation, fabricated to accommodate door hardware and to fit door frames.

2.17 DOOR SHOES & DOOR TOP CAPS

A. Specified: **IVES**.
   1. Alternate: **TRIMCO**.
B. Provide galvanized door shoes at all exterior wood doors and galvanized top caps at all exterior out-swing doors.

2.18 FASTENERS

A. Furnish all necessary fasteners required to securely anchor all hardware in position for heavy use and long life. Fastener types and sizes to be per hardware manufacturer's recommendations, suitable for fastening to material to which hardware is applied. Fastener materials and finishes to

match hardware items. At no time are self-tapping / threading fasteners allowed on panic/exit hardware or any of the device's parts including strike plate.

B. Fastener Types:
   1. To Wood: Phillips flat head, countersunk wood screws, full-threaded.
   2. To Metal: Phillips flat head, countersunk machine screws, full-threaded.
   3. Butt Hinges: Phillips flat head, countersunk wood screws, full-threaded.
   4. Strikes, Face Plates and Similar Items: Phillips flat head, countersunk.
   5. Push-Pull and Kick Plates: Phillips oval head.
   6. Closer and closer shoes to doors and panels-above-doors.
   7. Thru-Bolts and Grommets (sex-bolts), sleeved.
   8. Panic hardware to doors. Thru-Bolts and Grommets (sex-bolts), sleeved.
   9. Self-Tapping sheet metal screws: Do not use.
   10. Screws at Interior Doors and Frames: To match hardware finish.
   11. Screws at Exterior Doors and Frames: US26D Stainless Steel.

2.19 FINISHES

A. General:
   1. All hardware shall be satin chromium (US26D – 626) unless otherwise noted.
   2. Provide push plates, pull plates and kick or armor plates in satin stainless steel (US32D – 630) unless otherwise noted.
   3. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
   4. Aluminum items shall be finished anodized aluminum (US28 – 628), except thresholds which can be furnished as standard mill finish.

B. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).

C. Provide finishes that match those established by BHMA or, if none established, match Architect's sample.

D. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

E. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."

F. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. Finishes shown by certain manufacturers for their products.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
      a. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed in writing by the manufacturer.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
    a. Coordinate electrical power needs for those hardware items requiring electrical interface.
    b. Coordinate electrical alarm needs (security, fire/smoke detection) for those hardware items requiring electrical alarm interface.
2. Provide all required hardware templates.

B. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Coordinate the blocking required for all wall mounted hardware.
3. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
    a. Hardware distributor shall assist and advise installer in correcting field problems arising during installation of hardware.
    b. Hardware distributor shall be on the Project within 48 hours upon being notified by the Contractor.
    c. Hardware distributor shall assist installer in the proper adjustment of all door closers, and other operating devices.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by the Architect.
    a. Steel Doors and Frames: "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
    b. Door opening devices shall be installed at 34" minimum to 44" AFF maximum height per CBC Section 11B-404.2.7. Coordinate height to avoid overlaying vision glass.
5. Install each hardware item in compliance with the manufacturer's written instructions and recommendations. Where indicated and where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 09 Sections.
    a. Do not install surface-mounted items until finishes have been completed on the substrate involved.
6. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
7. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
8. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Specification Section - SEALANTS.
9. Weatherstripping and seals shall comply with manufacturer's written instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.4 FIELD QUALITY CONTROL

A. Inspection:
1. Contractor shall inspect all hardware to assure that it was installed correctly and is in proper working order.
2. The Contractor shall schedule an inspection prior to substantial completion, and notify the Owner's Inspector and any regulatory agencies of the time 48 hours prior to the inspection.

a. The inspection shall cover checking all locks and verifying that they have been installed in accordance with the hardware schedule and the keying schedule.

3.5 ADJUSTING

A. Adjusting:

1. Adjust and check each operating item of hardware and each door to ensure proper operations or function of every unit.
    a. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
        1) Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area.
        2) Clean operating items as necessary to restore proper function and finish of hardware and doors.
        3) Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.6 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.

1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.

3.7 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.

1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
    a. Provide the services of a factory-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
        1) Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.

3.8 SCHEDULES

A. The hardware schedule should be used as a guide only. In case of omissions, provide hardware in accordance with that scheduled for a similar opening.

3.9 HARDWARE SCHEDULE

MANUFACTURER	INITIALS
ADAMS RITE	AR
BEST ACCESS	BE
GLYNN-JOHNSON	GJ
HAFELLE	HAF
HAGER	HAG
IVES	IV
LCN	LCN
MARKAR	MK
NATIONAL GUARD	NG
NORTON	NOR
PEMKO	PK
PRECISION	PR
REESE	RE
SARGENT	SAR
SCHLAGE	SC
ACOUSTICAL DOOR AND FRAME MANUFACTURER (See Specification Section - ACOUSTICAL DOORS AND FRAMES)	ADM

STANLEY	ST
STOREFRONT MANUFACTURER (See Specification Section - STOREFRONTS)	SM
TRIMCO	TR
VON DUPRIN	VD

HW GROUP NO. 01

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL CLASSROOM SEC	ND98P6D RHO IS-CRS	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW B4E-CS	630	TRM
1	EA	FLOOR STOP/HOLDER	1267	626	TRM
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 02

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL CLASSROOM SEC	ND98P6D RHO IS-CRS	626	SCH
1	EA	OH STOP & HOLDER	100H ADJ	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW B4E-CS	630	TRM
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 03

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL CLASSROOM LOCK	ND94P6D RHO	626	SCH
1	EA	OH STOP & HOLDER	100H ADJ	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW B4E-CS	630	TRM
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

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HW GROUP NO. 04

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	630	IVE
1	EA	VANDL CLASSROOM LOCK	ND94P6D RHO	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW B4E-CS	630	TRM
1	EA	WALL STOP/HOLDER	1260W	626	TRM
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SHOE	153A	A	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 05

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96P6D RHO	626	SCH
1	EA	SURFACE CLOSER	4040XP SHCUSH	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW B4E-CS	630	TRM
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 06

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	VANDL OFFICE LOCK	ND91P6D RHO	626	SCH
1	EA	WALL STOP	1270CV	626	TRM
1	EA	GASKETING	188SBK PSA	BK	ZER

HW GROUP NO. 07

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CORRIDOR LOCK W/ INDICATOR	ND73P6D RHO OS-OCC	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW B4E-CS	630	TRM
1	EA	WALL STOP	1270CV	626	TRM
1	EA	GASKETING	188SBK PSA	BK	ZER

HW GROUP NO. 08 – NOT USED

HW GROUP NO. 09 - HARDWARE PER DETAIL

HW GROUP NO. 01PAD

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	PADLOCK	KZW1	-	MASTER

HW GROUP NO. 89

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	HINGE CLOSER	MAMMOTH-180	BLACK	LOC
1	EA	PANIC HARDWARE	98-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	FLOOR STOP / HOLDER	FS42 W/ 1268CK TRIMCO PLATE ANCHOR	626	IVE

END OF SECTION

SECTION 08 80 00 – GLASS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all glass materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 07 92 00 SEALANTS
4. 08 11 00 METAL DOORS AND FRAMES
5. 09 91 00 PAINTING
6. 10 05 00 MISCELLANEOUS SPECIALTIES
7. 10 14 00 IDENTIFYING DEVICES
8. 10 28 13 TOILET ACCESSORIES

1.2 DEFINITIONS

A. Manufacturer is used in this Section to refer to a firm that produces primary glazing, fabricated glazing, or both as defined in the referenced glazing standards.

B. 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 directions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

C. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written directions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated glass standard.

D. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and improper practices for maintaining, and cleaning insulating glass contrary to manufacturers written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on the interior surfaces of glass.

E. f.o.b. – "Free On Board".

F. Glass Surfaces:

1. Single Glazed:
   a. Surface #1: exposed to outdoors.
   b. Surface #2: exposed to indoors.
2. Dual Glazed:
   a. Exterior Lite:
      1) Surface #1: exposed to outdoors.
      2) Surface #2: faces insulating "air" space. Primary location for energy efficient coatings.
   b. Interior Lite:
      1) Surface #3: faces insulating "air" space. Secondary location for energy efficient coatings.
      2) Surface #4: exposed to indoors.

1.3 REFERENCE STANDARDS

A. AAMA: American Architectural Manufacturers Association.

B. ANSI: American National Standards Institute.

C. ASTM: American Society for Testing and Materials.

1. ASTM C920 Elastomeric Joint Sealants (Specification for)
2. ASTM C1036 Flat Glass (Specification for)
3. ASTM C1048 Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass (Specification for)
4. ASTM C1172 Laminated Architectural Blast Glass (Specification for)
5. ASTM C1281 Preformed Tape Sealants for Glazing Applications (Specification for)
6. ASTM E1300 Determining Load Resistance of Glass in Buildings (Standard Practice for)
7. ASTM E774 the Classification of the Durability of Sealed Insulating Glass Units (Specification for)

D. CSPC: Consumer Products Safety Commission.

E. FGMA: Flat Glass Marketing Association Glazing Manual, 1990 Edition.

F. GANA: Glass Association of North America

G. GTA: Glass Tempering Association.

H. IGCC: Insulating Glass Certification Council.

I. LSGA: Laminated Safety Glass Association.

J. SGCC: Safety Glazing Certification Council.

K. SIGMA: Sealed Insulating Glass Manufacturers Association.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Coordination Drawings:

1. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.

C. Product Data.

1. Submit manufacturer's product data for each glazing product and accessory material indicated.

D. Samples.

1. Provide 12-inch square sample of each glass type, color and pattern selected.
2. Provide 6-inch square samples of insulated glazing panels for each glazing type and pattern selected.
3. Provide 12-inch-long samples of each type of glazing sealant, gasket or glazing tape. Install sealant or glazing material sample between two strips of material representative in color of the adjoining framing system.

E. Quality Assurance/Control Submittals:

1. Test Reports:
   a. Compatibility and Adhesion Test: From sealant manufacturer indicating that glazing sealants were tested for adhesion to glass and glazing channel substrates and compatibility with glass and other glazing material.
2. Certificates:
   a. Contractor's Certification.
   b. Qualification Data:
      1) Material Qualifications.
      2) Installer Qualifications.
      3) Manufacturer/Supplier Qualifications.
   c. Product Certificates:
      1) Fire-Resistive Ceramic Glazing materials.
3. Manufacturer's Written Instructions:

a. Manufacturer's written installation instructions for all products.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
B. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
C. Warranty in accordance with Specification Section - WARRANTIES.
   1. Special Warranties:
      a. Coated Glass Products.
      b. Laminated Glass Products.
      c. Insulated Glass Products.
      d. Insulated Glazing Products.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Comply with published recommendations of glazing product manufacturers and organizations listed, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
      b. Obtain glazing from one source for each product indicated.
   2. Installer Qualifications:
      a. An experienced Installer who has completed three (3) projects similar in materials, design and extent to that indicated for this Project; whose work has resulted in glass installation with a record of successful in-service performance.
   3. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. All glazing shall comply with provisions of CBC Chapter 24 for quality standards and CBC Section 2403.1 for identification.
      b. All glazing subject to Hazardous Locations shall comply with Safety Glazing Requirements and CBC Chapter 2406.
C. Certificates:
   1. Contractor's Certification: Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the Code Minimum requirements, and the other specified requirements of this Section.
   2. Qualification Data: Contractor's installation certificates.
   3. Product Certificates: Glazing materials manufacturers certifying that their products comply with specified requirements.
   4. Fire-Resistive Ceramic Glazing materials certification that products comply with CPSC Requirements.
D. Meetings:
   1. Pre-Installation: Schedule prior to the start of work.
      a. Coordinate the work with other work being performed.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
      c. Pre-glazing conference: Scheduled by the Contractor prior to the start of any glazing operation for the proper performance of the work.

1) Minimum agenda shall be to review the work required; discuss field observations, problems, and decisions; corrective measures if necessary; and maintenance of quality and work standards in accordance with manufacturer's warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
      a. Protect glazing materials to comply with manufacturer's written directions and as needed to prevent damage to glazing and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
   2. Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator's recommendations for venting and sealing to avoid hermetic seal ruptures.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and Protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.
      a. Do not install liquid sealants when ambient and substrate temperature conditions are outside of limits by glazing sealant manufacturer or below 40 deg F.

1.9 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: from date of Substantial Completion.
   1. In accordance with manufacturer's written standard warranty.

C. Manufacturer's Warranty on Coated Glass Products: 5 Years.
   1. Submit written warranty 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 of Project Site, within specified warranty period.

D. Manufacturer's Warranty on Laminated Glass Products: 5 Years.

1. Submit written warranty signed by insulating glass manufacturer agreeing to replace laminated glass units that deteriorate as defined in the "Definitions" article, f.o.b. the nearest shipping point of Project Site.

E. Manufacturer's Warranty on Insulating Glass Products: 10 Years.
   1. Submit written warranty signed by manufacturer of insulating glass agreeing to replace insulating glass units that deteriorate as defined in "Definitions" article, f.o.b. the nearest shipping point of Project Site, within specified warranty period.

F. Manufacturer's Warranty on Acoustical Glass: 10 Years.
   1. Submit written warranty signed by manufacturer of acoustical glass agreeing to replace acoustical glass units that deteriorate as defined in "Definitions" article, f.o.b. the nearest shipping point of Project Site, within specified warranty period.

G. Manufacturer's Warranty on Insulated Glazing Panels: 20 Years.
   1. Submit written warranty signed by manufacturer of Insulating Glazing Panels agreeing to replace Insulating Glazing Panels that deteriorate due to crazing, cracking, color fading and delamination under ordinary conditions.

H. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure, including loss or glazing breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.

B. Glass Design: Glass thickness indicate minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for the various size openings in the thicknesses and strengths (annealed or heat-treated) to meet or exceed the following criteria:
   1. Minimum glass thickness for lites in exterior walls shall be not less than 6.0mm (1/4" nom.).

C. Thermal Movement: Provide glazing that allows for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures acting on glass-framing members and glazing components. Base engineering calculation on material's actual surface temperatures due to both solar heat gain and nighttime sky heat loss.
   1. Temperature Change Range: 120 deg F, ambient; 180 deg F, material surfaces.

D. Load resistance of glass under uniform load shall be determined in accordance with ASTM E1300 per CBC Section 2404.1.

E. Glass framing shall comply with CBC Section 2403.3.

2.2 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
   1. Class 1 materials:
      a. Specified: **VITRO ARCHITECTURAL GLASS**.
         1) Alternate: **AFG INDUSTRIES, INC.**
         2) Alternate: **CARDINAL GLASS INDUSTRIES**.
         3) Alternate: **GUARDIAN INDUSTRIES CORPORATION**
         4) Alternate: **PILKINGTON SALES (NORTH AMERICA) LTD.**
   2. Class 2 materials, Applied Coating:

a. Specified: **VIRACON INC.**
b. Acceptable Alternative Class 2 Applied Coating manufacturers:
1) Alternate: **AFG INDUSTRIES, INC.**
2) Alternate: **CARDINAL GLASS INDUSTRIES**.
3) Alternate: **GUARDIAN INDUSTRIES CORPORATION**.
4) Alternate: **PILKINGTON SALES (NORTH AMERICA) LTD.**
5) Alternate: **VITRO ARCHITECTURAL GLASS**.

3. Specified Laminated Glass product manufacturer, or approved equivalent:
a. Specified: **OLD CASTLE GLASS**, See schedule at the end of this section for type.
b. Interlayer Manufacturers:
1) Specified: **SOLUTIA INC.** “Clear Interlayers”.
2) Specified: **SOLUTIA INC.** “Colored Interlayers: VANCEVA”.
3) Specified: **DU PONT** SENTRYGLAS EXPRESSIONS “Custom Graphic Interlayer”.

4. Specified Insulating Glazing Panel product manufacturer, or approved equivalent:
a. Specified: **MAPES INDUSTRIES, INC.**

5. Specified Glazing Tapes and other Accessory manufacturer, or approved equivalent:
a. Specified: TREMCO Glass Tapes "440 Tape".
1) Alternate: **ADCO** "ADCOSEAL GT-1 or GT-4".

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.3 MATERIALS

A. General:
1. All glazing shall comply with all provisions of CBC Chapter 24.
a. Provide the required strength of glazing to comply with the area limitation set forth in CBC Table 2403.2.1 for individual lites.
2. Refer to the Glass Schedule of this section for the class of each Glazing Type.
3. Refer to the Insulating Glazing Panel Schedule of this section for the class of each Insulated Glazing Panel Type.

2.4 ANNEALED FLOAT GLASS

A. ASTM C1036, Type I, and ASTM C1048, Type (transparent glass, flat), Quality q3 (glazing select), of Class indicated.

2.5 HEAT-TREATED FLOAT GLASS

A. ASTM C1048 Type I (transparent glass, flat), Quality q3 (glazing select), of class, kind and condition indicated.
B. Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.
C. Provide Kind HS (Heat-Strengthened) float glass in place of annealed float glass where needed to resist thermal stresses indicated by differential shading of individual glass lites and to comply with glass design requirements.
D. Uncoated Glass: Comply with the requirements for Condition A.
E. Coated Glass: Comply with the requirements for Condition C.
F. Tempered: Provide Kind FT (Fully Tempered) float glass in place of annealed or Kind HS (Heat Strengthened) float glass where safety glass is indicated.

2.6 LAMINATED GLASS

A. ASTM C1172, laminated glass indicated and compliance with other requirements specified, and with the following:

B. Refer to annealed and heat-treated glass requirements relating to properties of glass products comprising laminated glass products.

C. Interlayer: Of material and thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

D. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:

1. Laminate lites with interlayer film in autoclave with heat plus pressure.

2.7 INSULATED GLASS

A. General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated inter-space, and complying with ASTM E774, of Class CBA units and with requirements specified.

B. Provide Kind HS (Heat-Strengthened) float glass in place of annealed glass where needed to resist thermal stresses inducted by differential shading of individual glass lites and to comply with glass design requirements.

C. Tempered: Provide Kind FT (Fully Tempered) glass where safety glass is indicated.

D. Overall Unit Thickness and Thickness of each lite dimension indicated for insulating glass units are nominal and the overall thickness of units are measured perpendicular from outer surfaces of glass lites at unit's edges.

E. Sealing System: Dual seal with primary and secondary sealants as follows:

1. Manufacturers standard sealants.

F. Spacer: Manufacturers standard spacer material and construction, compatible with dehydrating gas filler.

2.8 INSULATED GLAZING PANELS

A. See Insulated Glazing Panel Schedule at the end of this section for types and texture of panel faces, overall panel thickness, types and thickness of stabilizers, types and thickness of cores, minimum R-Values required, and any spandrel glass requirements.

B. When Porcelain Enamel faces exceed five feet in any one direction, provide 24 gage face in lieu of 28 gage face.

2.9 ACCESSORIES

A. Elastomeric Glazing Sealants:

1. General: Provide products of type indicated, complying with the following requirements:
    a. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glazing products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
    b. Suitability: Comply with sealant and glazing manufacturer's written recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.
    c. Colors: Provide color of exposed joint sealants to comply with the following:
        1) Match colors indicated by reference to manufacturer's standard designations.
        2) Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.
2. Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C920, requirements indicated in Specification Section - SEALANTS, including those referencing ASTM classifications for Type, Grade, Class and Uses.

B. Glazing Sealants for Fire-Rated Glazing Products:

1. Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

C. Glass Tapes:

1. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, non-staining and non-migrating in contact with nonporous surfaces, with or without spacer rod as recommended in writing by tape and glazing manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with ASTM C1281, and AAMA 800 "Voluntary Specifications and Test methods for Sealants" for products indicated below:
    a. AAMA Section 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

D. Miscellaneous Glass Materials:
1. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glass materials involved for glass application indicated, and with a proven record of compatibility with surfaces contacted in installation.
2. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
3. Setting Blocks: Elastomeric material with a Shore Type A durometer hardness of 85 plus or minus 5.
4. Spacers: Elastomeric blocks or continuous extrusions with a Shore Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
5. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side-walking).
6. Plastic Foam Joint Fillers: Pre-formed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.
7. Perimeter Insulation for Fire-Resistive Glass: Identical to product used in test assembly to obtain fire-resistive rating.

2.10 FABRICATION

A. Fabricate glass and other glass products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instruction and recommendations of product manufacturer and referenced glazing standard, to comply with system performance requirements.

B. Clean cut or flat grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

C. Grind smooth and Polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
    a. Examine glass framing, with glazier present, for compliance with the following:
        1) Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
        2) Presence and functioning of weep system for aluminum framing systems, and proper sealing of hollow metal frame systems with no weep systems.
        3) Minimum required face or edge clearances.
        4) Effective sealing between joints of glass-framing members.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
   3. Clean glass channels and other framing members receiving glass immediately before glazing.
   4. Remove coatings that are not firmly bonded to substrates.
   5. Wipe down any mirror backing with alcohol before applying mirror adhesives.

3.3 INSTALLATION

A. Glass, General:
   1. Comply with installation standards of CBC Chapter 24.
      a. Glass subject to human impact shall be installed in accordance with CBC 2406.
   2. Comply with combined written instructions and recommendations of manufacturers of glass, insulated glass panels, sealants, gaskets, and other glass materials, except where more stringent requirements are indicated, including those in referenced glazing publications.
   3. Glass channel dimensions, as indicated on Drawings, provide necessary bite on glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
   4. Protect glass from edge damage during handling and installation as follows:
      a. Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.
      b. Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.
   5. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
   6. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
   7. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
   8. Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:
      a. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glass tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
      b. Provide 3.0mm (1/8" nom.) minimum bite of spacers on glass and use thickness equal to sealant width. With glass tape, use thickness slightly less than final compressed thickness of tape.
   9. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.
   10. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

B. Tape Glazing:

1. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sight-line of stops.
    a. Slightly recess tape at exterior conditions, and continuously cap bead with elastomeric sealant leaving no open joints.
2. Install tapes continuously but not in one continuous length.
    a. Do not stretch tapes to make them fit opening.
3. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs.
4. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
5. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped.
6. Do not remove release paper from tape until just before each lite is installed.
7. Seal joints in tapes with compatible sealant approved by tape manufacturer.
    a. Apply continuous heal bead of elastomeric sealant at all exterior hollow metal framing stops.
    b. Install a continuous toe bead of elastomeric sealant at all exterior hollow metal framing stops on installations with Laminated Glass, Wire Glass or Insulated Glazing Panels.
    c. Apply continuous cap bead of elastomeric sealant over exposed edge of tape.
8. Install tapes on all fixed and loose stops.

C. Sealant glazing (Wet):
1. Install continuous spacers between glass lites and glass stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems (if any) until sealants cure.
    a. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
2. Force sealant into glass channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
3. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
    a. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion.
    a. Wash glass as recommended in writing by glazing manufacturer.

3.5 PROTECTION

A. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
2. Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass.
    a. Do not apply markers to glass surface.
    b. Remove nonpermanent labels, and clean surfaces.
3. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter.
    a. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended in writing by glass manufacturer.
4. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt,

scum, alkali deposits, or stains, and remove as recommended in writing by glass manufacturer.

5. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

3.6 GLASS SCHEDULE

A. **Gray Tinted Glass:**

1. **G2-2 Gray Float + Clear Float:**
   - a. Overall Unit Thickness: 25 mm (1" nominal).
   - b. Insulated Glazing Unit System:
     - 1) Outdoor Lite: Tinted float glass Graylite II.
       - a) Minimum Thickness: 6 mm (1/4 inch nominal).
       - b) Heat Treated: per ASTM C1048 Kind HS.
     - 2) Interspace: 1/2 inch.
       - a) Spacer Material: Manufacturer's standard.
       - b) Content: Air.
     - 3) Indoor Lite: Clear float glass.
       - a) Minimum Thickness: 6 mm (1/4 inch nominal).
       - b) Heat Treated: per ASTM C1048 Kind HS.
       - c) Surface #3 Coating: Solarban 60.
   - c. Visible Light Transmittance : 7%.
   - d. Solar Heat Gain Coefficient (SHGC): 0.13.
   - e. "U" Factor:
     - 1) Winter Night-time: 0.29.
     - 2) Summer Daytime: 0.27.

2. **G2-2T Tempered Gray Float + Clear Float:**
   - a. Overall Unit Thickness: 25 mm (1" nominal).
   - b. Insulated Glazing Unit System:
     - 1) Outdoor Lite: Tinted float glass Graylite II.
       - a) Minimum Thickness: 6 mm (1/4 inch nominal).
       - b) Heat Treated: per ASTM C1048 Kind FT.
     - 2) Interspace: 1/2 inch.
       - a) Spacer Material: Manufacturer's standard.
       - b) Content: Air.
     - 3) Indoor Lite: Clear float glass.
       - a) Minimum Thickness: 6 mm (1/4 inch nominal).
       - b) Heat Treated: per ASTM C1048 Kind FT.
       - c) Surface #3 Coating: Solarban 60.
     - 4) Visible Light Transmittance: 7%.
   - c. Solar Heat Gain Coefficient (SHGC): 0.13.
   - d. "U" Factor:
     - 1) Winter Night-time: 0.29.
     - 2) Summer Daytime: 0.27.
   - e. Remarks:

END OF SECTION

SECTION 09 24 00 – CEMENT PLASTER

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Cement Plaster materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS
2. DIVISION 01 SPECIFICATION SECTIONS
3. 04 22 00 CONCRETE MASONRY UNITS
4. 06 10 00 ROUGH CARPENTRY
5. 05 12 00 STEEL AND FABRICATIONS
6. 07 21 00 INSULATION
7. 07 60 00 SHEET METAL
8. 07 92 00 SEALANTS
9. 08 11 00 METAL DOORS AND FRAMES
10. 08 31 13 ACCESS DOORS AND FRAMES
11. 09 50 00 ACOUSTICAL CEILINGS
12. 09 65 10 RESILIENT BASE AND ACCESSORIES
13. 09 91 00 PAINTING
14. 10 05 00 MISCELLANEOUS SPECIALTIES
15. 10 14 00 IDENTIFYING DEVICES
16. 10 21 13 TOILET PARTITIONS
17. 10 26 00 WALL AND CORNER GUARDS
18. 10 28 13 TOILET ACCESSORIES
19. 10 44 00 FIRE PROTECTION SPECIALTIES

1.2 REFERENCE STANDARDS

A. AAMA: American Architectural Manufacturers Association

B. ASTM: American Society of Testing Materials

1. ASTM A510 General Requirements for Wire Rods and Course Round Wire Carbon Steel (Standard Specification for)
2. ASTM A641 Zinc-Coated (Galvanized) Carbon Steel Wire (Standard Specification for)
3. ASTM B117 Operating Salt Spray (Fog) Apparatus (Standard Practice for)
4. ASTM C150 Portland Cement (Specification for)
5. ASTM C206 Finishing Hydrated Lime (Specification for)
6. ASTM C847 Metal Lath (Standard Specification for)
7. ASTM C897 Aggregate for Job-Mixed Portland Cement-Based Plasters (Standard Specification for)
8. ASTM C926 Application of Portland Cement-Based Plaster
9. ASTM C932 Surface-Applied Bonding Compounds for Exterior Plastering (Specification for)
10. ASTM C933 Welded Wire Lath (Specification for)
11. ASTM C954 Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness (Standard Specification for)
12. ASTM C1002 Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs (Standard Specification for)
13. ASTM C1032 Woven Wire Plaster Base (Specification for)
14. ASTM C1063 Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster (Standard Specification for)
15. ASTM C1066 Installation of Lath and Furring to Receive Interior and Exterior Portland Cement-Based Plaster (Specification for)
16. ASTM C1328 Plastic (Stucco) Cement (Standard Specification for)

17. ASTM D226 Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing (Standard Specification for)
18. ASTM D412 Vulcanized Rubber and Thermoplastic Elastomers – Tension (Standard Test methods for)
19. ASTM D522 Mandrel Bend Test of Attached Organic Coatings (Standard Test Method for)
20. ASTM D2240 Rubber Property – Durometer Hardness (Standard Test Method for)
21. ASTM D2794 Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) (Standard Test Method for)
22. ASTM D4541 Pull-Off Strength of Coatings Using Portable Adhesion Testers (Standard Test Method for)
23. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
24. ASTM E96 Water Transmission of Materials (Test Methods for)
25. ASTM E488 Strength of Anchors in Concrete and Masonry Elements (Test Methods for)
26. ASTM E1667 Driven Fasteners, Nails, Spikes and Staples (Standard Specification for)
27. ASTM G26 Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials (Standard Practice for)

C. FS: Federal Specification

D. ML/SFA: Metal Lath / Steel Framing Association - a Division of NAAMM.

E. NAAMM: National Association of Architectural Metal Manufacturers.

F. PDSM: Plaster and Drywall Systems Manual, ©1988 by BNI and McGraw-Hill, Inc., Third Edition.

G. SSMA: Steel Stud Manufacturer’s Association.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data:
   1. Manufacturer's Data for each type of product specified.
   2. Submit manufacturer's standard color range for selection by the Architect.
   3. Manufacturer's full color range (including standard, premium and custom colors) of integral color mixes for selection.
   4. Manufacturer's ICC ES Evaluation Reports (ESR) for fasteners as required.

C. Shop Drawings:
   1. Show location of all metal accessories: expansion joints, control joints, casing beads, corner reinforcements, separation screeds and reglets.
   2. Provide installation details of flashings at various types of penetrations, all metal accessories, metal lath, and integration with other related work.

D. Samples:
   1. 24-inch square field sample of each Cement Plaster Finish prepared on rigid backing for selection.
      a. Cement Plaster Finish of each pattern and texture selected prior to paint coat.
      b. Cement Plaster Finish of each pattern and texture for each color with type of paint coating selected. Coordinate with Specification Section – PAINTING.
   2. 6-inch lineal samples of each piece of specified Metal Accessory material as required for the project.

E. Quality Assurance/Control:
   1. Installer's experience.
   2. Manufacturer's certification of Installers.
   3. Manufacturer's installation instructions.
   4. Water Tightness Test Reports.
   5. Manufacturer's Field Reports:
      a. Confirm mixing and installation procedures of proprietary mixes for all coats of the cement plaster system were within manufacturers requirements.
   6. Tension Testing Reports.

1.4 CLOSEOUT SUBMITTALS

A. In accordance with Specification Section - PROJECT CLOSEOUT.

B. Warranty in accordance with Specification Section – WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Material Qualifications:
    a. Proprietary systems data sheets shall include design properties of each product.
2. Installer Qualifications:
    a. Installer shall be experienced and shall have successfully completed three (3) projects of similar scope and size to that indicated for this Project.
    b. Shall participate in a mock-up installation that was successfully tested for water tightness.
    c. Manufacturer of proprietary products shall provide written certification that the Installer is qualified to install manufacturer's systems per manufacturer's warranty requirements.
3. Manufacturer/Supplier Qualifications:
    a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. In accordance with Specification Section – REGULATORY REQUIREMENTS.

C. Field Samples:

1. Provide Field Samples for approval prior to the application of the cement plaster coats.
2. Field Samples shall be panels of a complete installation, representing each of the finish textures and colors from the approved submittal samples.
    a. The field samples shall be done by the installers for the project.
    b. The approved field samples shall establish the acceptable standards for all subsequent work.
3. When it is the Contractor's intent to incorporate the approved sample panels into the finish Project, the panels shall be located in an area relatively obscured from general view.

D. Mock-Ups:

1. Provide mock-up panels prior to application of cement plaster work and prior to installation of any exterior wall cavity and interior materials.
2. Mock-Up Assemblies:
    a. Exterior wall assemblies: integrate all other related work assemblies, including but not limited to: each type of wall openings, wall/eave interface, wall sill, parapet cap, various types of penetrations, material transitions and shall be representative of the intended end-use configuration.
        1) Minimum overall size of 10'-0" wide x 8'-0" high.
    b. Mock Ups will be used for establishing construction sequence, installation requirements of materials, and creating water tight assemblies without the cement plaster coats.
    c. May become part of the completed Work upon successful testing for water tightness.
3. Installation:
    a. The Project Inspector, the Architect, Contractor’s Superintendent and Sub-contactor's Superintendent shall observe the installation of materials.
    b. Installation crew for the Mock-Ups shall be the installers of the Cement Plaster Systems for this project and installers, as necessary, of other related work assemblies.
    c. Mock Ups shall include the installation of water barriers, penetration flashing, Metal Accessories, Metal Lath, and other related work flashings and materials.
    d. Failed Mock Ups shall be removed and the assembly reinstalled until the water tightness test is successful.

E. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
    a. Coordinate the work with all other related work.

b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.
   a. Review for proper installation of work progress.
   b. Identify any installation problems and acceptable corrective measures.
   c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
   a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Store materials inside and under cover on a level platform, six (6) inches above ground, to allow air circulation.
      a. Keep dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature: No plastering shall be done under unsuitable conditions of weather or temperature.
      a. Exterior: No plastering shall be done when prevailing temperature is 40 degrees F. or less for the preceding 24 hours prior to plastering, during the plaster operations, and for at least 48 hours after the set of each plaster coat.
         1) Apply and cure plaster to prevent plaster drying out during the curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
      b. Interior: Maintain room temperatures at greater than 40 degrees F for at least 48 hours before plaster application, and continuously during and after application.
         1) Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
         2) Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contracting surfaces during plaster application and until plaster is dry.
      c. Factory-Prepared Finishes: Comply with manufacturers written recommendations for the environmental conditions for application of finishes.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 CONTROL LAYERS

A. Water Barriers: Water-Resistive Barriers per CBC Sections 1404.2 and 2510.6:
   1. Building Wrap (also qualifies as an "Air Barrier"): Woven and non-woven polyolefin sheets approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60-minute water-resistant rating.
      a. Specified: **DuPONT** "Tyvek® Commercial Wrap".
      b. Specified: **TYPAR** “Metro Wrap”.
   2. Sealing Tape: 3" wide minimum:
      a. Specified: **DUPONT** "Tyvek® Housewrap Tape".
      b. Alternate: **CANTECH** "Clipper Tape".
      c. Alternate: **3M** "8086 Construction Sheathing Tape".
      d. Alternate: **TYPAR** “Manufacturer’s Standard”.
   3. Building Paper:
      a. Number 15 Asphalt-Saturated Type I felt per ASTM D226.
      b. Asphalt-Saturated Kraft Waterproof Building Paper approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60-minute water-resistant rating.
      c. Specified: **FORTIFIBER CORP.**
B. Penetration Flashing: Self-adhered and self-healing weather barrier strips per FS UU-B-790a, Grade A.
   1. 40 mil. minimum thickness, in 9-inch and 12-inch widths as is appropriate for barrier application.
   2. Specified: **GCP** “VYCOR V40”.
   3. Alternate: **FORTIFIBER** “Fort-I-Flash 40”.
   4. Alternate: **PROTECTO WRAP** “PW 100/40”.
   5. Alternate: **TYVEK** “FlexWrap” and “StraightFlash”.

2.3 LATH SYSTEM

A. Lath:
   1. Expanded Metal Lath:
      a. Specified: **CLARK DIETRICH**.
         1) Alternate: **AMICO**.
         2) Alternate: **CEMCO**.
      b. Galvanized steel per ASTM C847.
         1) "Diamond Mesh" Lath, 3.4 pounds per square yard.
         2) "Hi Rib" Lath, 3/8-inch rib, 3.4 pounds per square yard.
         3) "Self-Furred Diamond Mesh" Lath, 3.4 pounds per square yard.

2. Woven Wire Fabric Lath:
   a. Specified: **GEORGETOWN WIRE COMPANY**
   b. Alternate: **DAVIS WIRE COMPANY**.
   c. Alternate: **JAENSON WIRE COMPANY**.
   d. Galvanized steel per ASTM C1032, and ASTM C1066.
   e. 1-1/2-inch x 17 gage (0.0540 inch) hexagon shaped mesh, 1.86 lbs. per square yard.
   f. "Paper Backed" Woven Wire Fabric Lath and "Self-Furring" Woven Wire Fabric Lath are not acceptable.
3. Welded Wire Fabric Lath:
   a. Specified: **STRUCTA WIRE COMPANY, INC.**
   b. Galvanized steel per ASTM C933, and ASTM C1066.
      1) 1-1/2-inch x 1-1/2 inch x 17 gage (0.0625 inch) square shaped mesh, 1.14 lbs. per square yard.
      2) "Paper Backed" Welded Wire Fabric Lath is not acceptable.
      3) "Self-Furring" Welded Wire Fabric Lath without paper backing shall be acceptable.

B. Lath Fasteners:
1. Screw Anchors:
   a. Specified: **POWERS FASTENERS** "TAPPER +".

C. Furring Wads for Screws:
1. Specified: **FLANNERY TRIM INC**. "FURRING WADS".

2.4 CEMENT PLASTER MATERIALS

A. Cement: ASTM C150, Type I or II Portland Cement
B. Plastic Cement: ASTM C1328, Type M or S.
C. Miracle Lime: ASTM C206, Type S.
D. Sand: ASTM C897, Clean and washed.
1. Grading:

a. U.S. SIEVE	WEIGHT MIN	RETAINED MAX
b. NO. 4	--	0
c. NO. 8	0	10%
d. NO. 16	10	40%
e. NO. 30	30	65%
f. NO. 50	70	90%
g. NO. 100	95	100%
h. NO. 200	97	100%

2. Finish Coat Sand: Washed, white silica sand, a.k.a. "Monterey Sand."

E. Surface Applied Liquid Bonding Agent: Resinous emulsion with the following minimum requirements:
1. Minimum tensile strength of 60 psi.
2. Minimum compressive shear strength of 300 psi.

2.5 CEMENT PLASTER BASE COAT MIXES

A. Per ASTM C926.
B. Scratch Coat Mix: No additions of plasticizing agents allowed.
1. One half part Common Cement.
2. One half part Plastic Cement.
3. Four parts Sand.

C. Brown Coat Mix: No additions of plasticizing agents allowed.
1. One half part Common Cement.
2. One half part Plastic Cement.
3. Five parts Sand.

2.6 CEMENT PLASTER FINISH COAT

A. Exterior Cement Plaster:
   1. Mix: No additions of plasticizing agents allowed.
      a. One part Common Cement.
      b. One part Miracle Lime.
      c. Three parts Finish Coat Sand: Sieve Size 20 – 60.
   2. Texture: "Light Dash" as indicated in the current "Plaster and Drywall Systems Manual."
      a. "Medium Dash" when application of Elastomeric Paint finish.

2.7 ACCESSORIES

A. Fasteners: Per ASTM C1063.
   1. Staples: ASTM E1667, galvanized steel.
      a. Provide 1/4-inch furring wads at staple attachments for lath.
   2. Nails: ASTM E1667, galvanized steel.
      a. Barbed, roofing or common nails: 7/16-inch (0.437 inch) diameter head minimum, and 11 gage (0.1205 inch).
      b. Nail attachments for lath: 1/4-inch self-sealing furring wads.
      c. Tie Nails: 10d galvanized nails.
      d. Concrete Stub Nails: Corrosion Resistant, 3/8-inch-wide head minimum.
   3. Screws at Wood Framing: ASTM C1002, Corrosion Resistant.
      a. 7/16-inch (0.437 inch) minimum diameter pan wafer head and a 0.163 inch (#8) diameter shank with sharp-point.
      b. Screw attachments for lath: 1/4-inch furring wads.
   4. Screws at Metal Framing: ASTM C954, Corrosion Resistant.
      a. 7/16-inch (0.437 inch) minimum diameter pan wafer head with self-drilling and self-tapping point.
         1) [0.163-inch (#8) diameter shank w/o rigid insulation] [0.22 inch (#10) diameter shank w/ rigid insulation].
      b. Screw attachments for lath: 1/4 inch furring wads at.
   5. Power or Powder Actuated Fasteners: ASTM E488, Corrosion Resistant.
      a. Size: 3/8-inch-wide heads minimum with 0.145-inch shank diameter, in length as required to achieve specified penetration.
   6. Screw Anchor Fasteners: ASTM E488, Corrosion Resistant.
      a. Per valid ICC ESR testing applicable to installation conditions.
      b. Size: 3/16-inch diameter, in length as required to achieve specified penetration.
      c. Accessories for Screw Anchor Fasteners:
         1) Matched tolerance drill bit, dust removal device, and other accessories per written manufacturer's instructions and ICC ES Evaluation Report.
   7. Wires: ASTM A641, Galvanized (Class 1 zinc coating) soft temper steel wire.
      a. All wire diameters specified are uncoated and corresponds with United States Steel Wire Gauge (USSWG):
         1) Member to Member: Minimum 16 gage (0.0625 inch).
         2) Lath to Support Member: Minimum 18 gage (0.0475 inch).
         3) Lath to Metal Accessories: Minimum 18 gage (0.0475 inch).
         4) Lath to Lath: Minimum 18 gage (0.0475 inch).

B. Metal Accessories:
   1. Control Joints:
      a. Specified: **AMICO** No. "GripLock J Control Joint".
      b. 28 gage galvanized steel, depth as required.
   2. Casing Bead:

a. Specified: **CLARK DIETRICH** “No. 66, Short Flange Casing Bead”.
b. 26 gage galvanized steel, 1-1/2" x depth as required.

3. Outside Corner Reinforcement:
   a. Specified: **CLARK DIETRICH** “1A, Expanded Flange”.
   b. 26 gage galvanized steel, depth as required.
4. Outside Arch Corner Reinforcement:
   a. Specified: **STOCKTON PRODUCTS** “AA: Arch Aid AA10SS”.
   b. Stainless Steel, 17.5 gage wire.
5. Inside Joints Reinforcement:
   a. Specified: **CLARK DIETRICH** “#30 Construction Control Joint”.
   b. 28 gage galvanized steel, depth as required.
6. Drip Mold:
   a. Specified: **STOCKTON PRODUCTS** “BSS Blind Spot #10 Drip”.
   b. 24 gage galvanized steel, 2-3/4" x depth as required.
7. Vents:
   a. Specified: **STOCKTON PRODUCTS** “SBS Bug Stop Vent”.
   b. 26 gage galvanized steel, 3" x depth as required.
   c. Specified: **STOCKTON PRODUCTS** “SES Ember Stop Soffit Vent”.
8. Foundation Sill Screed: 3-1/2-inch minimum vertical attachment flange per CBC Section 2512.1.2.
   a. 26 gage galvanized steel, 3-1/2" x depth as required,
   b. Specified: **CLARK DIETRICH** “#FHA7 Foundation Sill Screed with weep holes”.
9. Weep Screed:
   a. 26 gage galvanized steel, 1-1/2" x depth as required with weep holes,
   b. Specified: **CLARK DIETRICH** “#66 Short Flange Casing Bead, with weep holes”.
10. Channel Screeds, Reveal Moldings, & Screeds
    a. Specified: **FRY REGLET**.
    b. Minimum 0.025 extruded aluminum alloy 6063.
    c. Provide specific shapes as shown on the Drawings.
    d. Provide manufacturer's standard channel screed "+," "T," "L," and "corners," factory fabricated intersections as required for channel screeds, reveal moldings and screeds.
    e. Provide manufacturer's standard flashing connectors between straight runs and intersections.
    f. Butt Joints shall be flush and align with other metal accessories.
    g. Provide End Caps compatible for all channel screeds, reveal moldings, and screeds that terminate at opening frames and other construction.
    h. All finishes shall be "Special Anodic Coating" clear color.
11. Single Point Separation Screed:
    a. Specified: **STOCKTON PRODUCTS** “PBS Pointed Base Screed with Keyholes”.
    b. 26 gage galvanized steel, Expanded Metal Base x depth as required,
12. Stucco Reglet: 26 gage galvanized steel:
    a. Specified: **FRY REGLET** “STX Series 2-1/2-inch flange”.
    b. Specified: **FRY REGLET** “ST Series 1-3/4-inch flange”.
    c. Accessories: Factory manufactured mitered and sealed corners, and polyvinyl chloride **FRY REGLET** "Vinylok" flashing retainer clips.

C. Metal Accessories: Zinc Alloy, Aluminum or Hot-Dipped Galvanized Steel, G-60 minimum (Coordinate depth of trim and accessories with the thicknesses and number of plaster coats).
   1. Galvanized Metal Plaster Accessories:
      a. Specified: **CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS)**.
      b. Specified: **STOCKTON PRODUCTS** (SP).
      c. Alternate: **ALABAMA METAL INDUSTRIES CORPORATION (AMICO)**.
      d. Alternate: **CEMCO**.

2. Aluminum Plaster Accessories:
    a. Specified: **FRY REGLET CORPORATION**.
    b. Alternate: **FLANNERY, INC.**
    c. Alternate: **PITTCON**.
3. Fastener:
    a. Specified: **FLANNERY, INC.**

D. Open Corner Reinforcement:
1. Cement Plaster: Expanded Metal Lath.
    a. Specified: **AMICO** "Cornalath galvanized steel".
2. Elastomeric Finish Coat: 4" x 9", 15 oz/sq. yd. minimum weight, glass fiber mesh.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with all related work specified under other sections to ensure proper and adequate interface of work.
    a. Verify and locate framing and or backing necessary for proper installation of cement plaster system.
2. Integrate Water barriers and Penetration Flashing with all flashings from all other related work for proper shedding of water out of the building.
3. Protection:
4. Project Inspector shall verify that all stud cavity walls are free of moisture and dry prior to any other construction that fully closes the wall cavity.
5. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
    a. Provide temporary protections and enclosures for other work.

B. Surface preparation:
1. Prepare surface per manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION, GENERAL

A. General:
1. It is the intent to provide a weather resistant exterior plaster system envelope upon completion.
    a. Overlap and shingle fashion all substrate barriers, papers and penetration flashing with accessories in such a way as to shed water at the midpoint flashing (i.e. floor juncture flashing, or head flashing at openings and penetrations), or allow it to weep to drainage weep holes at the foundation sill screed per CBC Section 1403 and 1404.2.
2. Per ASTM C1063, and ASTM C926.
    a. Per CBC Chapter 7, Chapter 7A, Chapter 14, and Chapter 25.

b. Per listed UL Assemblies at designated fire rated assemblies.
c. Per "The Plaster and Drywall Systems Manual" (PDSM).
d. Per Regulatory Requirements.

B. Layout:
a. Set plumb, level, and square.
b. Lines of all Metal Accessories shall be straight and true. Set accessories to create a cement plaster finish plane within a tolerance of 1/8 inch in 10 feet.
c. Apply all Brown and Finish Coats of plaster to create a finish plane with a tolerance of 1/8 inch in 10 feet.

3.4 INSTALLATION OF CONTROL LAYERS

A. Installation of Water Barriers:
1. Water barriers shall be installed at all exterior walls, exterior soffits, and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e. Toilets, Showers, Lockers, Kitchens and etc.).
2. Install Water Barriers with Penetration Flashing, Metal Accessories, and all other related work in "shingle" or "weatherboard" fashion.
3. Water Barriers shall be installed as required in CBC Sections 1404.2, 1404.3, 1405, and 2510.6 as follows:
a. Provide two layers of Water Barriers.
1) One inner layer of Building Wrap:
a) Seal all laps and penetrations with a 3" wide minimum Sealing Tape.
2) One outer layer of Building Paper.
b. The Water Barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 6 inches and free from holes and breaks.
1) Where vertical joints occur, barrier shall be lapped not less than 6 inches.
c. Exposure:
1) Maximum exposure of Water Barriers shall be 30 days prior to plaster application or less as required by Water Barrier Manufacturer.
a) Protect Water Barriers from the elements (both exposure to the sun and water) with a temporary 6-mil visqueen barrier or other material approved by the barrier manufacturer.

B. Installation of Penetration Flashing:
1. Apply Penetration Flashing in conjunction with Water Barriers, Metal Accessories and all other related work.
2. Install Penetration Flashing at all openings and penetrations at all exterior walls and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e. Toilets, Showers, Lockers, Kitchens, etc.).
3. Install Penetration Flashings with Water Barriers, Metal Accessories and all other related work in "shingle" or "weatherboard" fashion.
4. Penetration Flashings shall be installed per CBC in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination of plaster systems.
a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
b. When an object extends through the Cement Plaster System, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

C. Installation of Metal Accessories:
1. Apply Metal Accessories in conjunction with Water Barriers, Penetration Flashings and all other related work.
2. Install Metal Accessories as required to delineate cement plaster work into areas of the following maximum size and shall be in addition to locations shown on the drawings:

a. Vertical surfaces: 144 sq.ft.
b. Horizontal and other non-vertical surfaces: 100 sq.ft.
c. Length-to-width ratios of not greater than 2-1/2:1.
d. Distances not greater than 18 feet.

3. Install Metal Accessories with Water Barriers, Penetration Flashing Sheets and all other related work in "shingle" or "weatherboard" fashion.
4. Install all Metal Accessories per manufacturer's instructions, and the PDSM.
   a. All Metal Accessories shall be fully supported per CBC, secure flanges to framing.
   b. Installed in 10 foot lengths wherever possible.
   c. All joints (butt, mitered, bent, continuing around corners, or changing directions) shall be cut accurately, welded, or folded, sealed, pop-riveted and sealed again, for a watertight joint.
      1) Special Trim Shapes joints (butt, "T," "+," "L" and inside/outside intersections) provide manufacturer's flashing connectors and factory fabricated intersections to connect shapes.
         a) Provide End Caps at all open ends and when terminated at opening frames and all other construction.
         b) Butt Joints shall be flush and align with other metal accessories.
         c) Seal all intersections and ends.
      2) Maintain the water barrier continuously behind any joint.
      3) Joints shall occur at nearest possible expansion or control joints.
   d. When an object extends through the Cement Plaster System, accurately cut and install in "shingle" or "weatherboard" fashion the Metal Accessories around the penetration. Apply sealant between the metal accessories and the penetrating object.
5. Metal Accessories shall be attached to framing members along supports.
   a. [**7 inches o.c. w/o rigid insulation**][**6 inches o.c. w/ rigid insulation**].
   b. Single Point Separation Screeds can be wire tied over Metal Lath.
   c. Where dissimilar metals come into surface contact provide electrolytic protection between dissimilar metals using neoprene, plastic sheet, EPDM rubber or other protective coating.

3.5 INSTALLATION OF LATH

A. Apply Metal Lath after the installation of Line Wire, Water Barriers, Penetration Flashings and Metal Accessories.

B. Install the various types of Metal Lath at the following conditions:
   1. Diamond Mesh Lath at horizontal and vertical surfaces over open framing members at 16 inches on center.
   2. Hi Rib Lath at horizontal and vertical surfaces over open framing members at 24 inches on center.
   3. Self Furred Diamond Mesh Lath at over Masonry and Concrete surfaces.
   4. Woven Wire Fabric Lath over Solid Sheathing.
   5. Welded Wire Fabric Lath over Solid Sheathing.
   6. Security Metal Lath at special construction and Custom Steel Fabricated Toilet Partitions.

C. Apply Metal Lath per all applicable portions of CBC Chapters 7 and 25, and ASTM C1063.
   1. Metal Lath shall be applied with long dimension of sheet perpendicular to the framing members to which it is attached.
      a. All fasteners shall be corrosion resistant equal to or **superior** to that of the lath.
      b. All lath shall be furred out away from supports and solid substrate at least 1/4 inch.
      c. Lath shall be attached to framing members along framing members except for 3/8-in. rib metal lath shall be attached at each rib [**at no more than 7 inches o.c. w/o rigid insulation**] [**at no more than 6 inches o.c. w/ rigid insulation**].
   2. Break Metal Lath at all metal accessories and cut into panels that are defined by the edges of the cement plaster metal accessories, expansion joints and the like.
      a. Perimeter of the lath panel shall be wire tied to the cement plaster metal accessories.
      b. No joints shall be permitted at any angle or corner.

3. Lapping of Metal Lath.
    a. Side laps shall be secured to framing members and shall be wire tied between supports with No. 18 gage (0.0475-inch) galvanized annealed steel wire at 9" o.c. maximum.
    b. Where end laps occur between the framing members or between attachments, the end of the metal lath sheets shall be laced or wire tied with No. 18 gage (0.0475 inch) galvanized annealed steel wire.
    c. Expanded Metal Lath shall be lapped 1/2-inch or nest the edge ribs at sides and 1" at ends.
    d. Wire Fabric Lath shall be lapped one mesh at the sides and the ends.

D. Wood Frame Construction:
1. Horizontal Framing:
    a. Screws shall be per the methods of attachment set forth in CBC Table No. 2507.2 per CBC Section 2507.3.
    b. Either of the following attachments shall be used in addition to the methods of attachment set forth in CBC Table No. 2507.2 per CBC Section 2507.3:
        1) Secure lath to alternate supports with ties consisting of a double strand of No. 18 W & M gage (0.475 inch) galvanized annealed wire at one edge of each sheet of lath. Wire ties shall be installed not less than 3 inches back from the edge of each sheet and shall be looped around stripping, or attached to an 8d common wire nail driven into each side of the joist 2 inches above the bottom of the joist or to each end of a 16d common wire nail driven horizontally through the joist 2 inches above the bottom of the joist and the ends of the wire secured together with three twists of the wire.
        2) Secure lath to each support with 1/2 inch wide, 1-1/2-inch-long No. 9 W & M gage (0.1483 inch), ring shank, hook staple placed around a 10d common nail laid flat under the surface of the lath not more than 3 inches from edge of each sheet. Such staples may be placed over ribs of 3/8 inch rib lath or over back wire of welded wire fabric or other approved lath, omitting the 10d nails.
2. Vertical Framing:
    a. Wire staples driven flush with plaster base, crown not less than 3/4 inch, shall provide not less than 3/4-inch penetration into framing members when lath is installed and shall engage not less than three strands of lath.
    b. Common nails or roofing nails driven to penetration of not less that 3/4 inch into framing members when lath is installed and shall be bent over to engage not less than three strands of lath.
        1) Nail attachments at Hi-Rib Lath shall be bent over ribs.
    c. Screws shall penetrate not less than 5/8 inch into framing members when lath is installed and shall engage not less than three strands of lath.
        1) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.

E. Metal Framed Construction:
1. Horizontal Framing:
    a. Screws shall project not less than 3/8-in. through metal framing member when the lath is installed and shall engage not less than three strands of lath.
        1) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.
    b. Where Water Barriers are not required, securely attach to metal framing members with No. 18 gage (0.0475 inch) wire ties, clips, hog rings or approved equivalent attachments.
        1) Securely attach Hi-Rib Lath to open-web steel joists by single ties of galvanized, annealed steel wire not less than No. 18 gage (0.0475 inch), with the ends of each tie twisted together 1-1/2 times.
2. Vertical Framing:
    a. Screws shall project not less than 3/8-in. through metal framing members when the lath is installed. and shall engage not less than three strands of lath.
        1) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.

b. Where Water Barriers are not required (Interior Walls), securely attach to metal framing members with No. 18 gage (0.0475 inch) wire ties, clips, hog rings or approved equivalent attachments.

F. Concrete Substrates, Horizontal and Vertical:
1. Install power driven or power actuated fasteners:
a. Penetration, min.: 3/4 inch.
b. Location: One fastener at each corner, and one fastener at midpoint of long dimension of lath sheet. Balance of locations may be same fasteners or hardened concrete stub nails.
c. Spacing:
1) Horizontal (row), max.: 16 inches on center.
2) Vertical (column), max: 7 inches on center.
d. Wire tie laps and metal accessories with expanded metal flanges. Power/powder-actuated fasten accessories with solid flanges.

G. Masonry Substrates, Vertical:
1. Install screw anchor fasteners per ICC ES Evaluation Report installation requirements.
a. Penetration: 1-1/2 inch.
b. Spacing:
1) End distance, min.: 3 inches.
2) Edge distance, min.: 1-1/2 inch.
3) Any direction, min.: 1-1/2 inch.
c. Pattern Spacing:
1) Horizontal (row), max: 16 inches.
2) Vertical (column), max: 7 inches.

H. Wire tie laps and metal accessories with expanded metal flanges. Screw anchor fasten accessories with solid flanges.

I. Attach accessories in such a manner as to ensure proper alignment during plaster application.

J. Installation of Security Metal Lath:
1. Install Security Metal Lath for Custom Steel Fabricated Metal Toilet Partitions.
2. Weld Security Metal Lath to cold rolled channels as detailed on the drawings.
a. Security Metal Lath end joints shall be butted and occur over studs; edge joints shall be butted and wire tied between supports.

3.6 INSTALLATION OF CEMENT PLASTER

A. General: Each plaster coat shall be applied without interruption to entire wall or ceiling panels to eliminate cold joints and abrupt changes in the uniform appearance of succeeding coats. Panels are defined by naturally occurring interruptions in the plane of the plaster, such as corner angles, rustications, openings, and control joints.

B. Nominal Cement Plaster Thickness over Metal Lath:
1. At open framing and sheathing substrates, Vertical and Horizontal Surfaces: 7/8" nominal.
a. Scratch Coat thickness: 3/8".
b. Brown Coat thickness: 3/8".
c. Finish Coat thickness: 1/8".
2. At concrete or masonry substrates, Vertical and Horizontal Surfaces 7/8" nominal.
a. Scratch Coat thickness: 1/2".
b. Brown Coat thickness: 1/4".
c. Finish Coat thickness: 1/8".

C. Nominal Cement Plaster Thickness over Concrete or Masonry Substrates:
1. Masonry Vertical Surfaces: 1/2" nominal.
a. Bond Coat: N/A.
b. Brown Coat thickness: 3/8".
c. Finish Coat thickness: 1/8".

2. Masonry Horizontal Surfaces: 3/8" nominal.
    a. Bond Coat: N/A.
    b. Brown Coat thickness: 1/4".
    c. Finish Coat thickness: 1/8".
3. Concrete Vertical and Horizontal Surfaces: 3/8" nominal.
    a. Bond Coat: N/A.
    b. Brown Coat thickness: 1/4".
    c. Finish Coat thickness: 1/8".
4. Where the installed plaster thickness over masonry will exceed the nominal 1/2 inch thickness, the plaster system shall be the three coat application over self-furred expanded metal lath.
5. Where the installed plaster thickness over concrete will exceed the nominal 3/8 inch thickness, the plaster system shall be the three coat application over self-furred expanded metal lath.

D. Scratch Coat Installation:
1. Cover Lath totally and completely with Scratch Coat Mix.
2. Finish: Heavily scratched at right angles to framing members to provide strong mechanical key for Brown Coat.
3. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and prior to application of Brown Coat.

E. Bond Coat Installation:
1. Apply "Surface Applied Liquid Bonding Agent" Mix solid over masonry or concrete and fill all pores completely to form bonding, water resistant finish.
2. Cure: Per Manufacturer's requirements and ASTM C932.

F. Brown Coat Installation:
1. Apply Brown Coat Mix to slightly damp, and cured Scratch Coat.
2. Finish: Dry rod to a straight even plane.
3. Float to densify at 1/8 inch in 10 feet and leave rough for finish.
    a. At exterior horizontal soffits with recessed light fixtures, provide a smooth and level brown coat finish around the perimeter of the light fixture housing.
        1) After installation of the brown coat, knock down any ridges and provide a smooth trowel finish within a distance of 3 inches around the light fixture housing. This level of finish is required, so that the light fixture lens (with a compression gasket) can be installed with full contact against the plaster system.
        2) Coordinate with the electrical contractor and obtain a sample fixture lens, and conduct a pre-cement plaster installation meeting to discuss this topic.
4. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and dry cure a minimum of 7 days, allow time for plaster to shrink prior to application of finish coats.

3.7 INSTALLATION OF CEMENT PLASTER FINISH COAT

A. Exterior Cement System:
1. Provide Open Corner Reinforcement where cement plaster is not divided or separated at opening corners. Place diagonally at all corners of openings and apply with cement adhesive on cured Brown Coat.
2. Apply 2 coats of Finish Coat Mix.
    a. First coat 1/16 inch minimum. Completely cover to create a bond with Brown Coat.
    b. Second coat 1/16 inch minimum. Apply immediately after first coat and when first coat is dry using a plaster mix of thinner consistency. Apply to create depth for texture and uniformity.
    c. Use proportionately more atomizing air at the gun nozzle.
3. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and dry cure a minimum of 7 days to allow time for plaster to shrink prior to installation of paint finish coats.

3.8 REPAIR / RESTORATION

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.9 FIELD QUALITY CONTROL

A. General: Comply with ASTM C926.
   1. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.
   2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
   3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Site Tests:
   1. As required by Regulatory Requirements.
   2. Mock-Up Assemblies:
      a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
         1) The Project Inspector, the Architect, Contractor's Superintendent and Sub-contactor's Superintendent shall visually inspect for water penetration.
         2) A Thermal Imagining process conducted by the Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
         3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.
      b. Reports:
         1) Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-Up Assemblies tested.
   3. Suspension System Anchorage:
      a. Tension Testing: Test concrete anchors that are installed for the suspension system Hanger and Bracing Wires. Testing shall occur prior to installation of any Main Runners and Cross-Furring.
         1) Must be capable of sustaining, without failure, a load equal to 200 lbs. tension for hanger wires anchors and 440 lbs. tension for bracing wires anchors by construction as determined by testing according to ASTM E488.
            a) Hanger Wire Anchors: 1 in 10 must be field tested.
            b) Bracing Wire Anchors: 1 in 2 must be field tested.
         2) If any anchor fails testing, Contractor shall remove and replace anchors, re-test replaced anchors and provide additional testing of all previously installed anchors that were not tested.
            a) When twenty (20) anchors consecutively pass testing, then resume initial testing frequency.
         3) All testing shall be done by Owner's Testing Laboratory and in the presence of the Project Inspector.
            a) Cost of additional testing and inspection, due to failure of anchor tests, shall be borne by the Contractor.
      b. Reports:
         1) The Owner's Testing Laboratory Agency shall provide a written report noting the installation and test results.

C. Inspection:
   1. As required by Regulatory Requirements and per CBC Section 2503.
   2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.

3. No work shall be without the inspections required by Regulatory Requirements.

3.10 CLEANING

A. Clean per Specification Section – PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Finish shall be clean and ready for the application of any additional finishes.
   3. Per manufacturer's written instructions and recommendations.

B. Remove temporary protection and enclosure of other work.

C. Promptly remove plaster from door frames, window and other surfaces not indicated to be plastered.

D. Repair floors, walls and other surfaces stained, marred or other wise damaged during plastering

END OF SECTION

SECTION 09 29 00 – GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Provide material, labor, equipment and services to complete GYPSUM BOARD system and related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 06 10 00 ROUGH CARPENTRY
5. 06 41 23 MODULAR CASEWORK
6. 07 21 00 INSULATION
7. 07 92 00 SEALANTS
8. 08 11 00 METAL DOORS AND FRAMES
9. 08 31 13 ACCESS DOORS AND FRAMES
10. 09 50 00 ACOUSTICAL CEILINGS
11. 09 65 10 RESILIENT BASE AND ACCESSORIES
12. 09 65 16 RESILIENT SHEET
13. 09 65 19 RESILIENT TILE
14. 09 68 40 CARPET
15. 09 72 00 WALL COVERINGS
16. 09 91 00 PAINTING
17. 10 05 00 MISCELLANEOUS SPECIALTIES
18. 10 11 00 VISUAL DISPLAY BOARDS
19. 10 14 00 IDENTIFYING DEVICES
20. 10 21 13 TOILET PARTITIONS
21. 10 26 00 WALL AND CORNER GUARDS
22. 10 28 13 TOILET ACCESSORIES
23. 10 44 00 FIRE PROTECTION SPECIALTIES

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials.

1. ASTM A641 Zinc-Coated (Galvanized) Carbon Steel Wire (Standard Specification for)
2. ASTM A653 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process (Specification for)
3. ASTM C173 Air Content of Freshly Mixed Concrete by the Volumetric Method (Test method for)
4. ASTM C473 Physical Testing of Gypsum Panels and Products (Test methods for)
5. ASTM C474 Joint Treatment Materials for Gypsum Board Construction (Standard Test Methods for)
6. ASTM C475 Joint Compound and Joint Tape for Finishing Gypsum Board (Standard Specification for)
7. ASTM C514 Nails for the Application of Gypsum Board (Standard Specification for)
8. ASTM C518 Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus (Test Method for)
9. ASTM C557 Adhesives for Fastening Gypsum Wallboard to Wood Framing (Standard Specification for)
10. ASTM C754 Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products (Standard Specification for)
11. ASTM C840 Application and Finishing of Gypsum Board (Standard Specification for)
12. ASTM C954 Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness (Standard Specification for)

13. ASTM C1002 Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs (Standard Specification for)
14. ASTM C1177 Glass-Mat Gypsum Substrate for use as Sheathing (Standard Specification for)
15. ASTM C1396 Gypsum Board (Standard Specification for)
16. ASTM C1629 Abuse-Resistant Non-Decorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels (Standard Classification for)
17. ASTM D3273 Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber (Standard Test Method for)
18. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
19. ASTM E119 Fire Tests of Building Construction and Materials (Test methods for)
20. ASTM E488 Strength of Anchors in Concrete and Masonry Elements (Test Methods for)
21. ASTM E661 Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads (Test Method for)
22. ASTM G21 Determining Resistance of Synthetic Polymeric Materials to Fungi (Standard Practice for)

B. CISCA: Ceilings & Interior Systems Construction Association.

C. DITF: Drywall Industry Trust Fund.

D. GA: Gypsum Association.

E. MPI: Master Painters Institute

F. PDCA: Painting and Decorating Contractors of America.

G. PDSM: Plaster and Drywall Systems Manual, ©1988 by BNI and McGraw-Hill, Inc., Third Edition.

1.3 MEETINGS

A. Pre-Installation: Scheduled by the Contractor prior to the start of work.
   1. Coordinate the work with other work being performed.
   2. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

B. Progress: Scheduled by the Contractor during the performance of the work.
   1. Review for proper installation of work progress.
   2. Identify any installation problems and acceptable corrective measures.
   3. Identify any measures to maintain or regain project schedule if necessary.

C. Completion: Scheduled by the Contractor upon proper completion of the work.
   1. Inspect and identify any problems that may impede issuance of warranties or guaranties.
   2. Maintain installed work until the Notice of Substantial Completion has been executed.

1.4 SUBMITTALS

A. Per Specification Section - SUBMITTAL PROCEDURES:

B. Product Data:for all materials specified.

C. Samples:
   1. Trim Accessories: Full-size Sample in 12-inch long length for each trim accessory indicated.
   2. Finishes: 24-inch square for each finish indicated and on same backing indicated for Work.
   3. Suspension System: Full-size Sample in 12-inch long length for each Suspension System accessory indicated.

D. General Construction Certificate: signed by the Contractor on Contractor's letterhead.

E. Products Certificates: signed by manufacturers of gypsum board assembly components.

F. Test Reports: Site Tests of suspended gypsum board ceiling fasteners and anchors provided by Testing Agency.

1.5 CLOSEOUT SUBMITTALS

A. Project Documents per Specification Section -PROJECT DOCUMENTS.

B. Warranty per Specification Section - WARRANTIES.

C. Contractor's General Warranty: in accordance with Specification Section - WARRANTIES

1.6 QUALITY ASSURANCE

A. Material Qualifications:
   1. Where fire-rated gypsum board assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E119, by an independent testing and inspecting agency acceptable to CSFM.

B. Installer Qualifications:
   1. Engage an experienced Installer who has successfully completed 3 projects of similar scope and size to that indicated for this Project.
      a. Helpers and apprentices used for such work shall be under full and constant supervision at all times by thoroughly skilled gypsum board installers.
      b. In the acceptance or rejection of installed gypsum board, no allowance will be made for lack of skill on the part of installers.

C. Certificates:
   1. General Construction: Contractor to certify that work provided, meets or exceeds the requirements of this section.
   2. Manufacturers of gypsum board assembly components certify that their products comply with specified requirements.
      a. Certify that all adhesive and compound materials have a good shelf life longer than the construction period of this project.

D. Mockups:
   1. Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and qualities of materials and execution.
      a. Install mockups for the following Architectural finishes:
         1) GB-1 – Uniformly smooth exposed to view.
         2) GB-2 – Textured exposed to view.
         3) GB-4 – Uniformly smooth to receive wallcoverings.
      b. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
      c. Simulate finished lighting conditions for review of mockups.
      d. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviation.
      e. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Handle packages carefully to assure products are without scratches, dents, and damage.

B. Acceptance at Site:
   1. Provide products in manufacturer's original unopened containers labeled with brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.8 WARRANTY

A. Manufacturer's Warranty: 1 year.
   1. In accordance with manufacturer’s written standard warranty.
   2. Manufacturer agrees to repair or replace gypsum panel product or accessory that fail within specified warranty period.

B. Installer's Warranty: 1 year.

1. In accordance with the terms of installers standard warranty.
2. Installer agrees to repair or replace components of gypsum panel product or accessory that fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

C. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 INTERIOR GYPSUM BOARD

A. **Wallboard**: For interior walls and ceilings.
   1. Specified: **NATIONAL** “Gold Bond Gypsum Board” and “Fire-Shield”
      a. Alternate: **PABCO** “Regular Interior” and “Flame Curb”
      b. Alternate: **USG** “Sheetrock Gypsum Panels” and Firecode X”
   2. Surface burning: ASTM E84, Class A, Flame spread: 20, Smoke developed: 0.
   3. Size: 5/8 inch thick by maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
   4. At curved walls: provide layers of 1/4 inch and 3/8 inch thick.
   5. At fire-resistive-rated assemblies: Type X.
   6. Long Edges: Tapered.
   7. Finish: Natural-finish face paper suitable for paint, wallpaper or other decorations.

B. **Moisture-Resistant**: For interior walls subjected to intermittent moisture and humidity, and at adhesive application of wallcoverings and tile.
   1. Specified: **NATIONAL** “Gold Bond XP” and “XP Fire-Shield”
      a. Alternate: **PABCO** "Mold Curb Plus" and "Mold Curb Plus Type X"
      b. Alternate: **USG** “Sheetrock Mold Tough" and Mold Tough Type X”
   2. Moisture- and mold-resistant core, and paper surfaces suitable for paint, wallpaper or other decorations, or tile.
   3. ASTM C1396.
   4. Surface burning: ASTM E84, Class A, Flame Spread 20, Smoke Developed 0.
   5. Mold/Mildew Characteristics:
      a. ASTM G21, 0.
      b. ASTM D3273, 10.
      c. ASTM C473, water absorption less than 5 percent.
   6. Size: 5/8 inch thick by maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
   7. Long Edges: Tapered.
   8. At fire-resistive-rated assemblies: Type X.

C. **Impact Board**: For interior walls requiring impact resistance.
   1. Specified: **NATIONAL** “Gold Bond Hi-Impact XP”
      a. Alternate: **PABCO** “Impact Resistant”
      b. Alternate: **USG** “Sheetrock Mold Tough VHI"
   2. Moisture- and mold-resistant core, embedded fiberglass mesh, and abrasion and mold/mildew/moisture resistant paper surfaces suitable for paint, wallpaper or other decorations, or tile.
   3. Abuse Characteristics: ASTM C1629:

a. Surface Abrasion Resistance: Level 3.
b. Indentation Resistance: Level 1.
c. Soft Body Impact: Level 3.
d. Hard Body Impact: Level 3.

4. Surface burning: ASTM E84, Flame spread 15, Smoke developed 0.
5. Mold/Mildew Characteristics:
   a. ASTM G21, 0.
   b. ASTM D3273, 10.
   c. ASTM C173, less than 5 percent.
6. Core: 5/8” Type X.
7. Long Edges: Tapered.

D. **Abuse Resistant**: For interior walls and ceilings requiring greater impact resistance.
1. Specified: **NATIONAL** “Gold Bond Hi-Abuse XP”
   a. Alternate: **PABCO** "Abuse Curb"
   b. Alternate: **USG** “Sheetrock Mold Tough AR"
2. Moisture- and mold-resistant core, and abrasion and mold/mildew/moisture resistant paper surfaces suitable for paint, wallpaper or other decorations, or tile.
3. Abuse Characteristics: ASTM C1629.
   a. Surface Abrasion Resistance: Level 3.
   b. Indentation Resistance: Level 1.
   c. Soft Body Impact: Level 1-2.
4. Surface burning: ASTM E84, Flame spread 15, Smoke developed 0.
5. Mold/Mildew Characteristics:
   a. Mold Resistance: ASTM G21, 0.
   b. Mold Resistance: ASTM D3273, 10.
   c. Water Absorption: ASTM C173, less than 5 percent.
6. Core: 5/8” Type X.
7. Long Edges: Tapered.

E. **Shaftwall**: For interior walls and ceiling at shafts, area separations, floor/ceiling assemblies, etc.
1. Specified: **NATIONAL** “Gold Bond Shaftliner XP”
   a. Alternate: **PABCO** "Mold Curb Plus Shaftliner"
   b. Alternate: **USG** “Sheetrock Liner PanelMold Tough"
2. ASTM C1396
3. Size: 1 inch thick by 2 foot wide maximum by practical length to minimize joints.
4. At fire-resistive-rated assemblies: Type C.
5. Long Edges: Beveled.

2.3 AUXILIARY MATERIALS

A. Gypsum Board Metal Accessories:
1. Specified: **CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS)**
2. Alternate: **USG**
3. Corner Beads: Outside Corner, 1-1/4-inch x 1-1/4 inch galvanized:
   a. Specified: **CDBS / USG** "Dur-A-Bead" #103.
4. Edge Trim:
   a. "U"-Shaped 1 inch galvanized
      1) Specified: **CDBS / USG** #200-A, size to fit gypsum board.
   b. "L"-Shaped 1 inch galvanized
      1) Specified: **CDBS / USG** #200-B, size to fit gypsum board.
      2) When "U"-Shaped molding above cannot be used.
5. Control Joint: 1-3/4" wide, 1/4" wide center channel with removable tape strip **CDBS / USG** #093.

B. Reveal Moldings (Aluminum Trim):
   1. Specified: **FRY REGLET**

a.	Reveal Molding	Sized to fit gypsum board.
b.	"L" Trim Molding	Sized to fit gypsum board.
c.	"F" Reveal Molding	Sized to fit gypsum board.
d.	Snap-In Reveal	Sized to fit gypsum board.
e.	"Z" Reveal Molding	Sized to fit gypsum board.
f.	Reveal Channel Screed	Sized to fit gypsum board.
g.	"F" Reveal	Sized to fit gypsum board.
h.	"T" Molding	Sized to fit gypsum board.

C. Joint Reinforcement Tape and Joint Compounds:
   1. In accordance with ASTM C474 and ASTM C475 and Gypsum Board Manufacturer's written recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
   2. Joint Tapes:
      a. Paper reinforcing tape, unless otherwise indicated.
   3. Polymer-coated, open glass-fiber mesh for cementitious backer units.
   4. Setting-Type Joint compounds for gypsum board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
      a. When used for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
      b. When used for pre-filling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.
      c. When used for filling joints and treating fasteners of moisture-resistant gypsum board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.
      d. When used for topping compound, use sandable formulation.

D. Gypsum Board Finishing Products:
   1. **Skim Coat**: Thin coat of joint compound applied at a trowel consistency applied in accordance with manufacturer recommendations.
   2. **Prep. Coat:** Preparation coat over gypsum board surfaces to be finished with texture.
      a. Specified: **WESTPAC MATERIALS** “Prep Tex” or “Prep Coat”
      b. Alternate: **USG** Sheetrock “First Coat Primer”
   3. **Primer-Surfacer:** Material manufactured especially for the purpose of a skim coat over the entire surface over gypsum board.
      a. Specified: **USG** "Tuff-Hide"
   4. **Textured Finish:** Products selected by the Contractor subject to the approval of the Architect.

E. Soundboard per Section – INSULATION.

F. Acoustical Sealant per Section – SEALANTS.

G. Firestopping per Section – FIRESTOPPING.

H. Smoke and fire per Section – SEALANTS.

I. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting setting materials, or of damaging gypsum panels or accessories.

2.4 ACCESSORIES

A. Fasteners At Gypsum Panels:
   1. Nails: In accordance with CBC Chapter 7 and ASTM C514.
   2. Screws: In accordance with CBC Chapter 7, ASTM C1002, Type S, G, and W, and ASTM C954, Type S-12.
      a. Provide "Bugle Head" screws that help prevent damage to gypsum core and face paper.
   3. Adhesives: Per ASTM C475 and ASTM C557.

a. Commercial adhesives bridging minor irregularities in the base or framing at "non-fire-rated" construction.

B. Other Accessories:
1. All other miscellaneous materials, not specifically described, but required for a complete and proper installation of gypsum panels, shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions:
1. Examine substrates, areas, and conditions, with Installers present, for compliance with requirements and other conditions affecting performance of the Work.
2. In case of discrepancy, notify the Architect at once. Do not continue with application in area of discrepancy until all such discrepancies have been fully resolved.
3. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
4. Execution of work indicates acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
2. Coordinate proper placement of ceiling mounted tracks, accessories, light fixtures, HVAC, registers and other items, which are to be integrated with gypsum board ceilings.

B. Protection:
1. Do not begin work until all rooms have been protected against the weather, and the building is covered and fully enclosed. Wet gypsum board after installation shall be removed and replaced at no extra cost to the Owner.
2. Remove and replace wet gypsum board after installation at no extra cost to the Owner.
3. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with Regulatory Requirements.
3. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.
2. Control Joints:
a. Layout in accordance with GA-234-08 for wall and ceiling conditions as follows:
b. Provide Control Joints at in an uninterrupted straight plane exceeding 30 ft. in length and total area between control joints, such that no area exceeds 900 sq. ft.

3.4 INSTALLATION OF INTERIOR GYPSUM BOARD

A. During Winter Weather Installation periods, follow the GA-220 GYPSUM BOARD WINTER RELATED INSTALLATION RECOMMENDATIONS.

B. Where sound, smoke control or fire-ratings are required, details of construction shall be in accordance with reports of tested assemblies meeting the requirements.

C. Install per CBC Chapter 25, DITF and GA recommendations, gypsum board panel manufacturer's written recommendations and in accordance with fire-rated design numbers.

D. At Ceilings and Soffits:

1. At gypsum board ceilings and soffit areas, install the ceiling prior to installing the walls.
2. Float the interior ceiling angles, and where permitted by code,

E. At Sound and Acoustical Walls:

1. Set all gypsum board panels on each side of the partition in a continuous 1/4 inch bead of acoustical sealant furnished and installed in accordance with the provisions of Specification Section -- SEALANTS.

F. At Moisture Resistant Walls:

1. Install where scheduled and in all areas where high moisture conditions are present, or ceramic tile, or wall coverings are scheduled over gypsum board.
2. In all areas to be tiled, treat all edges, cutouts, utility holes and joints, corners and nailheads with an approved sealant material in lieu of standard taping. Joints not to be covered by tile shall be treated as regular gypsum board. Do not use standard joint compound under ceramic tile.

G. At Sheathing:

1. Screw-attach sheathing to exterior of each stud with 1" Type "S-12" corrosion resistant screws spaced 3/8" from ends and edges and approximately 8" o.c. Apply sealant around sheathing perimeter at interface with other materials and install flashing.

H. Install gypsum board panels horizontally on walls, floor to ceiling.

I. At metal frames terminate wall board panel edge inside frame. Do not terminate gypsum board panel edge against metal frame trim unless otherwise indicated.

J. Cutting:

1. Cut gypsum board panels by scoring and breaking or by sawing, working from the face side.
    a. When cutting by scoring, cut through the face paper and then snap the panel back away from the cut face; then break the backpaper by snapping the panel in the reverse direction or by cutting the back paper.
2. Smooth all cut ends and edges of panels as necessary to obtain a smooth joint.
3. For cut-outs in panels for pipes, fixtures, and other small openings, make holes and cut-outs by sawing or by such other method as will not fracture the core or tear the covering and with such accuracy that plates, escutcheons, or trim will cover the edges.
4. The use of "score-and-knockout" method will not be permitted.

3.5 INSTALLATION OF METAL ACCESSORIES

A. Corner Beads:

1. Install at all corners with galvanized screws at 9 inch intervals in both flanges with fasteners placed opposite one another the full length of the corner bead. Clinch-on fastening is not allowed.
    a. Fasteners shall be driven below the anticipated finished joint compound surface.
2. Install in one piece except when length of corner exceeds stock lengths – then put splice up high away from people traffic.

B. Edge Trim: Install at all exposed joints where gypsum board panels abut another material with galvanized screws at 9 inch intervals the full length of the edge trim. Clinch-on fastening is not allowed.

1. Fasteners shall be driven below the anticipated finished joint compound surface.
2. Provide joint sealer in accordance with Specification Section -- SEALANTS.

a. Provide fire sealant in accordance with Specification Section -- FIRSTOPPING or Specification Section -- SEALANTS, when the wall or ceiling is part of a fire-rated situation.

C. Control Joints:
1. Install at 30'-0" o.c. maximum at all interior walls or partitions with uninterrupted planes that exceed 30' in length.
a. Opening frames that are full height of wall or partition may be considered a control joint.
2. Install at 50'-0" o.c. maximum at all interior ceilings and shall not exceed 2,500 sq.ft. in total area with perimeter relief.
3. Install at 30'-0" o.c. maximum at all interior ceilings and shall not exceed 900 sq.ft. in total area without perimeter relief.

D. Exterior Trim:
1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.

E. Fastening:
1. Properly space all fasteners in careful accordance with the manufacturer's written recommendations and code requirements, with heads driven slightly below the surface for proper cementing, but without breaking the paper face.
2. Loosely butt all joints to be taped; firmly butt all joints to be left untreated.
3. Stagger all end joints and the joints between panels to achieve a maximum of bridging and a minimum of continued joints.

3.6 FINISHING OF GYPSUM BOARD

A. General:
1. Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
2. Prefill open joints, rounded or beveled edges, and damaged surface areas.

B. Taping and Finishing:
1. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
2. First Coat:
a. Spread compound evenly over all joints, using suitable tools designed for the purpose.
b. Fill all joint recesses and metal trim.
c. Center the reinforcing tape on the joint and press into the fresh compound at all joints, wiping down with sufficient pressure to remove excess compound but leaving sufficient compound under the tape for proper bond.
d. Feather all edges and leave the surface free from blisters and tape wrinkles.
e. Apply compound to all fastener recesses, leaving flush with the adjacent surfaces.
f. Fold reinforcing tape along its centerline and apply to all interior angles, following the same procedure as for joints.
g. Surfaces shall be free of excess joint compound.
3. Second Coat:
a. Lightly sand the dry compound with fine sandpaper to remove all irregularities.
b. Apply a second coat of compound to all joints, feathering approximately three inches beyond edges of tape.
c. Apply second coat to all fastener recesses.
d. Surface shall be smooth and free of tool marks.
4. Third Coat:
a. Lightly sand the dry compound with fine sandpaper to remove irregularities.
b. Apply third coat of compound to all joints, feathering out approximately two inches beyond second coat.
c. Third coat all fastener recesses and metal trim, and all interior angles; allow to dry.

d. Surface shall be smooth and free of tool marks.

C. Primer-Surfacer - Manufactured Skim Coat:
1. Durable, high build, low sag drywall surfacer used prior to painting to minimize pattern variation.
2. Abrasion resistant.
3. Material coverage: approx. 80-110 sq ft per gallon when applied at 15-20 wet film thickness. Full coat coverage is required.
4. Application: airless sprayer. If touch-up sanding is required, sand with 220 grit mesh screen.
5. Prime exposed metal trim pieces before application.
6. Refer to manufacturer’s written recommendations.

D. Prep. Coat / Drywall Primer:
1. Use prior to application of texture to minimize texture pattern variation.
2. Material coverage: approx. 180-200 sq ft per gallon when applied at 8-10 wet film thickness. Full coat coverage is required.
3. Application: airless sprayer.
4. Prime exposed metal trim pieces before application.
5. Refer to manufacturer’s written recommendations.

E. Application of Texture Finishes:
1. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
2. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
3. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

A. Marking and Identification:
1. Where there is an accessible concealed floor, floor-ceiling or attic space, fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling in the concealed space and shall comply with all of the following:
a. Be located in accessible concealed floor, floor/ceiling, or attic spaces.
b. Be located within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition.
c. Include lettering not less than 3 inches in height with a minimum 3/8 inch stroke in a contrasting color identifying the wall type and its fire-resistance rating.
1) "FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS," or other wording.

B. Site Tests:
1. Testing Agency: The Owner's Testing Laboratory Agency shall perform field tests and Inspections and prepare test reports.
a. Testing and inspecting of completed installations of suspended gypsum board ceiling fasteners and anchors shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of gypsum board ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
2. Empty containers shall not be removed from site without the Project Inspector's approval.
3. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed:
a. Concrete Anchors:

1) Must be capable of sustaining, without failure, a load equal to 200 lbs. tension for hanger wires and 440 lbs. tension for bracing wires by construction as determined by testing according to ASTM E488, by a qualified independent testing agency.
   a) Hanger Wire Anchors 1 in 10 must be field tested.
   b) Bracing Wire Anchors 1 in 2 must be field tested.

4. Remove and replace gypsum board ceiling hangers where test results indicate that they do not comply with specified requirements.
5. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
   a. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors of previously tested until 20 pass consecutively and then will resume initial testing frequency.

C. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.8 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Clean any soiled surfaces at the end of each day, minimum.
3. Finish shall be clean and ready for the application of any additional finishes.
4. In accordance with manufacturer's written instructions and recommendations.

3.9 PROTECTION

A. Protection from weather:
1. Protect newly installed work from moisture after installation.

B. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.10 SCHEDULES

A. Apply the following finishes to the board surfaces prior to covering with other finish materials.
1. Refer to the Interior Finish Schedule for finish locations.
2. **GB-X**: Architect’s Finish Designation.
3. Level X: ASTM C840, modified per Architect’s Finish Designation.
4. Where no finish is indicated on the drawings, select the appropriate finish from the descriptions below or provide GB-2, minimum.

B. **GB-1** (Level 5, modified): Uniformly smooth surface; exposed to view.
1. Embed tape in joint compound at all joints and interior angles.
2. Apply 2 separate coats of joint compound over all flat joints and 1 separate coat of joint compound over interior angles.
3. Cover fastener heads and accessories with 3 separate coats of joint compound.
4. Joint compound surfaces shall be smooth and free of tool marks and ridges.
5. Apply primer-surfacer to the entire surface.
6. Painting system and its application to surfaces per Specification Section – PAINTING.

C. **GB-2** (Level 4, modified): Textured surface; exposed to view.
1. Embed tape in joint compound at joints and interior angles.
2. Apply 2 separate coats of joint compound over all flat joints and 1 separate coat of joint compound over interior angles.
3. Cover fastener heads and accessories with 3 separate coats of joint compound.

4. Joint compound surfaces shall be smooth and free of tool marks and ridges.
5. Apply prep coat to the entire surface.
6. Apply texture: Light orange peel. [Modernization Projects: Match existing texture.]
7. Painting system and its application to surfaces per Specification Section – PAINTING.

D. **GB-3** (Level 2): Substrate for thin set tile, acoustical panels, tackboard, FRP, wood panels.
1. Embed tape in joint compound at all joints and interior angles. Wipe with a joint knife leaving a thin coating of joint compound over all joints and interior angles.
2. Cover fastener heads and accessories with a coat of joint compound.
3. Tool marks and ridges are acceptable.

E. **GB-4** (Level 3): Smooth surface; substrate for wallcoverings.
1. Embed tape in joint compound at joints and interior angles.
2. Apply 1 additional coat of joint compound over all joints and interior angles.
3. Fastener heads and accessories shall be covered with two separate coats of joint compound.
4. Joint compound shall be smooth and free of tool marks and ridges.

F. **GB-5** (Level 1): Concealed from view.
1. Embed tape in joint compound at joints and interior angles.
2. Surface shall be free of excess joint compound.

END OF SECTION

SECTION 09 50 00 – ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Acoustical Ceiling Materials, Suspension Systems, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 05 12 00 STEEL AND FABRICATIONS
5. 06 10 00 ROUGH CARPENTRY
6. 06 17 33 WOOD JOISTS
7. 07 21 00 INSULATION
8. 09 24 00 CEMENT PLASTER
9. 09 29 00 GYPSUM BOARD
10. 09 72 00 WALL COVERINGS
11. 09 91 00 PAINTING
12. 10 05 00 MISCELLANEOUS SPECIALTIES

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM A641 Zinc-Coated (Galvanized) Carbon Steel Wire (Standard Specification for)
2. ASTM C635 the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings (Specification for)
3. ASTM C636 Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels (Practice for)
4. ASTM C834 Latex Sealants (Specification for)
5. ASTM D1779 Adhesive for Acoustical Materials (Standard Specification for)
6. ASTM D3273 Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber (Standard Test Method for)
7. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
8. ASTM E90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements (Test method for)
9. ASTM E119 Fire Tests of Building Construction and Materials (Test methods for)
10. ASTM E488 Strength of Anchors in Concrete and Masonry Elements (Test Methods for)
11. ASTM E580 Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint (Practice for)
12. ASTM E1264 Acoustical Ceiling Products (Classification for)
13. ASTM E1477 Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers (Test method for)

B. CISCA: Ceilings & Interior Systems Construction Association.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

1. Manufacturers Product Information for each type of Acoustical Ceiling Tile or Panel scheduled to be used.
2. Manufacturers Product Information for each component of the Suspension System specified or scheduled.

C. Shop Drawings.

1. Submit shop drawings from manufacturer detailing ceiling suspension system assemblies and indicating dimensions, method of field assembly (including hanger and bracing wires, compression struts, wall angle attachments), other components, and location and detail of each suspension system grid connection.
    a. Submit drawings showing details of Hanger Wires, Brace Wires, expansion joint locations, and Compression Strut connections to structure and to suspension system.

D. Samples.
1. Provide 4-to-6-inch square sample for each type of Acoustical Ceiling Tile or Panel scheduled to be used.
2. Provide 12-inch lineal sample of Suspension System components for each type of system specified or scheduled.

E. Quality Assurance/Control Submittals:
1. Test Reports:
    a. Tension Tests of acoustical ceiling wire anchors provided by Testing Agency.
2. Certificates:
    a. General Construction: Certification signed by the Contractor on Contractor's letterhead.
    b. Certificates signed by manufacturers of Acoustical Ceiling components certifying that their products comply with specified requirements.
3. Manufacturer's Written Instructions:
    a. Manufacturer's written instructions showing their suspension grid installation methods.

1.4 CLOSEOUT SUBMITTALS

A. In accordance with Specification Section - PROJECT DOCUMENTS.

B. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
1. Material Qualifications:
    a. Where fire-rated Acoustical Ceiling assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per UL or ASTM E119 by an independent testing and inspecting agency acceptable to the California State Fire Marshal.
    b. Source Limitations:
        1) Acoustical Ceiling Tiles or Panels: Obtain each type through one source from a single manufacturer.
        2) Suspension Systems: Obtain each type through one source from a single manufacturer.
2. Installer Qualifications:
    a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
        1) Helpers and apprentices used for such work shall be under full and constant supervision at all times by thoroughly skilled Acoustical Ceiling and Suspension System installers.
        2) In the acceptance or rejection of installed Acoustical Ceiling or Suspension Systems, no allowance will be made for lack of skill on the part of the installers.
3. Manufacturer/Supplier Qualifications:
    a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
    b. Products, materials and evaluation reports to comply with IR-A5.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
    a. CBC: California Building Code (CBC 803.1.1)
    b. CDPH: California Department of Public Health, “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers”
    c. CSFM: California State Fire Marshal.
    d. IR: Interpretation of Regulations.
    e. USDA/FSIS: United States Department of Agriculture., Food Safety and Inspection Service.

C. Certificates:
1. General Construction: Contractor to certify that work provided meets or exceeds the requirements of this section.
2. Products: Manufacturers of Acoustical Ceiling components shall certify that their products comply with specified requirements.

D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
    a. Coordinate the work with other work being performed.
    b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
2. Progress: Scheduled by the Contractor during the performance of the work.
    a. Review for proper installation of work progress.
    b. Identify any installation problems and acceptable corrective measures.
    c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
    a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
    b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a fully enclosed, conditioned space and protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination and other causes.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
1. Do not install acoustical ceilings until spaces are enclosed and weatherproof.
2. Wet work and dry work in spaces is completed, dry and dust free.
3. Work above ceilings is completed.
4. Ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for

extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 SEQUENCING AND SCHEDULING

A. Coordination:
   1. Coordinate layout and installation of Acoustical Ceiling Tiles, Panels and the Suspension Systems with other construction that penetrates ceilings or is supported, including light fixtures, HVAC equipment, smoke monitoring and fire-suppression systems.

1.9 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer’s Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 SUSPENSION SYSTEM DESIGN REQUIREMENTS

A. In accordance with allowable values and properties assigned and approved by CBC.
B. Heavy Duty in accordance with ASTM C635, ASTM E580, Section 5.1, ASCE 7 as modified by CBC Sections 1617A.1.21, 2506.2.1, and DSA IR 25-2.
C. Design Weight: Total Weight does not exceed four (4) pounds per square foot, including air conditioning grilles and light fixtures.
D. System is not to support lateral loads from partitions.
E. Fasteners must be capable of sustaining, without failure, hanger wires with 200 lbs. tension load and bracing wires with 440 lbs. tension load.

2.2 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
B. Source Limitations for Ceiling System: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.
C. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.3 ACOUSTICAL CEILING TILE

A. General:
   1. Standard: Provide manufacturer's standard tile or panels of configuration indicated that comply with ASTM E1264 classifications as designed by type, pattern, acoustical rating, light reflectance, and fire-rating, unless otherwise indicated.
   2. Colors and Patterns: Match appearance characteristics indicated for each product type.
   3. Antimicrobial Treated:
      a. Coating-Based: Provide tile or panel face surfaces (front and back) with coated antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D3273.
      b. Panel-Base: Provide tiles or panels treated with manufacturers standard antimicrobial solution that inhibits fungus, mold, mildew, gram-positive and gram-negative bacteria.

2.4 SUSPENSION SYSTEMS

A. General:
   1. Classification of Suspension System Grid is Heavy Duty in accordance with ASTM C635, ASTM E580, Section 5.1, ASCE 7 as modified by CBC Sections 1617A.1.21, 2506.2.1, and DSA IR 25-2.
   2. Provide Underwriter's Laboratory (UL) design number or California State Fire Marshal (CSFM) Listing number for the fire-rated ceiling assembly.
      a. The components and installation details must conform in every respect with the UL or CSFM approval for the design number specified.
      b. Custom designs which combine components from different approval designs but have not been tested as a complete assembly are not acceptable.
      c. See Exposed Grid at end of this section for specified system numbers.

B. Wire:
   1. Soft temper, Class 1 zinc coating, in accordance with ASTM A641.
      a. Hanger: 12 gage (0.106 inch diameter).
      b. Brace: 12 gage (0.106 inch diameter).

C. Clip Attachments:
   1. General: Fabricate from corrosion-resistant material with holes or loops for attaching hanger and brace wires.
      a. Ceiling Clips: 3/4" wide x 13 gage, galvanized steel.
      b. Steel Straps:
         1) 1" wide x length as required, 12 gage galvanized steel.
         2) 3" wide x 4" long x 12 gage galvanized steel.

D. Grid:
   1. Grid System shall be manufactured from commercial quality galvanized steel.
   2. Exposed Non-Rated 15/16" Tee Grid System
      a. Specified: **ARMSTRONG** "Prelude XL" (P-XL).
      b. Alternate: **USG** “Donn Brand DX/DXL”.
      c. Alternate: **ROCKFON / CHICAGO METALLIC** “1200 15/16”.
   3. Exposed Fire-Rated 15/16" Tee Grid System
      a. Specified: **ARMSTRONG** "Prelude XL Fire Guard" (P-XL).
      b. Alternate: **USG** “Donn Brand DX/DXL – Firecode”.
      c. Alternate: **ROCKFON / CHICAGO METALLIC** “1250 Fire-Rated 15/16"
   4. Exposed Non-Rated 9/16" Tee Grid System
      a. Specified: **ARMSTRONG** "Suprafine XL" (S-XL).
      b. Alternate: **USG** “Donn Brand Centricitee DXT/DXLT”.
      c. Alternate: **ROCKFON / CHICAGO METALLIC** “4000 Tempra 9/16”.
   5. Main Runners:
      a. Main Runner – Non-Rated 15/16"
         1) Specified: **ARMSTRONG** “#P-XL 7301”.
         2) Alternate: **USG** “DXL26”.
         3) Alternate: **ROCKFON / CHICAGO METALLIC** “200.XXZ.01 Main Runner 15/16".
      b. Main Runner – Fire-Rated 15/16"
         1) Specified: **ARMSTRONG** “#P-XL 8301”.
         2) Alternate: **USG** “DXL26”.
         3) Alternate: **ROCKFON / CHICAGO METALLIC** “270.XXZ.01 Main Runner Fire Rated 15/16"
      c. Main Runner - Non-Rated 9/16"
         1) Specified: **ARMSTRONG** “#S-XL 7501”.
         2) Alternate: **USG** “DXT26”.
         3) Alternate: **ROCKFON / CHICAGO METALLIC** “4040.01CH Main Runner 9/16".

d. Capped, Double-Web roll-formed from cold-rolled steel sheets, pre-painted with factory punched cross runner slots, hanger holes and integral bayonet style and couplings.
e. Fire-rated: Manufactured with fire-expansion reliefs.

6. Cross Runners:
   a. 2' Non-Rated Cross Runner 15/16"
      1) Specified: **ARMSTRONG** “#P-XL 7328”.
      2) Alternate: **USG** “DX216”.
      3) Alternate: **ROCKFON / CHICAGO METALLIC** “1202.01Z - 2' Cross Tee 15/16".
   b. 4' Non-Rated Cross Runner 15/16"
      1) Specified: **ARMSTRONG** “#P-XL 7341”.
      2) Alternate: **USG** “DXL424”.
      3) Alternate: **ROCKFON / CHICAGO METALLIC** “1210.01Z - 4' Cross Tee 15/16".
   c. 2' Fire-Rated Cross Runner 15/16"
      1) Specified: **ARMSTRONG** “#P-XL 8323”.
      2) Alternate: **USG** “DXL216”.
      3) Alternate: **ROCKFON / CHICAGO METALLIC** “1252.01Z - 2' Cross Tee Fire Rate 15/16"
   d. 4' Fire-Rated Cross Runner 15/16"
      1) Specified: **ARMSTRONG** “#P-XL 8341”.
      2) Alternate: **USG** “DXL424”.
      3) Alternate: **ROCKFON / CHICAGO METALLIC** “1254.01Z - 4' Cross Tee Fire Rate 15/16".
   e. 2' Non-Rated Cross Runner 9/16"
      1) Specified: **ARMSTRONG** “#S-XL 7520”.
      2) Alternate: **USG** “DXT222”.
      3) Alternate: **ROCKFON / CHICAGO METALLIC** “4022.01CZ - 2' Cross Tee 9/16".
   f. 4' Non-Rated Cross Runner 9/16"
      1) Specified: **ARMSTRONG** “#S-XL 7540”.
      2) Alternate: **USG** “DXT422”.
      3) Alternate: **ROCKFON / CHICAGO METALLIC** “4014.01CZ - 4' Cross Tee 9/16".
   g. Capped, Double-Web roll-formed from cold-rolled steel sheets, pre-painted with factory punched cross runner slots and hanger holes.
   h. Fire-rated: Manufactured with fire-expansion reliefs.
7. Wall Angles:
   a. "Angle" Ceiling Edge Trim, hemmed exposed edges, 7/8" x 7/8".
      1) Specified: **ARMSTRONG** “#7800”.
      2) Alternate: **USG** “M7”.
      3) Alternate: **ROCKFON / CHICAGO METALLIC** “1420.01 - 15/16"x15/16" Wall Angle.”
   b. Roll-formed of sheet metal of same gage and finish as the main runners.
   c. Provide wall angles fabricated to diameter required to fit circular penetrations of ceilings exactly.
8. Panel Hold Down Clips:
   a. Specified: **ARMSTRONG** “#P-XL 414”.
   b. Alternate: **USG** “Panel Retention Clip 20428”.
   c. Alternate: **ROCKFON / CHICAGO METALLIC** “426.01 Retention Clip”.
9. Compression Struts (Metal angles, galvanized steel):
   a. 1/8 inch thick x 1 inch x 1 inch; 800 lbs./1000 feet weight.
   b. 3/16 inch thick x 1-1/4 inch x 1-1/4 inch; 1,480 lbs./1000 feet weight.
   c. 3/16 inch thick x 1-1/2 inch x 1-1/2 inch; 1,800 lbs./1000 feet weight.
   d. 3/16 inch thick x 1-3/4 inch x 1-3/4 inch; 2,120 lbs./1000 feet weight.
   e. 3/16 inch thick x 2 inch x 2 inch; 2,440 lbs./1000 feet weight.
   f. 3/16 inch thick x 2 inch x 2-1/2 inch; 3,070 lbs./1000 feet weight.

g. 3/16 inch thick x 3 inch x 3 inch; 3,710 lbs./1000 feet weight.
h. 1/4 inch thick x 3-1/2 inch x 3-1/2 inch; 5,800 lbs./1000 feet weight.
i. 1/4 inch thick x 4 inch x 4 inch; 6,600 lbs./1000 feet weight
j. Alternate Compression Struts; Refer to drawings.
    1) Must be submitted to and approved by DSA.

10. Seismic Perimeter Clips:
    a. Specified: **ARMSTRONG** “#BERC2”.
    b. Alternate: **USG** “ACM7”.
    c. Alternate: **ROCKFON / CHICAGO METALLIC** “1496.00 Seiscmic Perimeter Clip”.
11. Cold Rolled Channels, 16 gage galvanized steel:
    a. 1-1/2" x 17/32" flange; 475 lbs/1000 feet weight.

2.5 ACCESSORIES

A. Fasteners:
    1. Wood Construction:
        a. Provide corrosion-resistant materials.
        b. Eye screws, minimum 1/4 inch diameter, 1-1/4 inch minimum embedment.
        c. Staples, 1-1/2 inch x 0.148 inch diameter (9 gage).
        d. Nails
            1) Specified: **STRONGHOLD** "J" nails.
    2. Suspension System Fasteners, runner to wall angle:
        a. Pop rivets as standard with the manufacturer, heads to match the finish of the main runners.
            1) Pop-rivets, screws or other attachments are not acceptable unless specifically detailed on the manufacturer's drawings and approved by UL and the CSFM.

B. Adhesives:
    1. Provide adhesives that comply with all requirements of ASTM D1779, for non-rated and fire-rated assemblies, and shall be compatible with the substrate to which the tile is to be installed as well as the tile material selected, and shall be UL Labeled for Class 0 - 25 Flame Spread..

C. Sealants:
    1. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C834, and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
    2. Acoustical Sealant for Concealed Joints: Manufacturer's standard non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

D. Other Materials: All other miscellaneous materials, not specifically described, but required for a complete and proper installation of acoustical ceilings, shall be as selected by the Contractor subject to the approval of the Architect.

2.6 FINISHES

A. Factory Finish:
    1. Suspension System: Manufacturer's standard baked-on enamel finish to all members. All fasteners shall match the main runner finishes.
        a. General: Comply with NAAMM's "Metal Finishes manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
    2. Tile or Panel: Refer to Tile and Panel Schedule for finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, examine substrates, areas, and conditions, including structural framing to which acoustical ceilings attach or abut, with installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical ceilings.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
   2. Coordinate proper placement of ceiling mounted tracks, accessories, light fixtures, HVAC registers and other items which are to be integrated with acoustical ceilings.
   3. Measure each ceiling area and establish layout of acoustical tiles or panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles or panels at borders and comply with layout shown on reflected ceiling plans.

B. Protection:
   1. Do not begin work until all rooms have been protected against the weather.
   2. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations along with CISCA's "Ceiling Systems Handbook" and USDA.
   2. In accordance with approved Submittals.
   3. In accordance with Regulatory Requirements.
   4. Installation shall comply with ASTM C636 and ASTM E580 Section 5.2.
   5. Installation shall also comply with CBC Section 1617A.1.21, 2506.2.1, and DSA IR 25-2.

B. Layout:
   1. Lines shall be straight and true.
   2. Set plumb, level, and square.

C. Suspension System:
   1. 12 gage (minimum) hanger wires may be used for up to and including 4'-0" x 4'-0" grid spacing and attached to main runners. Splices will not be permitted in any hanger wires unless specifically approved by DSA/SSS.
   2. Provide 12 gage hanger wires at ends of all main and cross runners within 8" from the support or within 1/4 of the length of the end tee, whichever is least, for the perimeter of the ceiling area.
      a. End connections for runners, which are designed and detailed to resist the applied horizontal forces may be used in lieu of the 12 gage hanger wires subject to DSA/SSS review and approval.

b. Perimeter wires are not required when the length of the end tee is 8" or less.

3. Provide trapeze or other supplementary support members at obstructions to maintain hanger spacing.
   a. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits or discontinuous areas.
   b. Hanger wires that are more than 1 in 6 out of plumb are to have counter-sloping wires.
4. Ceiling grid members may be attached to not more than 2 adjacent walls. Ceiling grid members should be at least 3/4 inch free of other walls.
   a. If walls run diagonally to ceiling grid system runners, one end of main and cross runners should be free and a minimum of 3/4 inch clear of wall.
   b. Pop rivets, screws, or other attachments in fire-rated ceilings shall not be acceptable unless specifically detailed on the manufacturer's drawings and approved by UL and DSA/FLS.
5. At the perimeter of the ceiling area where main or cross runners are not connected to the adjacent wall, provide Seismic Perimeter Clip, installed in accordance with manufacturer's instructions and ICC-ES Evaluation Report.
6. Provide bracing assemblies consisting of a compression strut and slotted angle spacer of four (4) 12 gage splayed bracing wires oriented 90 degrees from each other.
   a. Bracing assemblies shall be provided for each 144 square feet of ceiling area.
      1) Spaced not more than 12 feet by 12 feet on center.
   b. Bracing assemblies shall be located not more than 1/2 the above spacing from each perimeter wall or at the edge of vertical ceiling offsets.
   c. The slope of these wires should not exceed 45 degrees from the plane of the ceiling and should be taut without causing the ceiling to lift.
   d. Splices in bracing wires are not permitted unless specifically approved by DSA/SSS.
   e. Fire-Rated Assemblies shall have a bracing assembly for each 96 square feet.
      1) The first bracing assembly is required not more than four feet (4'-0") from each wall.
      2) A minimum of one bracing assembly is required between any two adjacent expansion cut-outs on runners being braced.
   f. Bracing assemblies are not required where the ceiling area is:
      1) 144 sq. ft. or less.
7. Fasten hanger wires with not less than 3 tight turns. Fasten bracing wires with 4 tight turns.
   a. Make all tight turns within a distance of 1-1/2 inches.
   b. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.
8. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc.
   a. It is acceptable to attach lightweight items, such as single electrical conduit not exceeding 3/4" nominal diameter, to hanger wires using connectors acceptable to DSA/SSS.
9. Attach all light fixtures and ceiling mounted air terminals or services to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures.
   a. Approved screws or fasteners are required.
10. Flush or recessed light fixtures weighing less than 56 pounds and mechanical terminals and services weighing less than 20 lbs. may be supported directly on the runners of a heavy-duty grid system but, in addition, they must have a minimum of two (2) 12 gage slack safety wires attached to the fixture at diagonal corners and anchored to the structure above.
    a. All 4 ft. x 4 ft. fixtures must have slack safety wires at each corner.
11. All flush or recessed light fixtures weighing 56 pounds or more and mechanical terminals and services weighing 20 lbs. or more shall be independently supported by not less than four (4) taut #12 gage wires each attached to the fixture.

a. Wires and their attachment to the structure must be capable of supporting 4 times the weight of the unit and attached to the structure above regardless of the type of ceiling grid system used.

12. Support surface mounted light fixtures by at least two positive devices which surround the runner and which are each supported from the structure above with 12 gage wire.
    a. Spring clips or clamps that connect only the runner are not acceptable.
    b. Provide additional supports when light fixtures are 8'-0" or longer.
13. Support pendant mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting four (4) times the weight of the fixture.
    a. Bracing assembly is required where the pendant hanger penetrates the ceiling.
    b. Pendant hanger is required to attach to the bracing assembly to transmit horizontal forces.
    c. Maximum spacing between supports shall not exceed 8 feet.
14. Ceiling Edge Condition:
    a. Where Grid System abuts wall, fasten wall angles to framing in wall structure.
        1) At Wood Framing, attach to backing with No. 10 x 3" Screws at 16" o.c.
        2) At Metal Framing, attach to metal framing backing with No. 8 self-tapping sheet metal screws at 16" o.c.
15. Supplemental Support Members:
    a. Where the width of ducts or other obstructions interfere with typical hangers and bracing assemblies, provide and install supplemental members and hangers in the form of trapeze or equivalent devices.
    b. Provide additional hangers, struts, or braces at all ceiling breaks, soffits, or discontinuous areas.
    c. Hanger wires that are more than one (1) horizontal in six (6) vertical shall have counter-sloping wires.
16. Expansion Joints:
    a. Expansion Joints shall be provided and installed in the ceiling at intersections of corridors and junctions of corridors with lobbies or other similar areas.
17. Expansion Joints shall be provided and installed in ceiling areas exceeding 2,500 sq. ft. in order to separate ceilings into areas not exceeding 2,500 sq. ft.

D. Suspended Acoustical Ceiling Panels:
1. Install acoustical ceiling panels with undamaged edges and fit accurately into suspension system runners and wall angles. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
    a. Install panels with pattern running in one direction.
2. Paint cut edges of panels remaining exposed after installation.
    a. Match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical ceiling manufacturer.
3. Install hold down clips at all Fire-Rated acoustical ceiling assemblies, food preparation areas, and at locker/shower areas.
4. Penetrations through the ceiling for sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a two (2) inch oversized ring, sleeve, or adapter through the ceiling tile to allow free movement of one (1) inch in all horizontal directions. Alternatively, swing joints may be provided per ASTM E580, Section 5.2.8.5.

E. Adhesively applied Acoustical Tiles:
1. Installation shall comply to ASTM D1779.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

1. Testing Agency: The Owner's Testing Laboratory Agency shall perform field tests and Inspections and prepare test reports.
    a. Testing and inspecting of completed installations of acoustical ceiling fasteners and anchors shall take place in successive stages, in areas of extent and using methods as follows.
    b. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
2. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed:
    a. Concrete Anchors:
        1) Must be capable of sustaining, without failure, a load equal to 200 lbs. tension for hanger wires and 440 lbs. tension for bracing wires by construction as determined by testing according to ASTM E488, by a qualified independent testing agency.
            a) Hanger Wire Anchors: 1 in 10 must be field tested.
            b) Bracing Wire Anchors: 1 in 2 must be field tested.
3. Remove and replace acoustical panel ceiling hangers where test results indicate that they do not comply with specified requirements.
4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
    a. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Clean any soiled surfaces at the end of each day, minimum.
3. Finish shall be clean and ready for the application of any additional finishes.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturers written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.6 ACOUSTICAL CEILING TILE SCHEDULE

A. TYPE ACT-I:
1. Specified: **ARMSTRONG** "Fissured Medium Texture" No. 755 Panel.
2. Alternate: **USG** “Fissured Basic Acoustical Panels”.
3. Material: Wet-Formed mineral fiber, with factory-applied vinyl latex paint surface finish.
4. Size: 24" x 48" x 5/8" panel – "Square Cut" lay-in edge.
5. Mounting: 15/16" Non-Rated exposed tee grid.
6. NRC Rating: 0.55.
7. CAC: 30.
8. Light Reflectance: ASTM E1477, 0.81.
9. ASTM Classification: ASTM E1264, Type III, Form 2, Pattern C D.
10. Fire Rating: ASTM E84, Class A
    a. Flame Spread Index: 25 or under.
    b. Smoke Density Developed Index: 50 or less.
11. Color: "White."

12. Antimicrobial Treatment: None.

SECTION 09 65 10 – RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Resilient Base and Accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 06 10 00 ROUGH CARPENTRY
4. 06 41 23 MODULAR CASEWORK
5. 09 24 00 CEMENT PLASTER
6. 09 29 00 GYPSUM BOARD
7. 09 65 16 RESILIENT SHEET
8. 09 65 19 RESILIENT TILE
9. 09 68 40 CARPET
10. 09 72 00 WALL COVERINGS
11. 09 91 00 PAINTING
12. 10 05 00 MISCELLANEOUS SPECIALTIES

1.2 REFERENCE STANDARDS

A. ADAAG: Americans with Disabilities Act Accessibilities Guidelines.

B. ASTM: American Society of Testing Materials

1. ASTM C109 Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens) (Test Method for)
2. ASTM D638 Tensile Properties of Plastics (Test method for)
3. ASTM D2047 Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine (Test Method for)
4. ASTM D2240 Rubber Property – Durometer Hardness (Standard Test Method for)
5. ASTM E648 Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source (Test Method for)
6. ASTM F710 Preparing Concrete Floors to Receive Resilient Flooring (Practice for)
7. ASTM F1861 Resilient Wall Base (Standard Specification for)
8. ASTM F2169 Resilient Stair Treads (Standard Specification for)

C. RFCI: The Resilient Floor Covering Institute.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data:

1. For each type of resilient base and accessory indicated.
2. Manufacturer's full color range (including any standard and premium colors).
3. Design Data for all compounds, fillers, adhesives, etc.

C. Samples.

1. Provide 6-inch linear samples of each piece of trim material specified.

D. Quality Assurance/Control Submittals:

1. Manufacturer's Written Installation Instructions.
2. Certificate from resilient base installer that all products supplied for installation comply with local regulations in the area where the project is located controlling the use of Volatile Organic Compounds (VOC's).
3. Statement of Installer’s Qualifications.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data (including recommended polish and buffing procedures) in accordance with Specification Section - PROJECT CLOSEOUT.

B. Record Documents in accordance with Specification Section – PROJECT DOCUMENTS.

C. Warranty in accordance with this Specification Section, and Specification Section – WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
    a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project, and is competent in the techniques required by the manufacturer.
2. Manufacturer/Supplier Qualifications:
    a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
    a. CBC: California Building Code (CBC 11B-302.1)

C. Meetings:

1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
    a. Coordinate the work with other work being performed.
    b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
    c. Review delivery, storage, and handling procedures.
    d. Review Project Conditions.
    e. Review subfloor preparation procedures.
2. Progress: Scheduled by the Contractor during the performance of the work.
    a. Review for proper installation of work progress.
    b. Identify any installation problems and acceptable corrective measures.
    c. Identify any measures to maintain or regain project schedule if necessary.
3. Completion: Scheduled by the Contractor upon proper completion of the work.
    a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
    b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, type, color, and size.
2. Damaged products will not be accepted.

C. Storage and protection:

1. Products shall be stored in a dry, protected, interior area above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
    a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
    1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled "Environmental Requirements."

1.7 PROJECT CONDITIONS

A. Environmental requirements:
    1. Temperature: Maintain temperature in space to receive products at sixty-eight (68) degrees Fahrenheit for two (2) days prior, during, and two (2) days following installation.
        a. After this period, maintain a temperature of not less than fifty-five (55) degrees Fahrenheit.
        b. After installation, at no such time shall the temperature exceed eighty-five (85) degrees Fahrenheit.

B. Existing Conditions:
    1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
    2. Field Measurements:
        a. Take and be responsible for field measurements as required.
        b. Report any significant differences between field dimensions and drawings to the Architect.

1.8 WARRANTY

A. Contractor's General Warranty:
    1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Rubber Base Warranty: 2 Years.
    1. In accordance with manufacturer's written standard warranty.

C. Manufacturer's Transitions Warranty: 2 Years.
    1. In accordance with manufacturer's written standard warranty.

D. Installer's Warranty: 2 Years.
    1. In accordance with the terms of the Specification Section - WARRANTIES:

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 MATERIALS

A. General:
    1. Resilient base and accessories shall be of first quality and the product of one manufacturer.
    2. Stair Treads shall be slip resistant by achieving a minimum 0.6 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM D2047.
    3. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as noted otherwise.

a. Stair treads, risers, and stringers shall be of the same color or matching color and product line.

4. All resilient base and accessories shall be impervious to water damage.
5. Minimize seams.

2.3 RUBBER BASE

A. Specified: **MANNINGTON COMMERCIAL**
   1. Alternate: **ROPPE CORPORATION**.
B. Shall comply with ASTM F1861, for Type TS (Vulcanized Rubber), Group 1 (Solid and Homogeneous).
   1. Critical Radiant Flux: ASTM E648, Class 1, not less than 0.45 W/sq.cm.
C. Base shall be [Coved]
D. Thickness: 0.125".
E. Base height shall be [**4"**]
F. Length: as long as possible to reduce seams.
G. Provide factory molded inside and outside base corners from the same dye lot as the rubber base.
H. .

2.4 TRANSITIONS

A. Specified: **MANNINGTON COMMERCIAL**.
   1. Alternate: **ROPPE CORPORATION**.
B. Include molding caps, dividers, edges, cove supports, feature strips, reducers, stair nosings, etc.
C. Shall be composed of Thermoplastic Vinyl throughout item.
   1. Stair Nosings shall be Thermoplastic Rubber (Vulcanized Rubber).
D. Critical Radiant Flux: ASTM E648, Class 1, not less than 0.45 W/sq.cm.
E. Shall comply to dimension requirements of section 4.5.2 (changes in level) and section 4.5.3 (carpet-edge trim) of the ADAAG.
F. Stair nosings shall provide color contrasting integral insert for the visually impaired as indicated.

2.5 ACCESSORIES

A. Underlayment Compound:
   1. Specified: **ARDEX INCORPORATED** "K-15."
      a. Alternate: **CHEMREX**.
         1) A compatible bonding agent is needed for this product to adhere to the Vapor-Alkalinity Control System and be considered as equivalent.
   2. Provide free-flowing, self-leveling, pumpable, cement based compound (ARDEX K-15) for applications from 1 inch thick to feathered edges, 4000 psi minimum in accordance with ASTM C109, modified for air cure only.
B. Crack and Joint Filler:
   1. Specified: **ARDEX INCORPORATED** "Ardifix".
   2. Provide low viscosity rigid polyurethane filler, tensile strength of 4,000 psi minimum, in accordance with ASTM D638.
C. Concrete Primer (if applicable):
   1. Nonstaining type as recommended in writing by flooring manufacturer.
D. Adhesives:
   1. Adhesive as recommended in writing by resilient base manufacturer.
      a. Provide manufacturer's written recommended epoxy adhesive at all rubber stair accessories and rubber stair nosings.

2. Compatible with Vapor-Alkalinity Control System, if installed.
3. Shall comply with requirements in the place where the project is located.
4. Shall be water and mildew resistant.
5. Shall bond to non-porous substrate surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.
   2. Insure that all flooring has been installed, fitted close to the wall to provide even support to the resilient base, and to insure a tight, smooth fit along the floor.
   3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:
   1. Verify that concrete slabs comply with ASTM F710.
   2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
   3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
   4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) for compliance with adhesives and resilient tile manufacturer's written substrate preparation recommendations.
      a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH Test Results, evaluate products for compatibility with adhesives and resilient base products.
   5. Determine adhesion characteristics by performing bond tests recommended by the resilient base and accessory manufacturer.

C. Wood Subfloors:
   1. Verify underlayment over subfloor complies with Specification Section - ROUGH CARPENTRY.
   2. Verify underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through the surface.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Wall substrates to receive resilient base must be completely clean, dry, smooth and free of oil, grease, rust, paint, varnish, shellac, or any other foreign substance.
   3. From floor substrates, remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that may contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the resilient base and accessory manufacturer.
      a. If a Vapor-Alkalinity Control System has been installed, do not remove this system.

4. Fill all cracks, joints, etc. with a Crack and Joint Filler according to manufacturer's written instructions.
5. Install self-leveling underlayment compound at depressed or uneven floor conditions.
6. Vacuum clean substrates to be covered immediately before installation.
7. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
8. Proceed only after unsatisfactory conditions have been corrected.
9. Perform manufacturer recommended bond test to verify adhesion of resilient base and accessory to substrate.
10. Apply any recommended primers over the leveling compounds or treated concrete slabs prior to the installation of any resilient base or accessory products if recommended by the manufacturer.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Layout:
   1. Lines shall be straight and true.
   2. Refer to Floor Pattern Drawing(s) in the Interior Color Schedule for transitions in color.

C. Resilient Base installation:
   1. For base installations on primed metal or enameled surfaces, provide manufacturer's written recommended co-adhesive method of installation applied to both surfaces with contact bond adhesive.
   2. On dry, absorbent surfaces, the base shall be adhered with manufacturer's written recommended adhesive and firmly pressed to the walls.
   3. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
   4. Install in lengths as long as possible to minimize seams.
   5. Minimize gaps at seams.
   6. Align tops of adjacent pieces.
   7. Tightly adhere resilient base to substrate throughout length of piece, with base in continuous contact with horizontal and vertical substrates.
   8. Do not stretch resilient base during installation.
   9. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
   10. Pre-molded Corners: Install pre-molded corners before installing straight pieces.
   11. After the installation, remove all excess adhesive before it dries.
   12. Allow adhesive to set firm for approximately 24 hours before washing or applying any pressure.

D. Transition installation:
   1. Measure and trim to fit transition pieces prior to installing.
   2. Use appropriate approved manufacturer written adhesives for each substrate.
   3. After installation, immediately remove all excess adhesive before it dries.

3.4 CLEANING

A. Cleaning:
   1. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   2. Clean any soiled surfaces immediately.
   3. Clean any soiled surfaces at the end of each day, minimum.
   4. Finish shall be clean and ready for the application of any additional finishes.
   5. In accordance with manufacturer’s written instructions and recommendations.

3.5 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 09 65 16 – RESILIENT SHEET

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to furnish and install Resilient Sheet Flooring, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 06 41 23 MODULAR CASEWORK
4. 09 29 00 GYPSUM BOARD
5. 09 65 10 RESILIENT BASE AND ACCESSORIES
6. 09 65 19 RESILIENT TILE
7. 09 68 40 CARPET
8. 10 05 00 MISCELLANEOUS SPECIALTIES

1.2 REFERENCE STANDARDS

A. ADAAG: Americans with Disabilities Act Accessibilities Guidelines.

B. ASTM: American Society of Testing Materials

1. ASTM C109 Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens) (Test Method for)
2. ASTM D638 Tensile Properties of Plastics (Test method for)
3. ASTM D2047 Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine (Test Method for)
4. ASTM E648 Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source (Test Method for)
5. ASTM E662 Specific Optical Density of Smoke Generated by Solid Materials (Test method for)
6. ASTM F710 Preparing Concrete Floors to Receive Resilient Flooring (Practice for)
7. ASTM F970 Static Load Limit (Test method for)
8. ASTM F1913 Vinyl Sheet Floor Covering Without Backing (Specification for)
9. ASTM F2034 Sheet Linoleum Floor Covering (Specification for)

C. RFCI: The Resilient Floor Covering Institute.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data:

1. For each type of resilient sheet flooring indicated.
2. Manufacturer's full color range (including any standard and premium colors).
3. Design Data for all components, fillers, adhesives, etc.

C. Shop Drawings:

1. Seaming Diagrams:
   a. Changes at patterns, colors, and seams shall be identified.

D. Samples:

1. Provide 12 inch square sample of each color and pattern indicated.

1.4 QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Manufacturer's Written Installation Instructions.

B. Certificate from floor covering installer that all products supplied for installation comply with local regulations in the area where the project is located controlling the use of Volatile Organic Compounds (VOC's).
C. Statement of Installer's Qualifications.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data (including recommended polish and buffing procedures) in accordance with Specification Section - PROJECT CLOSEOUT.
B. Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
C. Warranty in accordance with this specification and with Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project and is competent in techniques required by the manufacturer.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CBC California Building Code (CBC 11B-302.1)
      b. CDPH California Department of Public Health, “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers”
C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with other work being performed.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
      c. Review delivery, storage, and handling procedures.
      d. Review the article titled PROJECT CONDITIONS of this specification section.
      e. Review subfloor preparation procedures.
   2. Progress: Scheduled by the Contractor during the performance of the work.
      a. Review for proper installation of work progress.
      b. Identify any installation problems and acceptable corrective measures.
      c. Identify any measures to maintain or regain project schedule if necessary.
   3. Completion: Scheduled by the Contractor upon proper completion of the work.
      a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
      b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored in a dry, protected, interior area above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
      b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
         1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled “Environmental Requirements”.
      c. Store rolls upright.

1.8 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature: Maintain temperature in space to receive products at sixty-eight (68) degrees Fahrenheit for two (2) days prior, during, and two (2) days following installation.
      a. After this period, maintain a temperature of not less than fifty-five (55) degrees Fahrenheit.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Field Measurements:
      a. Take and be responsible for field measurements as required.
      b. Report any significant differences between field dimensions and drawings to the Architect.

1.9 WARRANTY

A. Contractor's General Warranty: In accordance with Specification Section – WARRANTIES.

B. Manufacturer's Warranty: 5 Years.
   1. In accordance with manufacturer's written standard warranty.

C. Installer's Warranty: 5 Years.
   1. In accordance with the terms of the specification section – WARRANTIES.

1.10 MAINTENANCE

A. Extra Materials:
   1. Furnish not less than one sq. yd. of floor covering of each class, wearing surface, color, pattern and size of resilient sheet flooring installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 MATERIALS

A. General:

1. All resilient sheet flooring shall be the product of one manufacturer and shall to maximum extent possible be of a single batch number.
2. Resilient sheet flooring shall be slip resistant by achieving a minimum 0.6 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM D2047.
    a. Resilient sheet flooring installed on ramps shall achieve a minimum 0.8 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM D2047.
3. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as noted otherwise.
4. All resilient sheet flooring shall be impervious to water damage.

2.3 VINYL SHEET

A. Specified: TARKETT COMMERCIAL, INC.
    1. Alternate: **ARMSTRONG WORLD INDUSTRIES, INC.**
    2. Alternate: **MANNINGTON COMMERCIAL**.
B. Shall comply with ASTM F1913.

2.4 ACCESSORIES

A. Underlayment Compound:
    1. Specified: ARDEX "K-15".
        a. Alternate: **CHEMREX**.
            1) A compatible bonding agent is needed for this product to adhere to the Vapor-Alkalinity Control System and be considered as equivalent.
    2. Provide free-flowing, self-leveling, pumpable, cement based compound (ARDEX K-15) for applications from 1 inch thick to feathered edges, 4000 psi minimum in accordance with ASTM C109, modified for air cure only.
B. Crack and Joint Filler:
    1. Specified: ARDEX "ARDIFIX".
    2. Provide low viscosity rigid polyurethane filler, tensile strength of 4,000 psi minimum, in accordance with ASTM D638.
C. Concrete Primer (if applicable):
    1. Nonstaining type as recommended in writing by flooring manufacturer.
D. Adhesives:
    1. Adhesive as recommended in writing by resilient base manufacturer.
    2. Compatible with Vapor-Alkalinity Control System, if installed.
    3. Shall comply with requirements in the place where the project is located.
    4. Shall be water and mildew resistant.
    5. Shall bond to non-porous substrate surfaces.
E. Polish:
    1. If applicable, provide manufacturer's written recommended acrylic floor polish, compatible with resilient flooring materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of conditions:
    1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
    2. Check sub-floor variation with long straight edge.

3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:
1. Verify that concrete slabs comply with ASTM F710.
2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) for compliance with adhesives and resilient tile manufacturer's written substrate preparation recommendations.
   a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH Test Results, evaluate products for compatibility with adhesives and resilient base products.
5. Determine adhesion characteristics by performing bond tests recommended by the resilient base and accessory manufacturer.

C. Wood Subfloors:
1. Verify underlayment over subfloor complies with Specification Section - ROUGH CARPENTRY.
2. Verify underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through the surface.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other specification sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that may contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the resilient sheet manufacturer.
   a. If a Vapor-Alkalinity Control System has been installed, do not remove this system.
3. Fill all cracks, joints, etc. with a Crack and Joint Filler according to manufacturer's written instructions.
4. Install self-leveling underlayment compound at depressed or uneven floor conditions.
5. Broom and vacuum clean substrates to be covered immediately before installing resilient sheets.
6. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
7. Proceed only after unsatisfactory conditions have been corrected.
8. Perform manufacturer recommended bond test to verify adhesion of resilient sheet floor covering to substrate.
9. Apply any recommended primers over the leveling compounds or treated concrete slabs prior to the installation of any resilient sheet products if recommended by the resilient sheet manufacturer.
10. Concrete (Previous Flooring Material Removed): Remove existing adhesive by grinding with a concrete grinding machine and moist sand. Do not use solvents to remove adhesive.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.

B. Layout:
1. Lines shall be straight and true.
2. Refer to Floor Pattern Drawing(s) in the Interior Color Schedule for layout of Patterns.

C. Resilient sheet flooring installation:
1. Apply adhesive in accordance with manufacturer's current written recommendations.
a. Do not apply adhesive too far in advance of the floor covering installation. Adhesive must be sufficiently "tacky" in accordance with adhesive manufacturer's written recommendations for the proper installation of the floor covering.
b. Adhesive shall be applied around perimeter, at seams, and around all fixtures to provide a homogenous surface.
2. Maintain uniformity of resilient sheet direction.
3. Arrange for a minimum number of seams and place them in inconspicuous and low traffic areas, but in no case less than 6 inches away from parallel joints in flooring substrates.
4. Match edges of resilient floor coverings for color shading and pattern at seams.
5. Avoid cross seams.
6. Scribe, cut and fit resilient sheet flooring to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture, including cabinets, pipes, outlets, edgings, thresholds and nosing’s.
7. Extend resilient sheet flooring into toe spaces, door reveals, closets and similar openings.
8. Hand roll resilient sheet floor covering in both directions from center out to embed in adhesive and eliminate trapped air.
a. At wall, door casings, and other locations where access by roller is impractical, press floor coverings firmly in place with flat-bladed instrument that will not harm the flooring.
9. Prepare seams to produce tightly fitted seams without gaps or overlaps.
a. Heat weld seams
b. Chemically bond seams.
10. Installation shall be true, level, and even with tight joints.
11. Maintain reference markers, holes or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.

D. Base:
1. Shall be integrally coved 4 inches high (unless otherwise indicated), and capped with continuous metal edge strip.

3.4 CLEANING

A. Cleaning:
1. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
2. Clean any soiled surfaces immediately.
3. Clean any soiled surfaces at the end of each day, minimum.
4. Finish shall be clean and ready for the application of any additional finishes.
5. In accordance with manufacturer's written instructions and recommendations.

B. Polishing (if applicable):
1. Prior to final acceptance for occupancy, all resilient sheet flooring surfaces shall be polished and buffed with a minimum of three coats without diminishing any polish's slip resistance characteristics in accordance with approved manufacturer’s written recommendations.

3.5 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.

1. Provide the services of a manufacturer-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
    a. Train Owner's maintenance personnel on cleaning procedures and schedules related to cleaning and preventative maintenance,
    b. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.

3.6 PROTECTION

A. Protection from traffic:
    1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

A. Vinyl Sheet: **RS-1**.
    1. Manufacturer: **TARKETT**
    2. Product name: iQ OPTIMA HOMOGENEOUS SHEET
    3. Style: iQ OPTIMA
    4. Physical Characteristics:
        a. Wearing Surface: Smooth.
        b. Overall Thickness: 2 mm.
        c. Sheet Width: 6 feet 6 inches.
        d. Static Load Limit: ASTM F970, 0.005"
    5. Performance Characteristics:
        a. Critical Radiant Flux: ASTM E648, Class 1, not less than 0.45 W/sq.cm.
        b. Smoke Density: ASTM E662, Less than 450.

END OF SECTION

SECTION 09 65 19 – RESILIENT TILE

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Resilient Tile Floor Covering materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 02 26 00 HAZARDOUS MATERIALS PROCEDURES
4. 06 10 00 ROUGH CARPENTRY
5. 06 41 23 MODULAR CASEWORK
6. 08 11 00 METAL DOORS AND FRAMES
7. 09 29 00 GYPSUM BOARD
8. 09 65 10 RESILIENT BASE AND ACCESSORIES
9. 09 65 16 RESILIENT SHEET
10. 09 68 40 CARPET
11. 10 05 00 MISCELLANEOUS SPECIALTIES

1.2 REFERENCE STANDARDS

A. ADAAG: Americans with Disabilities Act Accessibilities Guidelines

B. ASTM: American Society of Testing Materials

1. ASTM C109 Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens) (Test Method for)
2. ASTM C501 Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser (Test Method for)
3. ASTM D638 Tensile Properties of Plastics (Test method for)
4. ASTM D2047 Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine (Test Method for)
5. ASTM D2240 Rubber Property – Durometer Hardness (Standard Test Method for)
6. ASTM E648 Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source (Test Method for)
7. ASTM E662 Specific Optical Density of Smoke Generated by Solid Materials (Test method for)
8. ASTM F150 Electrical Resistance of Conductive and Static Dissipative Resilient Flooring (Test Method for)
9. ASTM F710 Preparing Concrete Floors to Receive Resilient Flooring (Practice for)
10. ASTM F970 Static Load Limit (Test method for)
11. ASTM F1066 Vinyl Composition Floor Tile (Specification for)
12. ASTM F1344 Rubber Floor Tile (Specification for)
13. ASTM F1700 Solid Vinyl Floor Tile (Specification for)

C. RFCI: The Resilient Floor Covering Institute.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

1. For each type of resilient tile flooring indicated.
2. Manufacturer's full color range (including any standard and premium colors).
3. Design Data for all components, fillers, adhesives, etc.

C. Samples.

1. Provide 12 inch square sample of each color and pattern selected.

D. Quality Assurance/Control Submittals:
   1. Manufacturer's Written Installation Instructions.
   2. Certificates:
      a. Certificate from floor covering installer that all products supplied for installation comply with local regulations in the area where the project is located controlling the use of Volatile Organic Compounds (VOC's).
   3. Statement of Installer's Qualifications.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
B. Record Documents in accordance with Specification Section - PROJECT DOCUMENTS.
C. Warranty in accordance with this specification and Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project and is competent in techniques required by the manufacturer.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CBC California Building Code (CBC 11B-302.1)
      b. CDPH California Department of Public Health, “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers”
C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with other work being performed.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
      c. Review delivery, storage, and handling procedures.
      d. Review the article titled PROJECT CONDITIONS of this specification section.
      e. Review subfloor preparation procedures.
   2. Progress: Scheduled by the Contractor during the performance of the work.
      a. Review for proper installation of work progress.
      b. Identify any installation problems and acceptable corrective measures.
      c. Identify any measures to maintain or regain project schedule if necessary.
   3. Completion: Scheduled by the Contractor upon proper completion of the work.
      a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
      b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:

1. Products shall be stored in a dry, protected, interior area above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
   b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
      1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled "Environmental Requirements."
   c. Do not double stack.

1.7 PROJECT CONDITIONS

A. Environmental requirements:

1. Temperature: Maintain ambient temperature in space to receive products at sixty-eight (68) degrees Fahrenheit for two (2) days prior, during, and two (2) days minimum following installation.
   a. After this period, maintain a temperature of not less than 55 degrees Fahrenheit.
   b. After installation, at no such time shall the temperature exceed 85 degrees Fahrenheit.
   c. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Field Measurements:
   a. Take and be responsible for field measurements as required.
   b. Report any significant differences between field dimensions and drawings to the Architect.

1.8 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

1. In accordance with manufacturer's written standard warranty.

C. Manufacturer's Luxury Vinyl Tile Warranty: 10 Years.

1. In accordance with manufacturer's written standard warranty.

D. Installer's Warranty: 5 years.

1. In accordance with the terms of the specification section – WARRANTIES.

1.9 MAINTENANCE

A. Extra Materials:

1. Furnish not less than one box for each 50 boxes or fraction thereof, of each class, wearing surface, color, pattern and size of resilient floor tile installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 MATERIALS

A. Resilient Tile Flooring shall be the product of one manufacturer and shall to the maximum extent possible be of a single lot number.

B. Resilient Tile Flooring shall be slip resistant by achieving a minimum 0.6 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM D2047.

1. Resilient Tile Flooring installed on ramps shall achieve a minimum 0.8 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM D2047.

C. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as noted otherwise.

D. All Resilient Tile Flooring shall be impervious to water damage.

2.3 LUXURY VINYL TILE

A. **RT-3** Luxury Vinyl Tile

1. Specified: **TARKETT COMMERCIAL**. “iD Latitude”.
2. Classification of Composition per ASTM F1700, Class III.
3. Wearing Surface: Smooth.
4. Finish: Techtonic
5. Wear Layer Thickness: 20 mil
6. Overall Thickness: 3 mm
7. Tile Size: 6 inch x 48 inch
8. Static Load Limit: ASTM F970, 250 psi.
9. Critical Radiant Flux: ASTM E648, Class 1, not less than 0.45 W/sq.cm.
10. Smoke Density: ASTM E662, Less than 450.

2.4 ACCESSORIES

A. Underlayment Compound:

1. Provide free-flowing, self-leveling, pumpable, cement based compound for applications from 1 inch thick to feathered edges, 4000 psi minimum in accordance with ASTM C109, modified for air cure only.
2. Specified: ARDEX "K-15."
    a. Alternate: **CHEMREX**
        1) A compatible bonding agent is needed for this product to adhere to the Vapor-Alkalinity Control System and be considered as equivalent.

B. Crack and Joint Filler:

1. Specified: **ARDEX** "ARDIFIX."
2. Provide low viscosity rigid polyurethane filler, tensile strength of 4,000 psi minimum, in accordance with ASTM D638.

C. Concrete Primer (if applicable):

1. Nonstaining type as recommended in writing by flooring manufacturer.

D. Adhesives:

1. Adhesive as recommended in writing by resilient tile manufacturer.
2. Compatible with Vapor-Alkalinity Control System, if installed.
3. Shall comply with requirements in the place where the project is located.
4. Shall be water and mildew resistant.
5. Shall bond to non-porous substrate surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which, affect the execution of work under this specification section.
   2. Check sub-floor variation with long straight edge.
   3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:
   1. Verify that concrete slabs comply with ASTM F710.
   2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
   3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
   4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) test results for compliance with adhesives and resilient tile manufacturer's written substrate preparation recommendations.
      a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH Test Results, evaluate products for compatibility with adhesives and resilient tile products.
   5. Determine adhesion characteristics by performing bond tests recommended by the resilient tile manufacturer.

C. Wood Subfloors:
   1. Verify underlayment over subfloor complies with Specification Section - ROUGH CARPENTRY.
   2. Verify underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through the surface.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that may contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the resilient tile manufacturer.
      a. If a Vapor-Alkalinity Control System has been installed, do not remove this system.
   3. Fill all cracks, joints, etc. with a Crack and Joint filler according to manufacturer's written instructions.
   4. Install self-leveling underlayment compound at depressed or uneven floor conditions.

5. Broom and vacuum clean substrates to be covered immediately before installing resilient tile.
6. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
7. Proceed with installation only after unsatisfactory conditions have been corrected.
8. Apply any recommended primers over the leveling compounds or treated concrete slabs prior to the installation of any resilient tile products.
9. Concrete (Previous Flooring Material Removed): Remove existing adhesive by grinding with a concrete grinding machine and moist sand. Do not use solvents to remove adhesive.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.

B. Layout:
   1. Lines shall be straight and true.
   2. Refer to Floor Pattern Drawing(s) in the Interior Color Schedule for layout of patterns.

C. Resilient Tile installation:
   1. Apply adhesive in accordance with manufacturer's current written recommendations.
      a. Do not apply adhesive too far in advance of the tile installation. Adhesive must be sufficiently "tacky" in accordance with adhesive manufacturer's written recommendations for the proper installation of the tile.
   2. Start installation at center line of room, unless indicated otherwise, and work towards the borders.
   3. Border tiles shall not be less than half a tile.
   4. Scribe, cut, and fit resilient tile flooring to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture, including cabinets, pipes, outlets, edgings, thresholds, and nosing's.
   5. Extend resilient tile flooring into toe spaces, door reveals, closets, and similar openings.
   6. Installation shall be true, level, and even with tight joints.
   7. Check work to see that all tile are lying down and setting in.
   8. Maintain reference markers, holes or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other non-permanent marking device.

3.4 CLEANING

A. Cleaning:
   1. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   2. Clean any soiled surfaces immediately.
   3. Clean any soiled surfaces at the end of each day, minimum.
   4. Finish shall be clean and ready for the application of any additional finishes.
   5. In accordance with manufacturer's written instructions and recommendations.

B. Polishing:
   1. Prior to final acceptance for occupancy, all resilient tile flooring surfaces shall be polished and buffed with a minimum of three coats without diminishing any polish's slip resistance characteristics in accordance with manufacturer's written recommendations.

3.5 DEMONSTRATION

A. In accordance with Specification Section – PROJECT CLOSEOUT.
   1. Provide the services of a manufacturer-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
      a. Train Owner's maintenance personnel on cleaning procedures and schedules related to cleaning and preventative maintenance,
      b. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.

3.6 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 09 68 40 - CARPET

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all carpet materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 06 10 00 ROUGH CARPENTRY
4. 06 41 23 MODULAR CASEWORK
5. 08 11 00 METAL DOORS AND FRAMES
6. 09 29 00 GYPSUM BOARD
7. 09 65 10 RESILIENT BASE AND ACCESSORIES
8. 09 65 16 RESILIENT SHEET
9. 09 65 19 RESILIENT TILE
10. 09 72 00 WALL COVERINGS
11. 09 91 00 PAINTING

1.2 REFERENCE STANDARDS

A. AATCC: American Association of Textile Colorists and Chemists.

B. ASTM: American Society of Testing Materials.

1. ASTM C109 Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens) (Test Method for)
2. ASTM D638 Tensile Properties of Plastics (Test method for)
3. ASTM D1335 Tuft Bind of Pile Yarn Floor Coverings (Test Method for)
4. ASTM D2859 Ignition Characteristics of Finished Textile Floor Covering Materials (Test method for)
5. ASTM D3936 Resistance to Delamination of the Secondary Backing of Pile Yarn Floor Covering (Test Method for)
6. ASTM E648 Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source (Test Method for)
7. ASTM E662 Specific Optical Density of Smoke Generated by Solid Materials (Test method for)
8. ASTM F710 Preparing Concrete Floors to Receive Resilient Flooring (Practice for)

C. CRI: Carpet and Rug Institute Recommendations and Standards.

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

1. For each type of carpet indicated:
2. Manufacturer's full color range (including any standard and premium colors).
3. Design data for all adhesives, tape, etc. for all carpet accessories.

C. Shop Drawings.

1. Seaming diagrams.
    a. Changes at carpet types, patterns, colors, and field seams shall be identified.

D. Samples.

1. Provide 18" x 18" sample of each color and pattern selected.
2. Provide 200 square inch sample of each color and pattern indicated.
3. Provide 200 square inch sample of padding selected (if any).

E. Quality Assurance/Control Submittals:
   1. Manufacturer's Written Installation Instructions.
   2. Certificates:
      a. Certificates from the manufacturer that the installation was in compliance with manufacturer's written instructions.
   3. Statement of Installer's Qualifications.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data (indicating all recommended cleaning and maintenance instructions) in accordance with Specification Section - PROJECT CLOSEOUT.
B. Project Record Documents in accordance with Specification Section - PROJECT RECORD DOCUMENTS.
C. Warranty in accordance with this specification and Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CBC: California Building Code (CBC 804.1 and CBC 11B-302.1 and 11B-302.2)
      b. CDPH: California Department of Public Health, “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers”
      c. NFPA: National Fire Protection Agency
      d. SCAQMD: South Coast Air Quality Management District, Rule 1168
C. Meetings:
   1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
      a. Coordinate the work with all other related work.
      b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
      c. Review delivery, storage and handling procedures.
      d. Review project conditions.
      e. Review subfloor preparation procedures.
   2. Progress: Scheduled by the Contractor during the performance of the work.
      a. Review for proper installation of work progress.
      b. Identify any installation problems and acceptable corrective measures.
      c. Identify any measures to maintain or regain project schedule if necessary.
   3. Completion: Scheduled by the Contractor upon proper completion of the work.
      a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
      b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped in the original protective wrapping with legible registration labels indicating manufacturer's name, style, color and dye lot.
B. Storage and protection:
   1. Products shall be stored in a dry, protected interior area.
      a. Carpet shall be stored flat and shall not have anything stacked on top.

b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
   1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled "Environmental Requirements."

1.7 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature: Maintain ambient temperature in space to receive products between sixty-eight (68) degrees Fahrenheit and eighty (80) degrees Fahrenheit for seven (7) days prior, during, and seven (7) days minimum following installation.
      a. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.
   2. Humidity: Maintain humidity in space to receive products between 6 percent to 9 percent for four (4) days minimum prior, during, and following installation in accordance with manufacturer's written recommendations.
      a. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Space shall be dry.
      a. Concrete slab shall be a minimum of 4 months old.
   3. Field Measurements:
      a. Take and be responsible for field measurements as required.
      b. Report any significant differences between field dimensions and drawings to Architect.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Broadloom Warranty: Life of the Carpet.
   1. Shall cover Wear, Anti-shock, Edge Ravel, Tuft Bind, Dimensional Stability, Zippering, Static Protection, and Backing Delamination.

C. Manufacturer's Modular Tile Warranty: Life of the Carpet.
   1. Shall cover Wear, Anti-shock, Edge Ravel, Tuft Bind, Dimensional Stability, Zippering, Static Protection, and Backing Delamination.

D. Manufacturer's Walk-Off Warranty: 15 Years.
   1. Shall cover Wear, Anti-shock, Edge Ravel, Tuft Bind, Dimensional Stability, Zippering, Static Protection, and Backing Delamination.

E. Installer's Warranty: 2 Years.
   1. In accordance with the terms of the specification section - WARRANTIES:
      a. Shall be co-endorsed by the General Contractor.

1.9 OWNER'S INSTRUCTIONS

A. Provide the services of a manufacturer's-authorized service representative to demonstrate and train the Owner's maintenance personnel prior to substantial completion as specified below:
   1. Proper maintenance and cleaning procedures in accordance with manufacturer's written recommended instructions.

1.10 MAINTENANCE

A. Extra Materials:
   1. Broadloom:
      a. Provide two percent (2 percent) of each color and all salvage pieces over 1 square yard in accordance with Specification Section - PROJECT CLOSEOUT.
   2. Walk-Off:
      a. Provide five percent (5 percent) of each color, in accordance with Specification Section - PROJECT CLOSEOUT.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 MATERIALS

A. All materials shall be newly manufactured and of a quality consistent with industry standards and this specification.
B. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as otherwise specified.
C. Carpet shall have integral static protection.
D. Carpet shall be impervious to water damage.
E. The stain resistant properties must be permanent and cannot be removed by commercial cleanings or abrasive wear. Test data as follows:
   1. Red Dye 40 must be released by water only, after exposure to 150,000+ cycles in a tetra pod walker and after sample is allowed to soak in 10:1 solution of water and ammonia.
   2. Topical stain resistant treatments will not be acceptable. Stain resistant properties must be inherent.
F. Carpet must meet or exceed qualifications for environmental standards of the Carpet and Rug Institute's Green Label Program.

2.3 BROADLOOM

A. **BL-1** Broadloom
   1. Specified: **TANDUS CENTIVA** “Aftermath II #03026" PowerBond”.
   2. Physical Characteristics:
      a. Construction Type: Stratatec Patterned Loop.
      b. Fiber System: Dynex SD Nylon / Dynex Nylon.
      c. Fiber Type: TDX Nylon.
      d. Dye Method: 90% Solution Dyed / 10% Yarn Dyed.
      e. Density: 7,145 oz/cu. yd.
      f. Pile Characteristics: Textured Loop.
      g. Yarn Count: 1800/1 & 1245/2.
      h. Pile Height: 0.187 inches.
      i. Face Weight: 17 oz / sq. yd.
      j. Stitches: 98.5 per inch.
      k. Gage: 5/641/13 ends per inch.
      l. Primary Backing: Synthetic Non-Woven.
      m. Secondary Backing: Closed Cell.
      n. Backing System: PowerBond Cushion.

o. Size: 6' width.
p. Soil Resistance Treatment: Ensure.

3. Performance Characteristics:
   a. Critical Radiant Flux: ASTM E648, Class 1 not less than 0.45 W/sq. cm.
   b. Smoke Density: ASTM E662, Less than 450.
   c. Methenamine Pill Test: ASTM D2859, self-extinguishing.
   d. Tuft Bind: ASTM D1335, Not less than 10 lbf.
   e. Delamination: ASTM D3936, Not less than 2.5 lbf/in.
   f. Electrostatic Propensity AATCC 134: Less than 13.5kV.
   g. .

2.4 WALK-OFF

A. **WO-1** Walk-Off Tile
   1. Specified: **TARKETT** “Abrasive Action II”.
   2. Pattern: Monolithic, unless otherwise noted.
   3. Physical Characteristics:
      a. Construction Type: Tufted.
      b. Fiber Content: 100% nylon 6/6.
      c. Fiber Type: TDX Nylon.
      d. Pile Characteristic: Patterned Loop.
      e. Yarn Count: 1200/2 denier.
      f. Density: 7,513 oz/cu. yd.
      g. Pile Height: 0.187 inches.
      h. Stitches: 8.0 per inch.
      i. Gage: 1/12 ends per inch.
      j. Face Weight: 24 oz/sq. yd.
      k. Primary Backing: non-woven synthetic fabric.
      l. Secondary Backing: 100% Recycled content with Tru Bloc.
      m. Backing System: ER3 Modular Tile.
      n. Size: 24" x 24".
      o. Soil Resistance Treatment: Ensure.
      p. Antimicrobial Treatment: Not applicable.
   4. Performance Characteristics:
      a. Critical Radiant Flux: ASTM E648, Class 1, Not less than 0.45 W/sq. cm.
      b. Smoke Density: ASTM E662, Less than 450.
      c. Methenamine Pill Test: ASTM D2859, self-extinguishing.
      d. Tuft Bind: ASTM D1335, Not less than 10 lbf.
      e. Delamination: ASTM D3936, Not less than 2.5 lbf/in.
      f. Electrostatic Propensity AATCC 134: Less than 3.5 kV.

2.5 ACCESSORIES

A. Underlayment Compound:
   1. Provide free-flowing, self-leveling, pumpable, cement based compound for applications from 1 inch thick to feathered edges.
      a. Compressive Strength, air cure only: ASTM C109, 4,000.
   2. Specified: **ARDEX INCORPORATED** "K-15."
   3. Alternate: **CHEMREX**
      a. Provide compatible bonding agent for this product to adhere to the Vapor-Alkalinity Control System to be considered as equivalent.

B. Crack and Joint Filler: low viscosity rigid polyurethane filler.
   1. Specified: **ARDEX** "ARDIFIX."
   2. Tensile strength: ASTM D638, 4,000 psi minimum.

C. Concrete Primer (if applicable):

1. Nonstaining type as recommended in writing by flooring manufacturer.

D. Adhesives:
1. Adhesive as recommended in writing by carpet manufacturer.
2. Compatible with VAPOR-ALKALINITY CONTROL SYSTEM, if installed.
3. Shall comply with requirements in the place where the project is located.
4. Shall be non-staining and water and mildew resistant.
5. Complies with flammability requirements for installed carpet.
6. Shall bond to non-porous substrate surfaces.

E. Seaming Cement:
1. Hot-melt adhesive tape or similar product
2. Complying with requirements in the place where the project is located.
3. Recommended in writing by carpet manufacturer for taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

F. Tackless Carpet Stripping:
1. Water-resistant plywood in strips as required to match cushion thickness and that comply with CRI, Section 16.2.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
2. Check sub-floor variation with long straight edge.
3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:
1. Verify that concrete slabs comply with ASTM F710.
2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) test results for compliance with adhesives and carpet manufacturer recommendations.
   a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH test results, evaluate products for compatibility with adhesives and carpet products.
5. Determine adhesion characteristics by performing bond tests recommended by the carpet manufacturer.

C. Wood Subfloors:
1. Verify underlayment over subfloor complies with Specification Section - ROUGH CARPENTRY.
2. Verify underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:

1. General: Comply with CRI, Section 7, "Site Conditions- All Installations" and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.
2. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the carpet manufacturer.
   a. If a Vapor-Alkalinity Control System has been installed do not remove this system.
3. Use crack and joint filler according to manufacturer's written instructions, to fill cracks, holes, and spalls in substrates.
4. Install self-leveling underlayment compound at depressed or uneven floor conditions.
5. Broom and vacuum clean substrates to be covered immediately before installing carpet.
6. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
7. Proceed with installation only after unsatisfactory conditions have been corrected.
8. Concrete (Previous Flooring Material Removed): Remove existing adhesive by grinding with a concrete grinding machine and moist sand. Do not use solvents to remove adhesive.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.

B. Layout:

1. Lines shall be straight and true.
2. Refer to Wall and Floor Pattern Drawing(s) in the Interior and Exterior Color Schedules for layout of patterns.

C. Carpet Installation:

1. Direct-Glue-Down Installation: Comply with CRI, Section 13, "Direct Glue-Down Installation."
2. Double-Glue-Down Installation: Comply with CRI, Section 14, "Double Glue-Down Installation."
3. Carpet with Attached-Cushion Installation: Comply with CRI, Section 15, "Attached Cushion."
4. Carpet with Pre-applied Adhesive Installation: Comply with CRI, Section 15.4, "Pre-Applied Adhesive Systems (PEEL AND STICK)."
5. Stretch-in Installation: Comply with CRI, Section 16, "Stretch-in Installation."
6. Carpet on Stairs Installation: Comply with CRI, Section 17, "Carpet on Stairs."
7. Comply with carpet manufacturer's written recommendations for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
   a. Level adjoining edges at seams with hand shears.
   b. Level adjoining edges.
8. Do not bridge building expansion joints with carpet.
9. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosing's. Bind or seal cut edges as recommended in writing by carpet manufacturer.
10. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
11. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.

D. Broadloom:

1. Install carpet cushion seams at 90-degree angle with carpet seams.

E. Carpet Base:
   1. Cut and fit carpet base to butt tightly end to end and to floor, changes in wall planes, columns, and cabinets.
   2. Bind edges at exposed ends.

3.4 CLEANING

A. Perform the following operations immediately after installing carpet:
   1. Remove and dispose of debris and recycle all unusable scrap.
   2. Remove excess adhesive and other surface blemishes using cleaner recommended in writing by carpet manufacturer.
   3. Remove yarns that protrude from carpet surface.
   4. Vacuum carpet using commercial machine with face-beater element.

3.5 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.
   1. Provide the services of a manufacturer-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
      a. Train Owner's maintenance personnel on cleaning procedures and schedules related to cleaning and preventative maintenance.
      b. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.

3.6 PROTECTION

A. Protect installed carpet to comply with CRI, Section 20, "Protecting Indoor Installations."

B. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION

SECTION 09 72 00 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all materials, labor, equipment and services necessary to furnish and install all Wall Coverings, accessories, and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
   1. FRP Panel systems.
   2. Vinyl Covered Tackboard Panel systems.
   3. Vinyl Wall Covering systems.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 06 41 23 MODULAR CASEWORK
   4. 09 24 00 CEMENT PLASTER
   5. 09 29 00 GYPSUM BOARD
   6. 09 50 00 ACOUSTICAL CEILINGS
   7. 09 65 10 RESILIENT BASE AND ACCESSORIES
   8. 09 68 40 CARPET
   9. 10 26 00 WALL AND CORNER GUARDS
   10. 10 28 13 TOILET ACCESSORIES
   11. 10 44 00 FIRE PROTECTION SPECIALTIES

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials
   1. ASTM C208 Cellulosic Fiber Insulating Board (Specification for)
   2. ASTM C423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method (Test Method for)
   3. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.
   1. Submit manufacturer's full color range (including any standard, premium and custom colors) of all Wall Coverings for selection by the Architect.

C. Samples.
   1. Provide 6-inch square sample of each Wall Covering product for color and pattern selected.
   2. Provide 6-inch lineal samples of each Wall Covering trim material specified.
      a. Submit memo size samples cut from current production of ground wall covering selected to demonstrate quality, weight and embossing.
   3. Custom Graphic Vinyl Wall Covering samples:
      a. Submit one reduced scale color proof showing the overall image of each mural for approval prior to manufacture.
      b. Submit 24" x 24" min. ground full strike-off at full scale of each mural design for approval prior to manufacture. Minimum of one sample and maximum of three samples if needed to ensure colors and images are correct.
      c. Submit memo size samples cut from current production of ground wall covering selected to demonstrate quality, weight and embossing.

1.4 CLOSEOUT SUBMITTALS

A. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
      b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
   2. Manufacturer/Supplier Qualifications:
      a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. CBC: California Building Code (CBC 803).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped.
   2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature: Maintain ambient temperature in space to receive products between sixty (60) degrees Fahrenheit and eighty (80) degrees Fahrenheit for three (3) days prior, during, and three (3) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 SCHEDULING

A. Custom Graphic Wallcovering: Verify lead time with manufacturer. Assume no less than six week lead time from approved submittals.

1.9 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 FRP PANELS

A. Specified: **NUDO**
   1. Alternate: **BP CHEMICALS**.
   2. Alternate: **MARLITE**.
   3. Alternate: **CRANE COMPOSITES "Sequentia"**
B. Width: 48 inches.
C. Thickness: 0.090 inches.
D. Surface burning: ASTM E84, Class C, Flame spread max: 175, Smoke developed max: 270.
E. Finish: Pebble finish.
F. Color: As selected from manufacturer's standard, premium, and custom color palette.
G. Accessories:
   1. Adhesive as recommended in writing by manufacturer that meets the requirements of the place where the Project is located.
   2. Sealant.
      a. Set all perimeter J-Mold trim in a continuous bead of silicon sealant.
H. Trim:
   1. Specified: **NUDO**.
   2. Alternate: **NUDO** trim accessories for all alternates.
   3. Provide inside, outside, division and edge trim moldings as required for the conditions present in the project.
   4. Material: Aluminum.
   5. Lengths: 96 inches
   6. Thickness: 0.090 inch
   7. Trim Shapes:
      a. J-Mold
         1) Specified: **NUDO** "A-28".
      b. Divider
         1) Specified: **NUDO** "A-30".
      c. Inside Corners
         1) Specified: **NUDO** "A-32".
      d. Outside Corners
         1) Specified: **NUDO** "A-34".

8. Finish: Powder Coated in colors to match the field color of the FRP Panels.

2.3 VINYL COVERED TACKBOARD

A. Panel:
   1. Specified: **CHATFIELD-CLARKE distributed by WESTERN BUILDING MATERIALS**.

B. Tackboard Size: 1/2" x 48" wide by maximum practical height to minimize joints.
   1. Wood fiber substrate tackboard shall be 1/2" thick, cellulose fiberboard sheathing, beveled side edges and square end edges, in accordance with ASTM C208, complying with the minimum standards listed below:
      a. Weight, lb/1000 ft2 640.
      b. Transverse strength, lbf 14.5.
      c. Tensil Strength, lb/in2 242.
      d. MOR, lb/in2 380.
      e. "k" Factor 0.37.
      f. Maximum Flame Spread - Class B 75.
      g. Maximum Smoke Developed - Class B 175.

C. Finish:
   1. Specified: **CHATFIELD CLARKE**
      a. Alternate: **KOROSEAL** “Koroseal School Collection”.
      b. Alternate: **LAMVIN INC.**
   2. Architect to select from manufacturer's standard textures and colors from the following series: Type I, Group 1.
   3. All vinyls used are to be 15 oz. total weight per lineal yard (Type I) with a cloth backer to insure consistent emboss.
      a. Surface burning: ASTM E84, Class A, Flame spread: 25. Smoke developed: 5.

D. Edge:
   1. Beveled, long side edges with vinyl wrapped to back side. Short end edges to be square cut with vinyl flush with end of substrate board.

E. Accessories:
   1. Provide vinyl covered PVC moldings in the following configurations: edge, inside and outside corner, and intermediate splice moldings. Provide colors to match the field panels. Use of moldings and locations shall be indicated on the drawings.

F. Overall panel when wrapped with Class A vinyls:
   1. Surface burning: ASTM E84, Class B, Flame spread: 75, Smoke developed: 175.

G. Adhesive:
   1. In accordance with tackboard panel manufacturer's written recommendations, and in compliance with VOC requirements.

2.4 CUSTOM GRAPHIC VINYL WALLCOVERINGS

A. Specified: **KOROSEAL** "Digital Lab".

B. Digital Image: Owner/Architect to provide PDF file of image.
   1. Type: Type II.
   2. Size: 54 inches wide.
   3. Total Weight: 21 oz. per linear yard.
   4. Fabric Weight: 2.7 oz. per linear yard.
   5. Vinyl Weight: 18.3 oz. per linear yard.
   6. Vinyl Gage: 9 mils.
   7. Fabric Backing: "Osnaburg".
   8. Ground: "Fine Texture SMSDCDS01031".
   9. "Early Warning Effect" formulation warning of impending fire before flames develop.
   10. Formulation releases a colorless, odorless vapor which automatically activates ionization smoke detectors.

11. Standard top coating for cleanability and UV protection.
12. Surface burning: ASTM E84, Class A, Flame spread max: 15, Smoke developed: 20.

C. Accessories:
1. Adhesives:
a. Specified: **KOROSEAL** “A-848-B Heavy Duty Premixed Vinyl adhesive”.
b. Manufacturer's recommended clear strippable wall covering adhesive.
2. Substrate primer/sealer compatible with GYPSUM BOARD: white pigmented alkyd or acrylic/latex base primer specially for use with vinyl wallcoverings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

3.4 INSTALLATION OF FRP PANELS

A. Install panels in a full spread of adhesive.

B. Install factory-laminated panels using concealed mounting splines in panel joints.

C. Install trim accessories with adhesive.

D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.

E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Finish shall be clean and ready for the application of any additional finishes.
   3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to furnish and install Painting, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Material and Equipment to be Painted: Paint all piping, unwrapped ductwork, electric conduits exposed to view. Prime and paint all factory finished mechanical and electrical equipment and accessories exposed to view.

C. Material and Equipment not to be Painted: Do not paint piping, ductwork, equipment and machinery located in attic spaces, above furred or suspended ceilings, in furred pipe or duct spaces. Do not paint factory finished equipment or machinery located in mechanical rooms or mechanical buildings, attics, furred or suspended ceilings.

D. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 05 12 00 STEEL AND FABRICATIONS
5. 06 41 23 MODULAR CASEWORK
6. 07 60 00 SHEET METAL (Shop Priming)
7. 07 92 00 SEALANTS
8. 08 11 00 METAL DOORS AND FRAMES
9. 08 31 13 ACCESS DOORS AND FRAMES
10. 08 70 00 HARDWARE
11. 08 80 00 GLASS
12. 09 24 00 CEMENT PLASTER
13. 09 29 00 GYPSUM BOARD
14. 09 50 00 ACOUSTICAL CEILINGS
15. 09 65 10 RESILIENT BASE AND ACCESSORIES
16. 09 68 40 CARPET
17. 10 05 00 MISCELLANEOUS SPECIALTIES
18. 10 21 13 TOILET PARTITIONS
19. 10 26 00 WALL AND CORNER GUARDS
20. 10 44 00 FIRE PROTECTION SPECIALTIES

1.2 DEFINITIONS

A. The following definitions are just some of the more important definitions used within this section, and were taken from the MPI Glossary Manual, or used to simplify language used by the Architect. These definitions and others stated within the Manual apply for this Specification Section.

B. Acrylic Latex: An aqueous dispersion of acrylic resins.

C. Acrylic Resin: A/R - Synthetic resins made by polymerizing esters of acrylic acid.

D. A/U: Aliphatic Urethane

E. A/A/U: Aliphatic Acrylic Urethane

F. Blocking: Sticking or bonding together of two painted surfaces that are in direct contact. Most often caused by stacking painted articles before dry or reaching a "block free" (or "non-blocking") stage.

G. DFT: Dry Film Thickness – the depth or thickness of a coating in the dry state. Expressed in mils (1/1000 inch) or microns.

H. DRY FALL: A Fog Paint designed to be applied by spray and dries fast enough that the overspray will be a dry powder after falling a certain distance. The dust can then be swept or vacuumed up.

I. ODFT: "Overall Dry Film Thickness" – the depth or thickness of a complete coating system in the dry state. Expressed in mils (1/1000 inch) or microns.

1.3 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials
   1. ASTM D523 Specular Gloss (Test for)
   2. ASTM D3359 Measuring Adhesion by Tape Test (Standard Test Methods for)
   3. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)

B. MPI: Master Painters Institute
   1. MPI: Architectural Painting Specification Manual.
   2. MPI: Maintenance Repainting Manual.
      a. MPI RSP: Master Painters Institute Repaint Surface Preparation Standards, Chapter 6, Section 2.
   3. MPI: Glossary.

C. PDCA: Painting and Decorating Contractors of America, latest edition of the Architectural Specification Manual, as prepared by Specification Services, Inc., Washington State Council of the PDCA.

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.
   1. Submit manufacturer's full color range, including standard, premium and custom colors, for selection by the Architect.
   2. Material Safety Data Sheets will be turned over to the Owner in compliance with local rules and regulations, but will not be reviewed.
   3. Materials List: Format in accordance with Paint Finish Schedule.
   4. Additional submittals to substantiate proposed equivalent systems.

C. Samples.
   1. Brushouts: In accordance with Specification Section - SUBMITTAL PROCEDURES.
   2. For each color and finish selected provide paint brushouts showing color tint graduation of each coat to and including the final color coat.
      a. Selected colors and finishes:
         1) Size: 8 1/2" x 11" boards.
         2) Quantity: 3 boards of each color and finish.
         3) Board material wherever possible and for transparent finishes shall be same as material to be finished. Opaque finishes may be on heavy card stock.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

B. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.

C. Warranty in accordance with Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Material Qualifications:
      a. Where possible (except for specified materials), paint materials shall be products of only one manufacturer.
      b. All materials, preparation and workmanship shall conform to requirements of the specified edition of the Architectural Painting Specification Manual by the Master Painters Institute (hereafter referred to as the MPI Painting Manual), unless otherwise indicated.
      c. Flame Spread Ratings in accordance with ASTM E84:

1) Paint finishes in required exit stairways, corridors and exitways must meet flame spread ratings as required by regulatory agencies.
2) Class A - Tunnel Test 0-25 for enclosed required exit stairways and other exit ways.
3) No interior paint or wall finish will be permitted having a tunnel test in excess of 200. All paint materials must be certified that materials meet these requirements.

d. Manufacturer's Written Instructions - One for the Architect, Contractor and the Owner:
1) Submit three (3) copies of manufacturer's written instructions.

e. Compatibility:
1) Paint materials and equipment shall be compatible in use.
2) Finish coats shall be compatible with prime coat.
3) Prime coats shall be compatible with surface to be coated.
4) Tools and materials shall be compatible with coating to be applied.

f. Air Quality:
1) Paint materials and equipment used for application will comply with CARB Air Quality Control Standards in effect at the Project Site and at the time of application.

2. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
1) Only qualified journeypersons, as defined by local jurisdiction, shall be engaged in painting and decorating work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyperson in accordance with trade regulations.

3. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CA-CHPS California High Performance Schools
b. CAL/OSHA California/Occupational Safety and Health Act
c. SCAQMD South Coast Air Quality Management District, Rule 1168

C. Mockups: Provide a full-coat benchmark finish sample for each type of coating and substrate required for Architect's review. Duplicate finish of approved sample Submittals.
1. Wall Finishes shall be at least 100 sq. ft., suitably marked "MOCKUPS" and protected for the duration of the construction Project.
2. Small areas and items can be selected by the Contractor, suitably marked "MOCKUPS" and protected for the duration of the construction Project.
3. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
4. Approved mockups (wall areas and small areas or items) may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Meetings:
1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
a. Coordinate the work with all other related work.
b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.
a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.
    a. Inspect and identify any problems that may impede issuance of warranties and guaranties.
    b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site:
    1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
    2. Damaged products will not be accepted.
B. Storage and protection:
    1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in a locked, clean and neat, well ventilated area.
        a. All receiving, opening and mixing shall be done in this area.
        b. Oily rags and waste shall be removed from area each night and all other precautions shall be taken to avoid danger of fire.
        c. Empty containers shall not be removed from site, unless otherwise approved by the Architect.
        d. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Environmental requirements:
    1. Rain or Fog:
        a. No work under this section shall be started or maintained under threat of rain.
        b. Surfaces shall be painted only when they are free from moisture.
        c. No painting of exterior surfaces shall be done less than 72 hours of actual drying weather after a rain or during periods of dew or fog.
        d. Perform no painting or decorating work when the maximum moisture content of the substrate exceeds:
            1) 12 percent for concrete and masonry (clay and concrete brick / block).
            2) 15 percent for wood.
            3) 12 percent for plaster and gypsum board.
        e. Perform no painting or decorating work when the relative humidity is above 85 percent or when the dew point is less than 5 degrees F variance between the air / substrate temperature.
    2. Temperature: No painting shall be done when ambient air and substrate temperatures are below 50 degrees F.
    3. Alkalinity: An alkali level of between 7.0 and 8.5 pH is suitable for painting. Any reading above that level, then the surface shall be neutralized as required for the surface to be painted.
        a. Methods shall be consistent with MPI - Architectural Painting Specification Manual, and shall not result in any adverse condition causing inadequate adhesion, improper curing and drying, or durability of paint system.
    4. No exterior painting shall be done during winds or dusty conditions.
    5. Perform no exterior painting and decorating work unless environmental conditions are within MPI and paint manufacturer's requirements or until adequate weather protection is provided.
        a. Where required to meet project schedules, suitable weatherproof covering and sufficient heating facilities shall be in place to maintain minimum ambient air and substrate temperatures for 24 hours before, during and after paint application.
    6. Perform no interior painting or decorating work unless adequate continuous ventilation and sufficient heating facilities are in place to maintain minimum ambient air and substrate temperatures above minimum requirements for 24 hours before, during and after paint application.

a. Where required to meet project schedules, provide supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Concrete and masonry surfaces shall be installed at least 28 days prior to painting and decorating work and shall be visually dry on both sides.
3. Conduct all moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple cover patch test.
4. Test concrete, masonry and plaster surfaces for alkalinity as required.
5. Contractor shall provide a minimum lighting level of 323 Lux (30 foot candles) on surfaces to be painted or decorated.

1.9 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.
a. Original adherence of all materials and no evidence of any surface defect shall be maintained during warranty period.
b. Color at end of warranty period shall remain free from serious fading and any discernible variations shall be uniform.

B. Manufacturer's Warranty: 10 Years.
1. In accordance with manufacturer's written standard warranty:

C. Paint Manufacturer's special Material Warranty co-endorsed by the installer for exterior paint application of cement plaster surfaces.

D. Water-Repellent Manufacturer's special Weatherproofing Warranty co-endorsed by the installer for exterior sealer application of concrete or concrete block surfaces.

E. Paint Installer's Warranty: 2 Years
1. Installer will certify that a Paint Manufacturer's Representative tested the substrate according to Paint Manufacturer's standard procedures and have submitted project information and test patch forms.
2. Installer shall certify that Paint Manufacturer's products were installed on the structure in accordance with manufacturer's specification requirements.
3. Installer further agrees that if installer fails to fulfill their obligation under this certification statement within 30 days notice of the complaint, Paint Manufacturer may proceed with the investigation and repairs and shall pay the entire material cost, providing it wasn't the installer's responsibility.

F. Water-Repellent Installer's Warranty: 2 Years.
1. Installer will certify that a Water-Repellent Manufacturer's Representative tested the substrate according to Water-Repellent Manufacturer's standard procedures and have submitted project information and test patch forms.
2. Installer shall certify that Water-Repellent Manufacturer's products were installed on the structure in accordance with manufacturer's specification requirements.
3. Installer agrees:
a. Investigate all complaints of leakage and/or water absorption on surfaces to which Water-Repellent Manufacturer's weatherproofing products were applied and provide a written report of the cause to Water-Repellent Manufacturer within thirty (30) days of the complaint.
b. Re-apply Water-Repellent Manufacturer's weatherproofing products according to Water-Repellent Manufacturer's standard procedures at installer's cost for labor and material if the leakage and/or water absorption is due to improper surface preparation, application and/or improper use of material.

c. Request authority from Water-Repellent Manufacturer to re-apply Water-Repellent Manufacturer's weatherproofing products at Water-Repellent Manufacturer's expense to areas, which were not rendered hydrophobic due to imperfect weatherproofing materials.

4. Installer further agrees that if installer fails to fulfill their obligation under this certification statement within 30 days notice of the complaint, Water-Repellant Manufacturer may proceed with the investigation and repairs and shall pay the entire cost, providing it wasn't the installer's responsibility.

1.10 MAINTENANCE

A. Extra Materials:

1. Quantity: 10 percent of quantity needed to paint Project, but not to exceed one gallon, of each type and color of finish coat used.
2. Identification: At project completion, provide an itemized list complete with manufacturer, paint type and color coding for all colors used, and locations within the Project for Owner's later use in maintenance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

1. Specified paint coating product manufacturer, or approved equivalent:
   a. Specified: **PPG PAINTS**.
      1) Composed of the following companies: **AMERITONE PAINT, DECRATREND, DEFT, DEVOE COATINGS, DEVOE PAINT, FLOOD WOOD CARE, FULLER O'BRIEN, GLIDDEN, and SINCLAIR PAINT**.
   b. Also specified: **GEMINI and MONOPOLE.**
   c. Acceptable alternative manufacturers:
      1) **DUNN EDWARDS**, **SHERWIN WILLIAMS**, **BENJAMIN MOORE** and **VISTA PAINT**. Submittals by these manufacturers, subject to specification requirements, must be in accordance with Section - SUBMITTAL PROCEDURES.
         a) Paint material quality and systems shall be equal to numbers and systems listed in Paint Finish Schedule at the end of this section.
         b) If submitted paint numbers differ from Darden Architects, Inc. Paint Equivalency List, additionally submit explanation of difference and certification letter from the installer attesting that the different product is equal to or better than specified; i.e. equivalent or better percentage of solids, system ODFT, and VOC compliant. Paint Equivalency List published by Darden Architects, Inc. is available only for this project at written request.
2. Specified water-borne Alkyltrialkoxy Silane water repellent product manufacturer, or approved equivalent:
   a. Specified: **EVONIK DEGUSSA CORPORATION**.
3. Specified Graffiti coating manufacturer, or approved equivalent:
   a. Sacrificial:
      1) Specified: **VISUAL POLLUTION TECH, INC.**
   b. Non-sacrificial:
      1) Specified: **BASF** “HYDROZO”.
      2) Specified: **EVONIK DEGUSSA CORPORATION**.
      3) Specified: **TSW - THIS STUFF WORKS**.
4. Specified Intumescent Paint Manufacturer, or approved equivalent:

a. Specified: ISOLATEK INTERNATIONAL

5. Specified High Gloss Epoxy Pool Paint and Primer Manufacturer, or approved equivalent:
   a. Specified: **RAMUC**.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 MATERIALS

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   1. Shop Primers or Coil-Coated Primers: It shall be assumed that all Shop Primed or Coil-Coated primed metals do not meet the requirements for primer material and mil thickness as defined herein. As such, all Shop Primed or Coil-Coated primed metals shall be field primed as indicated in the schedule.

B. Material Quality: Provide manufacturer's best-quality coating material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
   1. All materials used shall be lead and mercury free and shall have low VOC content to meet the applicable standards in the area where the Project is located.
   2. All paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes, sags, air entrapment, etc.
   3. All Water-Repellant Coatings shall comply with the following:
      a. Provide Alkyltrialkoxy Silane combination with a ratio concentration and application procedure as recommended by the manufacturer with the ability to cover in one or more applications for a ten year warranty in accordance with the following substrates:
         1) Thin Brick.
         2) Concrete.
         3) Concrete Masonry Units
         4) Split-Faced Concrete Masonry Units.
      b. Color: Clear.
      c. Active Substance: Alkyltrialkoxy Silane.
      d. Active Content: 100 percent.
      e. Solvent: Water.
      f. Flash Point (Concentrate): 93 degrees F.
      g. Flash Point (Mixed): 200 degrees F.
      h. Density: 7.77 lbs./gallon.
      i. VOC (19:1): 50 g/liter (Maximum).
      j. VOC (9:1): 100 g/liter (Maximum).
      k. VOC (6:1): 200 g/liter (Maximum).
   4. All Bituminous Paint:
      a. Shall comply with Cold-Applied Asphalt-Mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 MIXES

A. Mixing and Tinting:
   1. Unless otherwise specified herein or pre-approved, all paint shall be ready-mixed and pre-tinted at the factory. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
   2. Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
   3. Where thinner is used, addition shall not exceed paint manufacturer's written recommendations.
   4. Do not use kerosene or any such organic solvents to thin water-based paints.

5. Thin paint for spraying in strict accordance with paint manufacturer's written instructions. If directions are not on the container, obtain instructions in writing from the manufacturer and provide one copy of instructions to the Project Inspector.

2.4 FINISHES

A. Finish Colors:

1. Unless otherwise specified herein, all painting work shall be in accordance with MPI Premium Grade finish requirements as a minimum.
2. Determined by Architect prior to or as work progresses.
   a. Colors to be selected from paint manufacturer's full color systems, including standard, premium and custom colors.
3. When deep or 'Ultra colors' are selected, submit to Architect proposed revision to specified system product numbers, according to manufacturer's written recommendations.
   a. When deep or ultra colors are selected for use on walls or special color treatments such as graphics or many color changes are desired, the areas and extent of use will be clarified upon request of the Contractor.
4. Gloss standards ASTM D523:

	Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
a.				
b.	G1	Matte or Flat Finish	0 to 5	10 max.
c.	G2	Velvet Finish	0 to 10	10 to 35
d.	G3	Eggshell Finish	10 to 25	10 to 35
e.	G4	Lo-Sheen / Satin Finish	20 to 35	35 min.
f.	G5	Semi-Gloss Finish	35 to 70	
g.	G6	Gloss Finish	70 to 85	
h.	G7	High-Gloss Finish	Greater than 85	

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
   a. Thoroughly examine (and test as required, if necessary) all conditions and surfaces to be painted and report in writing to the Contractor and the Architect any conditions or surfaces that will adversely affect the work of this section.
   b. The Installer is responsible for verifying the compatibility of items primed by others and the finish coat or coats required by the Contract Documents. Should an incompatibility occur, the Installer (along with the manufacturer's technical representative) will recommend compatible alternatives for the Architect's approval.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Protection before Application:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
2. Removal of Hardware and Miscellaneous Items:
   a. Coordinate the work with other trades so that they remove electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings, fastenings, and the like prior to starting work under this Section.

b. Store during painting work. Coordinate cleaning and reinstallation after painting work is finished.
c. Do not use solvent or cleaning agents detrimental to permanent finishes.
d. Remove doors before painting to paint bottom and top edges, and then re-hang.

3. Protect adjacent surfaces against damage from painting operations. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
   a. Protective means include: Drop cloths, shields, masking templates, etc.
   b. Exterior surfaces include: landscaping, walks, drives, adjacent building surfaces, glazing, aluminum surfaces, etc.
   c. Interior surfaces include: rating and instruction labels on doors, frames, equipment, piping, etc.

3.3 SURFACE PREPARATION

A. General:
   1. Per MPI Standards.
   2. Surfaces to be finished shall be clean, dry and free of dirt, passivators, oils, loose paint and any other contamination that would adversely affect adhesion, protective properties or appearance of the coating.
   3. Remove oil, grease, dirt or other foreign matter by washing with a solution of cleaner and water, rinse and allow to dry.
   4. Neutralize efflorescence, alkali or glazed surfaces with acid wash followed by thorough water rinsing.
      a. Protect adjacent substrates or materials that could be affected by acid washing or water rinsing. Collect all washing & rinsing residue and dispose of away from structures.

B. Wood Substrates:
   1. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
   2. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
   3. Prime patching materials to control absorption rates of the primed surface and the patching material.
   4. Fill holes and other imperfections with putty or plastic wood to match natural finish before and after application of prime or seal coat.
   5. Provide necessary extra treatment over knots, pitch pockets, sappy portions and other defects to produce a proper base for painting.
   6. Sand down raised grain or rough surfaces.
   7. Clean surfaces free of dust, soil and other foreign material.

C. Gypsum Board Substrates:
   1. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
   2. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
   3. Do all necessary minor sanding.
   4. Fill minor cracks, scratches, holes and nail heads.

D. Plaster Substrates:
   1. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
   2. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
   3. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
   4. Neatly patch, flush and smooth, minor cracks, holes, pits and other imperfections in plaster or concrete surfaces.

E. Concrete Substrates:
   1. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
   2. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
   3. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
   4. Neatly patch, flush and smooth, minor cracks, holes, pits and other imperfections in plaster or concrete surfaces.

F. Metal Substrates:

1. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
2. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
3. Shop Primed or Factory Primed Surfaces:
    a. Shop Primed or Factory Primed Surfaces are considered "un-primed" due to their mil thicknesses provided, and common incompatibility issues with specified coating system; and are suitable only for protection during transit (shipment and storage) until incorporated into the Project.
    b. Remove dust, oil and rust.
    c. Sand surface lightly.
    d. Touch up imperfections, scratches, surface damage, etc. with the appropriate primer.
    e. Field connection welds, soldered joints, burned and abraded portions shall be spot primed with the appropriate primer.
4. Coil-Coated Product Surfaces:
    a. Coil-Coated Product Surfaces are considered "un-primed" due to their mil thicknesses provided, and the common incompatibility issues with specified coating system; and are suitable only for protection during shipment and storage until incorporated into the Project.
    b. Remove dust, oil and rust.
    c. Touch up imperfections, scratches, surface damage, etc. with the appropriate primer.
    d. Field connection welds, burned and abraded portions shall be spot primed with the appropriate primer.
    e. Field apply manufacturer's written recommended primer coat over entire surface compatible with substrate finish and finish coats indicated on the paint schedule.
5. Un-primed Surfaces:
    a. Remove dust, rust, mill scale, grease and foreign matter by sand blasting or wire brushing.
    b. Surfaces to be smooth and ready to receive coatings.
6. Non-Ferrous Metal, Galvanized, Aluminum, and Copper Surfaces:
    a. Metal Etch and Solvent Clean per SSPC-SP 1 or clean with TSP or other appropriate cleaner followed by thorough water rinsing.
    b. Brush Blast to standards of SSPC-SP 16, or if blasting is not feasible, sand thoroughly, wipe clean and apply a test patch for the coating specified.
    c. Allow system to cure at least one week, then test adhesion per ASTM D3359.

G. Concrete Block Surfaces:
1. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
2. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
3. Clean and free of all dirt, dust, rust, oil and free from all foreign matter.
4. Test for moisture content.
    a. Do not coat if moisture is present.
    b. Concrete Blocks to be thoroughly dry and cured prior to coating.
5. Do not coat Masonry wall if joints are not properly pointed, has excessive mortar drippings cracked units or shows signs of excessive efflorescence.
    a. Notify Architect promptly through General Contractor.
    b. Do not coat until unsatisfactory and unacceptable Concrete Block surfaces are corrected suitable for coating.
6. Do not apply opaque finishes to Concrete Block with airless sprayer unless "backrolled."

3.4 APPLICATION

A. Standards:
1. In accordance with MPI Painting Manual.
2. In accordance with manufacturer's specifications.

B. Method:

1. Apply by brush, roller or spray in accordance with MPI Painting Manual and the coating manufacturer's written recommendations except where specified otherwise in Schedule of Paint Finishes.
2. Painting of doors by rollers shall only be allowed only if the applicator uses a 1/4 inch nap or less roller.

C. Coatings:
1. All coatings shall be applied without reduction except as specifically required by label directions, or required to be reduced by this Specification. In such cases, reduction shall be the minimum permitted and shall not exceed VOC limits.
2. Apply each coat evenly and allow each coat to dry prior to applying succeeding coats. Each coat to have enough consistency to conceal work to which it is applied.
   a. Follow manufacturer's recommendations for recoat windows when using high performance coatings, epoxies, and urethanes.
3. Cut into a true line and leave smooth and clean without overlapping. Coat doors and windows in open position.
4. Sand finishes on smooth surfaces to assure proper adhesion of subsequent coats.
5. Tint each undercoat a lighter shade to facilitate identification of each coat, if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
6. Apply coating systems so as to obtain not less than the dry film mil thickness recommended by the manufacturer.
7. Sand metal work only as necessary to provide for the complete bonding of coats.
8. Project Inspector to inspect and approve each coat and operation before succeeding coats are applied.
9. Finish work to be free from runs, sags, defective application and improper workmanship.
10. Back prime all woodwork and casework coming in contact with plaster, masonry or concrete immediately upon delivery to project.
11. Post sign promptly following application of coatings.

3.5 FIELD QUALITY CONTROL

A. All surfaces, preparation and paint applications shall be inspected by the Project Inspector.

B. Painted surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Painting Inspection by the Project Inspector:
1. Brush / Roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
2. Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
3. Damage due to touching before paint is sufficiently dry or any other contributory cause.
4. Damage due to application on moist surfaces or caused by inadequate protection from the weather.
5. Damage and / or contamination of paint due to blown contaminants (dust, spray paint, etc.).

C. Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces:
1. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 39 inches.
2. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 39 inches.
3. Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
4. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.

D. Painted surfaces rejected by the Project Inspector shall be made good at the expense of the Contractor. Small affected areas may be touched up; large affected areas or areas without

sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.6 CLEANING

A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS and PROJECT CLOSEOUT.

B. Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

C. Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.

D. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.

E. Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g., rags, drop cloths, masking papers, etc.), paints, thinners, paint removers / strippers in accordance with the safety requirements of authorities having jurisdiction in the place where the Project is located.

F. Protect and safeguard work of other trades.

3.7 PROTECTION

A. Protection from Weather:

1. Protect newly installed work from moisture for a period of time as recommended by the manufacturer after application.

B. Protection from Traffic:

1. Erect barriers or screens and post signs to warn of or limit or direct traffic away or around work area as required.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.8 SCHEDULES

A. Refer to Finish Schedules on Drawings for applicable finishes used. This is a guide only and paint sub-contractor is responsible to check all drawings and be responsible for all paint work required to cover the complete painting and finishing of the interior and exterior including specialty items.

B. It is the intent of the specifications and drawings to cover the complete painting and finishing of the Project whether or not it is specifically called for in the Specifications, Schedule of Paint Finishes, or indicated on the Drawings. Surfaces not specified in Paint Finishes Schedule shall be in accordance with manufacturer's written recommendations.

1. Inform the Architect of any changes caused by stricter Air Quality Standards as part of the submittal process.
2. Provide products compliant with Local Air Quality Control District requirements at the time of installation.

C. Exception: When the Project involves remodel work, the scope of work is limited to the remodel area and adjacent existing substrates to minimize visible color incompatibility.

D. Provide coating system minimum ODFT specified.

1. Do not apply thicker coats than specified to achieve ODFT. Apply additional coats if necessary for uniform color.

E. "Ultra Color" Note: A fourth and/or fifth coat may be required to achieve uniform chromatic hue without ghosting from undercoat or substrate.

1. The Contractor shall consider all Metal Paint Finishes noted "Ultra-color" as requiring as many as five (5) total coats.

3.9 INTERIOR PAINT FINISHES:

A. INTERIOR WOODWORK

1. W-1 Flat Latex Minimum ODFT 4.2 MILS.
   a. 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
   b. 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
   c. 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
2. W-2 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
   a. 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
   b. 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
   c. 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
3. W-3 Gloss Waterborne Acrylic Non-Blocking Enamel Minimum ODFT 9.4 MILS.
   a. 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
   b. 2nd Coat Gloss Acrylic **PITT-TECH PLUS** 90-1310
   c. 3rd Coat Gloss Acrylic **PITT-TECH PLUS** 90-1310
4. W-4 Semi-Transparent Resin Stain Minimum ODFT 1.9 MILS.
   a. 1st Coat Resin Wiping Stain **DEFT** Int. Stain
   b. 2nd Coat Clear Acrylic **DEFT** Clear Wood
5. W-5 Semi-Transparent Resin Stain Minimum ODFT 3.3 MILS.
   a. 1st Coat Resin Wiping Stain **DEFT** Int. Stain
   b. 2nd Coat Clear Acrylic **DEFT** Clear Wood
   c. 3rd Coat Clear Acrylic **DEFT** Clear Wood
6. W-6 Stained and Water Clear Lacquer Minimum ODFT 3.8 MILS.
   a. 1st Coat Resin Wiping Stain **DEFT** Int. Stain
   b. 2nd Coat Lacq. Sanding Sealer **DEFT** WB Sanding Sealer
   c. 3rd Coat Clear Acrylic **DEFT** WB 109/S
   d. 4th Coat Clear Acrylic **DEFT** WB 109/S
7. W-7 Filled and Sealed Floor Finish Minimum ODFT 3.0 MILS.
   a. 1st Coat Paste Filler As recommended by Flooring Manufacturer
   b. 2nd Coat Satin Polyurethane **DEFT** 26
   c. 3rd Coat Satin Polyurethane **DEFT** 26
8. W-8 Velvet Lacquered Finish Minimum ODFT 4.7 MILS.
   a. 1st Coat Lacq. Sanding Sealer **DEFT** WB Sanding Sealer
   b. 2nd Coat Clear Acrylic **DEFT** WB 109/S
   c. 3rd Coat Clear Acrylic **DEFT** WB 109/S
   d. 4th Coat Clear Acrylic **DEFT** WB 109/S

B. INTERIOR GYPSUM BOARD

1. DW-1 Flat Latex Minimum ODFT 4.2 MILS.
   a. 1st Coat SPEEDHIDE ZERO (SPH-0) P/S 6-4900XI
   b. 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
   c. 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
2. DW-2 Eggshell Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
   a. 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
   b. 2nd Coat Eggshell 0 VOC (SPH-0) 6-4310XI
   c. 3rd Coat Eggshell 0 VOC (SPH-0) 6-4310XI
3. DW-3 Gloss Acrylic Non-Blocking Enamel Minimum ODFT 9.4 MILS.
   a. 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
   b. 2nd Coat Gloss Acrylic **PITT-TECH PLUS** 90-1310
   c. 3rd Coat Gloss Acrylic **PITT-TECH PLUS** 90-1310
4. DW-4 Gloss Epoxy Polyamide (Corrosion Resistant) Minimum ODFT 7.6 MILS.
   a. 1st Coat Acrylic Primer SEAL GRIP 17-921
   b. 2nd Coat Epoxy Gloss **AQUAPON** WB-EP 98E-1

c. 3rd Coat Epoxy Gloss **AQUAPON** WB-EP 98E-1

5. DW-4 WB Semi-Gloss Epoxy (Corrosion Resistant) Minimum ODFT 4.6 MILS.
   a. 1st Coat Acrylic Primer SEAL GRIP 17-921
   b. 2nd Coat Epoxy Semi-Gloss **PITT-GLAZE** 16-510
   c. 3rd Coat Epoxy Semi-Gloss **PITT-GLAZE** 16-510
6. DW-5 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
   a. 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
   b. 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
   c. 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
   d. Note: This system was previous named "DW-2".

C. INTERIOR CEMENT PLASTER, VENEER PLASTER OR GYPSUM PLASTER
1. P-1 Flat Latex Minimum ODFT 5.4 MILS.
   a. 1st Coat Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
   c. 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
2. P-2 Eggshell Acrylic Non-Blocking Enamel Minimum ODFT 5.6 MILS.
   a. 1st Coat Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat Eggshell 0 VOC (SPH-0) 6-5310
   c. 3rd Coat Eggshell 0 VOC (SPH-0) 6-5310
3. P-3 Gloss Acrylic Non-Blocking Enamel Minimum ODFT 10.6 MILS.
   a. 1st Coat Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat Gloss Acrylic **PITT-TECH PLUS** 90-1310
   c. 3rd Coat Gloss Acrylic **PITT-TECH PLUS** 90-1310
4. P-4 Gloss Epoxy Polyamide (Corrosion Resistant) Minimum ODFT 7.6 MILS.
   a. 1st Coat Acrylic Primer SEAL GRIP 17-921
   b. 2nd Coat Epoxy Gloss **AQUAPON** WB EP 98E-1 Series
   c. 3rd Coat Epoxy Gloss **AQUAPON** WB EP 98E-1 Series
5. P-4 WB S/G Epoxy (Corrosion Resistant) Minimum ODFT 4.6 MILS.
   a. 1st Coat Acrylic Primer SEAL GRIP 17-921
   b. 2nd Coat WB Epoxy Semi-Gloss **PITT-GLAZE** 16-510
   c. 3rd Coat WB Epoxy Semi-Gloss **PITT-GLAZE** 16-510
6. P-5 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 5.2 MILS.
   a. 1st Coat Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI / 6-5510
   c. 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI / 6-5510

D. INTERIOR CONCRETE OR CONCRETE MASONRY UNITS
1. CB-1 Clear Water Repellent Sealer
   a. One Coat Alkyltrialkoxy Silane
      1) EVONIK DEGUSSA"Aqua-Trete®CONCENTRATE."
   b. Follow manufacturer's recommended coverage rate and installation recommendations for type of substrate to be covered.
   c. Provide manufacturer's 10 year warranty for Concrete Masonry Units and Split Faced Concrete Masonry Units.
2. CB-2 Flat Latex - Fine Texture Minimum ODFT 9.9 MILS.
   a. 1st Coat Acrylic Block Filler (SPH-0) 6 - 7
      1) Omit at concrete surfaces.
   b. 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
   c. 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
3. CB-3 Semi-Gloss Acrylic Enamel:
   a. Concrete Masonry Units: Minimum ODFT 9.7 MILS.

1) 1st Coat Acrylic Block Filler (SPEEDHIDE INT/EXT BLOCK FILL) 6-7
2) 2nd Coat Flat 0 VOC (SPH-0) 6-4510XI
3) 3rd Coat Flat 0 VOC (SPH-0) 6-4510XI

b. Concrete Surfaces: Minimum ODFT 4.6 MILS.

1) -1st Coat Seal Gripper Acrylic Primer-Sealer 17-921XI
2) 2nd Coat Flat 0 VOC (SPH-0) 6-4510XI
3) 3rd Coat Flat 0 VOC (SPH-0) 6-4510XI

4. CB-4 Color High-Gloss Polyamide Epoxy:

a. Concrete Masonry Units: Minimum ODFT 15.6 MILS.

1) 1st Coat W/B Epoxy Block Fill SPEEDHIDE HI-FILL INT/EXT BLOCK FILL
2) 2nd Coat Acrylic Primer SEAL-GRIP 17-921
3) 3rd Coat Epoxy Gloss **AQUAPON** WB EP 98E-1
4) 4th Coat Epoxy Gloss **AQUAPON** WB EP 98E-1

b. Concrete Surfaces: Minimum ODFT 7.6 MILS.

1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
2) 2nd Coat Epoxy Gloss **AQUAPON** WB EP 98E-1
3) 3rd Coat Epoxy Gloss **AQUAPON** WB EP 98E-1

5. CB-4 Color WB Semi-Gloss Epoxy:

a. Concrete Masonry Units: Minimum ODFT 15.6 MILS.

1) 1st Coat W/B Epoxy Block Fill SPEEDHIDE 6-15
2) 2nd Coat Epoxy Primer SEAL-GRIP 17-921
3) 3rd Coat Epoxy S/G **PITT-GLAZE** 16-510
4) 4th Coat Epoxy S/G **PITT-GLAZE** 16-510 DFT 3.0 mils.

b. Concrete Surfaces: Minimum ODFT 7.6 MILS.

1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
2) 2nd Coat Epoxy S/G **PITT-GLAZE** 16-510
3) 3rd Coat Epoxy S/G **PITT-GLAZE** 16-510

6. CB-5 Clear High-Gloss Polyamide Epoxy Minimum ODFT 5.0 MILS.

a. 1st Coat Epoxy Gloss MONOPOLE Permashield 200
b. 2nd Coat Epoxy Gloss MONOPOLE Permashield 200

E. INTERIOR METALS

1. PRIMER NOTE: Metals that are shop primed shall be considered "un-primed" and shall be primed with appropriate primer and thicknesses listed below:

a. Ferrous Metal:

1) **PPG PITT-TECH PLUS** 4020 "Red" Mult-Purp. Metal Primer DFT 3.0 mils.

b. Non-Ferrous Metal, Galvanized Metal or Aluminum:

1) **PPG PITT-TECH PLUS** 4020 "White" Mult-Purp. Metal Primer DFT 3.0 mils.

2. COIL-COATED PRODUCTS NOTE: Metal products primed with coil-coated products are to be assumed to be "un-primed" products and shall be additionally coated (or primed again) as follows:

a. Coil-Coated Products:

1) Field apply manufacturer's recommended primer coat and mil thickness over entire surface compatible with substrate finish and finish coats indicated on paint schedule.

3. M-1 Flat Latex Minimum ODFT 5.8 MILS.

a. 1st Coat Primer See primer note above.
b. 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
c. 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI

4. M-2 Semi-Gloss "Ultra Color" Industrial Acrylic Minimum ODFT 11.0 MILS.

a. 1st Coat Primer See primer note above.
b. 2nd Coat Acrylic Semi-Gloss **PITT-TECH PLUS** 90-1610
c. 3rd Coat Acrylic Semi-Gloss **PITT-TECH PLUS** 90-1610

5. M-3 Gloss "Ultra Color" Waterborne Acrylic Minimum ODFT 11.0 MILS.
   a. 1st Coat Primer See primer note above.
   b. 2nd Coat Gloss Acrylic **PITT-TECH PLUS** 90-1310
   c. 3rd Coat Gloss Acrylic **PITT-TECH PLUS** 90-1310
6. M-4 Semi-Gloss Epoxy Polyamide Minimum ODFT 6.0 MILS.
   a. 1st Coat Primer See primer note above.
   b. 2nd Coat Epoxy Semi-Gloss **PITT-GLAZE** 16-510
   c. 3rd Coat Epoxy Semi-Gloss **PITT-GLAZE** 16-510
7. M-5 Gloss Epoxy PolyamideMinimum ODFT 4.6 MILS.
   a. 1st Coat Epoxy Primer SEAL-GRIP 17-921
   b. 2nd Coat Epoxy Gloss **AQUAPON** WB EP 98E-1 Series
   c. 3rd Coat Epoxy Gloss **AQUAPON** WB EP 98E-1 Series
8. M-5 Water Base S/G Epoxy (Corrosion Resistant) Minimum ODFT 7.6 MILS.
   a. 1st Coat Acrylic Primer SEAL GRIP 17-921
   b. 2nd Coat WB Epoxy S/G **PITT-GLAZE** 16-510
   c. 3rd Coat WB Epoxy S/G **PITT-GLAZE** 16-510
9. M-6 Flat Waterborne Paint Minimum ODFT 4.4 MILS.
   a. 1st Coat Flat Dry Fall Prime SUPER TECH 6-726XI
   b. 2nd Coat Flat Dry Fall Finish SUPER TECH 6-726XI
10. M-7 Semi-Gloss Waterborne Paint Minimum ODFT 4.4 MILS.
    a. 1st Coat S/G Dry Fall Primer SUPER TECH 6-724XI
    b. 2nd Coat S/G Dry Fall Finish SUPER TECH 6-724XI
11. M-8 Satin Industrial Acrylic Minimum ODFT 11.0 MILS.
    a. 1st Coat Primer See primer note above.
    b. 2nd Coat Acrylic Satin **PITT-TECH PLUS** 90-1110
    c. 3rd Coat Acrylic Satin **PITT-TECH PLUS** 90-1110

F. INTERIOR ACOUSTICAL TILE
1. A-1 Matte Flat Vinyl Acrylic Minimum ODFT 1.3 MILS.
   a. 1st Coat Flat Vinyl Acrylic PRO-EV 0-VOC 12-110

3.10 EXTERIOR PAINT FINISHES

A. EXTERIOR WOOD
1. EW-1 Flat 100 percent Acrylic Minimum ODFT 6.0 MILS.
   a. 1st Coat Epoxy Primer SEAL-GRIP 17-921
   b. 2nd Coat 100 percent Acrylic Flat SUNPROOF 72-Series
   c. 3rd Coat 100 percent Acrylic Flat SUNPROOF 72-Series
2. EW-2 Semi-Gloss 100 percent Acrylic Minimum ODFT 5.6 MILS.
   a. 1st Coat Epoxy Primer SEAL-GRIP 17-921
   b. 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF 78-Series
   c. 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF 78-Series
3. EW-3 100 percent Acrylic Resin (A/R) Stain Minimum ODFT 3.0 MILS.
   a. 1st Coat 100 percent A/R Stain Coat FLOOD SWF
   b. 2nd Coat 100 percent A/R Stain Coat FLOOD SWF

B. EXTERIOR SOFFIT BOARD
1. ESB-1 Lo-Sheen 100 % Acrylic Resin-Heavy Stipple Minimum ODFT 5.8 MILS.
   a. 1st Coat Epoxy Primer SEAL-GRIP 17-921
   b. 2nd Coat 100 percent Acrylic Satin SUNPROOF 76-Series
   c. 3rd Coat 100 percent Acrylic Satin SUNPROOF 76-Series
   d. *Note: 2nd Coat to have medium size aggregate added to achieve heavy stipple texture.

C. EXTERIOR CEMENT PLASTER
1. EP-1 Flat 100 percent Acrylic Minimum ODFT 7.0 MILS.

a. 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
b. 2nd Coat 100 percent Acrylic Flat SUNPROOF 72-Series
c. 3rd Coat 100 percent Acrylic Flat SUNPROOF 72-Series

2. EP-2 Semi-Gloss 100 percent Acrylic Minimum ODFT 6.6 MILS.
   a. 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF 78-Series
   c. 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF 78-Series
3. EP-3 Gloss Styrene Acrylic Minimum ODFT 5.6 MILS.
   a. 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat Gloss ADVANTAGE 900 INT/EXT STYRENE ACRYLIC
   c. 3rd Coat Gloss ADVANTAGE 900 INT/EXT STYRENE ACRYLIC
4. EP-4 Smooth Elastomeric, Lo Sheen Acrylic/Resin (A/R) Minimum ODFT 11.9 MILS.
   a. 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat Smooth Elastomeric **PITT-FLEX** 4-110. Spray and Backroll.
   c. 3rd Coat 100 percent Acrylic Resin Semi Gloss 76-Series
5. EP-5 Satin Elastomeric, S/G Acrylic/Resin (A/R) Minimum ODFT 11.8 MILS.
   a. 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat Matte Flex Elastomeric **PITT-FLEX** 4-110
      1) Spray and Backroll
   c. 3rd Coat 100 percent Acrylic semi-gloss SUNPROOF 78-Series
6. EP-6 Coarse Elastomeric, Satin Acrylic/Resin (A/R) Minimum ODFT 11.8 MILS.
   a. 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat Elastomeric Finish 4-110. Spray and Backroll.
   c. 3rd Coat 100 percent Acrylic Satin SUNPROOF 76-Series

D. EXTERIOR CONCRETE OR CONCRETE MASONRY UNITS:
1. ECB-1 Clear Water Repellent Sealer:
   a. One Coat Alkyltrialkoxy Silane:
      1) EVONIK DEGUSSA "Aqua-Trete®CONCENTRATE."
   b. Provide manufacturer's 10 year warranty for Concrete Masonry Units and Split Faced Concrete Masonry Units.
2. ECB-2 Flat 100 percent Acrylic Minimum ODFT 11.5 MILS.
   a. 1st Coat W/B Acrylic Block Filler SPEEDHIDE 6-7
      1) Omit at concrete surfaces
   b. 2nd Coat 100 percent Acrylic Flat SUNPROOF 72-Series
   c. 3rd Coat 100 percent Acrylic Flat SUNPROOF 72-Series
3. ECB-3 Flat 100 percent Acrylic Minimum ODFT 5.5 MILS.
   a. 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
   b. 2nd Coat 100 percent Acrylic Flat SUNPROOF 72-Series
   c. 3rd Coat 100 percent Acrylic Flat SUNPROOF 72-Series

E. EXTERIOR METAL
1. PRIMER NOTE: Metals shop primed shall be considered "un-primed" and shall be primed with appropriate primer and thicknesses listed below:
   a. Ferrous Metal, Type 1 Typical:
      1) PITT TECH PLUS 4020 "Red" Multi-Purpose Metal Primer DFT 3.0 mils.
   b. Ferrous Metal, Type 2 as specified in Specification Section – STEEL AND FABRICATIONS:
      1) **AMERCOAT** 68HS Reinforced Inorganic Zinc-Rich Urethane Metal Primer DFT 5.0 mils.
   c. Ferrous Metal, Type 3 when Urethane is used as a finish:
      1) **AMERLOCK** 2VOC/400 VOC Epoxy Metal Primer DFT 6.0 mils.

d. Non-Ferrous Metal, Type 4 Galvanized Metal or Aluminum:
   1) PITT TECH PLUS "White" Multi- Purpose Metal Primer DFT 3.0 mils.
e. Non-Ferrous Metal, Type 5 Galvanized Metal or Aluminum, when Urethane is used as a finish.
   1) **AMERLOCK** 2VOC/400 VOC Epoxy Metal Primer DFT 6.0 mils.

2. COIL-COATED PRODUCTS NOTE: Metal products primed with coil-coated products are to be assumed to be unprimed products and shall be re-primed as follows:
   a. Coil-Coated Products:
      1) Field apply manufacturer's recommended primer coat and mil thickness over entire surface compatible with substrate finish and finish coats indicated on paint schedule.
3. EM-1 Flat 100 percent Acrylic Minimum ODFT 7.4 MILS.
   a. 1st Coat Primer See primer notes above.
   b. 2nd Coat 100 percent Acrylic Flat SUNPROOF 72-Series
   c. 3rd Coat 100 percent Acrylic Flat SUNPROOF 72-Series
4. EM-2 Semi-Gloss "Ultra Color" 100 percent Acrylic Minimum ODFT 7.2 MILS.
   a. 1st Coat Primer See primer notes above.
   b. 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF 78-Series
   c. 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF 78-Series
5. EM-3 Gloss "Ultra Color" 100 percent Acrylic Waterborne Minimum ODFT 11.0 MILS.
   a. 1st Coat Primer See primer notes above.
   b. 2nd Coat Gloss Acrylic **PITT-TECH PLUS** 4216 HP
   c. 3rd Coat Gloss Acrylic **PITT-TECH PLUS** 4216 HP
6. EM-4 Gloss "Ultra Color" Aliphatic Acrylic Urethane (A/A/U) Finish, Spray Applied, Deep Tone, Custom ColorMinimum ODFT 16.0 MILS.
   a. 1st Coat Primer See primer notes above.
   b. 2nd Coat A/A/U Gloss Color **AMERSHIELD** VOC
   c. 3rd Coat A/A/U Gloss Color **AMERSHIELD** VOC
7. EM-5 Gloss "Ultra Color" Aliphatic High Solids Finish, Spray Applied, Deep Tone, Custom Color with clear protective coats Minimum ODFT 18.0 MILS.
   a. 1st Coat Primer See primer notes above
   b. 2nd Coat A/A/U Gloss Color **AMERSHIELD** VOC
   c. 3rd Coat A/A/U Gloss Color **AMERSHIELD** VOC
   d. 4th Coat A/A/U Gloss Clear **AMERSHIELD** VOC
   e. 5th Coat A/A/U Gloss Clear **AMERSHIELD** VOC
8. EM-6 Semi-Gloss "Ultra Color" Aliphatic Urethane (A/U) Finish, Spray Applied, Deep Tone, Custom Color Finish Minimum ODFT 20.0 MILS.
   a. 1st Coat Primer See primer notes above.
   b. 2nd Coat A/A/U Semi-Gloss **AMERCOAT** 240
   c. 3rd Coat A/A/U Semi-Gloss **AMERSHIELD** VOC

3.11 SPECIALTY PAINT FINISHES:

A. PROVIDE SPECIALTY PAINT FINISHES AS SHOWN OR AS FOLLOWS:

1. **Finish No. X-1:** Minimum ODFT 15.0 MILS.
   a. Lines on Concrete or Asphaltic Concrete Paving Exit and Entrance Signs - 10" width lines, maximum. Reflectorize as required.
   b. **PPG** ZoneLine
2. **Finish No. X-2:** Minimum ODFT 15.0 MILS.
   a. Lines on Walk Top. Colors as selected by Architect.
      1) **PPG** ZoneLine
3. **Finish No. X-3:** Minimum ODFT 2.2 MILS.
   a. Space above Vents or Grilles.

b. 1st Coat 100 percent Acrylic Flat Black 72-Series

4. **Finish No. X-4:** Minimum ODFT 7.0 MILS.
   a. Piping Black Steel or Cast Iron.
   b. 1st Coat Multi-Purpose Metal Primer: PITT TECH PLUS 4020 "Red"
   c. 2nd Coat Acrylic Gloss Finish 2406G
5. **Finish No. X-5:** Minimum ODFT 7.0 MILS.
   a. Piping Galvanized.
   b. 1st Coat General Purpose Metal Primer. PITT TECH PLUS 4020 "White"
   c. 2nd Coat Gloss Enamel Finish: PITT TECH PLUS 90-1310
6. **Finish No. X-6:** Minimum ODFT 11.0 MILS.
   a. Machinery and Equipment (Coil Coated Products):
   b. 1st Coat General Purpose Metal Primer: PITT TECH PLUS 4020 "White"
   c. 2nd Coat Gloss Enamel PITT TECH PLUS 90-1310
   d. 3rd Coat Gloss Enamel PITT TECH PLUS 90-1310
7. **Finish No. X-7:** Minimum ODFT 7.0 MILS.
   a. Sheet Metal Ducts:
   b. 1st Coat General Purpose Metal Primer: PITT TECH PLUS 4020 "White"
   c. 2nd Coat 100 percent Acrylic Flat: PITT TECH PLUS 90-1310
8. **Finish No. X-8:** Minimum ODFT 7.0 MILS.
   a. Fire Hydrants:
   b. 1st Coat General Purpose Metal Primer: PITT TECH PLUS 4020 "White"
   c. 2nd Coat 100 percent Acrylic Flat: PITT TECH PLUS 90-1310
9. **Finish No. X-9:** Minimum ODFT 7.4 MILS.
   a. Following items listed will receive Finish No. X-9 (including, but not limited to), Louvers, Grilles, or Access Panels.
   b. 1st Coat General Purpose Metal Primer: PITT TECH PLUS 4020 "White"
   c. 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
   d. 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
10. **Finish No. X-10:** Minimum ODFT 1.9 MILS.
    a. Striping under Acoustical Board Surrounding Structure:
    b. 1st Coat 100 percent Acrylic Flat Black SUNPROOF FLAT 72-Series
11. **Finish No. X-11:** Minimum ODFT 2.2 MILS.
    a. Acoustical Board and Exposed Striping and Structural:
    b. 1st Coat 100 percent Acrylic Flat Black SUNPROOF FLAT 72-Series
12. **Finish No. X-12**:
    a. Minimum ODFT as recommended by graffiti coating manufacturer.
    b. Graffiti Coating, non-toxic, liquid, sacrificial wax-based Coating:
    c. 1st Coat Graffiti Coating:
       1) Graffiti-Pruf by VISUAL POLUTION TECH, INC.
    d. 2nd Coat Graffiti Coating:
       1) Only if recommended by manufacturer for substrate material type.
       2) Graffiti-Pruf by VISUAL POLUTION TECH, INC.
13. **Finish No. X-13** (NOT APPLICABLE).
14. **Finish No. X-14** (NOT APPLICABLE).
15. **Finish No. X-15:**
    a. Clear Graffiti Coating, non-toxic, liquid, multi-polymer, non-sacrificial, single component sealer by **BASF**, or approved equivalent: One Coat
       1) **NOTE #1:** Test a small area of the existing substrate in an out-of-the-way spot, as determined by the Architect, for compatibility. Inform the Architect if an incompatibility is found for further direction. If found to be compatible, proceed as follows:
    b. 1st Coat Clear, flat matte coat **TAGGUARD** by **BASF**.

1) **NOTE #2**: Follow manufacturer's recommendations for proper installation over various substrates. Applicator must be certified by the manufacturer as an approved applicator for this product over various substrate materials. Protect at least 24 hours minimum the treated surface until manufacturer's recommended curing time has been achieved against graffiti.
2) REMOVAL COAT **TAGGUARD** Cleaner.
3) **NOTE #3:** Provide remover in small containers equal to 8-16 oz. containers of material for the Owner's use. Instruct the designated representative of the Owner as to proper application of the remover, and all procedures for removing graffiti.

16. **Finish No. X-16:** Non-sacrificial, aqueous, silane chemistry, ready-to-use, zero VOC high performance anti-graffiti treatment for masonry, concrete and natural stone, dries clear and will not yellow.
    a. Follow manufacturer's printed recommendations prior to use.
    b. Do not apply to wet surfaces. If surface is wet, let dry for a minimum of 24 hours prior to application. Do not use if temperature is below 40 degrees F or above 100 degrees F.
    c. Protect non-porous surface substrates from overspray. Always do a test patch to confirm the treatment before using to determine if there is any problems prior to full coverage of the porous surfaces.
    d. Concrete shall be allowed to cure a minimum of 28 days. All pointing or re-pointing shall be completed and allowed to cure for at least 3 days prior to coverage. All patching materials, caulking, sealing materials and traffic paint shall be fully cured before application.
    e. 1st Coat Clear, flat matte coat **PROTECTOSIL** ANTIGRAFFITI.
        1) 175 to 250 sq. ft. per gallon, diluted by 14 parts of water, using a 1" nap roller.
    f. 2nd Coat Clear, flat matte coat **PROTECTOSIL** ANTIGRAFFITI.
        1) 175 to 250 sq. ft. per gallon, un-diluted, using a 1" nap roller.
    g. 3rd Coat Clear, flat matte coat **PROTECTOSIL** ANTIGRAFFITI.
        1) 175 to 250 sq. ft. per gallon, un-diluted, using a 1" nap roller.
        2) 3rd Coat shall always be figured in as part of the Base Bid. 3rd Coat may be deleted if it is determined by all concerned that the two coats were sufficient to protect the surfaces. If not needed, then figure on a credit back to the Owner.
        3) Most graffiti removal can be achieved with standard non-hazardous cleaners and low-pressure waterblasting. Contact manufacturer for stubborn markings for removal.
17. **Finish No. X-17:** Non-sacrificial, 100 percent active silane treatment with oleophobic additive, clear penetrating breathable VOC Compliant (400 g/L) surface treatment for use on concrete, brick masonry, concrete masonry units and natural stone.
    a. For flat (horizontal) concrete walks.
        1) Manufacturer's printed recommendations for rate of coverage, and type of application method to protect porous surfaces from graffiti and for ease of walk-way clean-up.
        2) Follow manufacturer's printed recommendations prior to use.
        3) Do not apply to wet surfaces. If surface is wet, let dry for a minimum of 24 hours prior to application. Do not use if temperature is below 40 degrees F or above 100 degrees F.
        4) Protect non-porous surface substrates from overspray. Always do a test patch to confirm the treatment before using to determine if there is any problems prior to full coverage of the porous surfaces.
        5) Concrete surfaces shall be allowed to cure a minimum of 28 days. All pointing or re-pointing shall be completed and allowed to cure for at least 3 days prior to coverage. All patching materials, caulking, sealing materials and paint shall be fully cured before application.
    b. 1st Coat Clear, flat matte coat PROTECTOSIL BHN PLUS.
18. **Finish No. X-18:** Non-sacrificial, Graffiti Coating, non-toxic, liquid, semi-permanent, acrylic-based coating - Minimum ODFT as recommended by graffiti coating manufacturer.

a. For application on sealed surface, including but not limited to CMU scheduled to be sealed, verify compatibility with sealer manufacturer prior to application of Sealer.
   1) Only if recommended by manufacturer for substrate material type.
   2) For application on natural porous surface, thin first coat with 40 percent water. All other coats shall be full strength.
b. 1st Coat: Graffiti Coating TSW4.
c. 2nd Coat: Graffiti Coating TSW4.
d. 3rd Coat: Graffiti Coating TSW4.
e. 4th Coat: Graffiti Coating TSW4.
f. Provide Manufacturer's recommended TSW2G Graffiti Removal Kit.

19. **Finish No. X-19:** Intumescent Paint - Minimum ODFT per fire rating required.
    a. Primer: Per manufacturer's Written Recommendations, ODFT as required.
    b. 1st Coat Water Based Polymer, **ISOLATEK INTERNATIONAL** "CAFCO Spray Film WB3."
    c. 2nd Coat As required if needed - no greater than 62 mils per coat.
    d. 3rd Coat As required if needed - no greater than 62 mils per coat.
    e. 4th Coat Premium Exterior Latex Semi-Gloss GL68XX in thickness as recommended by manufacturer, and in color as selected by the Architect.
20. **Finish No. X-20:** Pool Paint High Gloss Epoxy - Minimum ODFT Approximately 3.6 mils.
    a. Primer: **RAMUC** "Clean and Prep Solution".
    b. 1st Coat by **RAMUC** “Pool Paint”.
    c. Finish Coat Pool Paint by **RAMUC**

END OF SECTION

SECTION 10 05 00 – MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Provision for and installation of specialty and built-in items required for this Work as indicated on the Drawings.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 05 12 00 STEEL AND FABRICATIONS
5. 06 10 00 ROUGH CARPENTRY
6. 06 41 23 MODULAR CASEWORK
7. 07 60 00 SHEET METAL
8. 08 11 00 METAL DOORS AND FRAMES
9. 08 70 00 HARDWARE
10. 08 80 00 GLASS
11. 09 24 00 CEMENT PLASTER
12. 09 29 00 GYPSUM BOARD
13. 09 50 00 ACOUSTICAL CEILINGS
14. 09 65 10 RESILIENT BASE AND ACCESSORIES
15. 09 65 16 RESILIENT SHEET
16. 09 65 19 RESILIENT TILE
17. 09 72 00 WALL COVERINGS
18. 09 91 00 PAINTING
19. 10 26 00 WALL AND CORNER GUARDS
20. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM A36 Carbon Structural Steel (Standard Specification for)
2. ASTM A307 Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength (Specification for)
3. ASTM A575 Steel Bars, Carbon, Merchant Quality, M-Grades (Specification for)
4. ASTM A675 Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties (Specification for)
5. ASTM A1011 Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength (Specification for)
6. ASTM B633 Electrodeposited Coatings of Zinc on Iron and Steel (Specification for)
7. ASTM C1028 Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method (Standard Test Method for)
8. ASTM D570 Water Absorption of Plastics (Test Method for)
9. ASTM D638 Tensile Properties of Plastics (Test method for)
10. ASTM D695 Compressive Properties of Rigid Plastics (Test Method for)
11. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
12. ASTM E1264 Acoustical Ceiling Products (Classification for)

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Shop Drawings:

1. Submit Shop Drawings and catalog cuts to the architect showing all details of installation and assembly and all requirements for work by other trades.

C. Product Data:
   1. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.

1.4 REGULATORY REQUIREMENTS

A. In accordance with Specification Section - REGULATORY REQUIREMENTS.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and protection:
   1. Use all means necessary to protect all specialty items before, during and after installation and to protect the installed work and materials of all other trades.
B. Replacements:
   1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.6 PROJECT CONDITIONS

A. Existing Conditions:
   1. Surface Conditions:
      a. Coordination: Coordinate with all other trades as required to ensure proper and adequate provision in framing and wall finish for the installation of the selected specialties in the locations required.
   2. Inspection:
      a. Prior to Installation, inspect all specific locations and verify that all necessary provisions have been made.
      b. In the event of discrepancy, immediately notify the Architect.
      c. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.7 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 BUILDING EXTERIOR SPECIALTIES

A. Lock Box:
   1. Specified: **KNOX CO** “Rapid Entry System Recessed Lock Box Model #3200-R”.
   2. Heavy-Duty, Medium Capacity, holds 10 keys maximum, 4" W x 5" H x 3-1/4" D.

a. Door shall be 1/2" steel plate with neoprene weather seal, has 3-point locking and heavy stainless steel lock cover.
b. Housing shall be 100% welded 1/4" plate steel.
c. Finish shall be Aluminum polyester powder coat with undercoat primer.

2.3 INTERIOR EQUIPMENT

1. Janitor Cart
   a. Manufacturer: RUBBERMAID
   b. Model No. H-1336
   c. Quantity: 2
   d. Dimensions: 22” x 46” x 38”
   e. Accessories: Replacement Bag - Model No. S-15827

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all specialty items where indicated on the Drawings and in full accordance with all pertinent regulations and the manufacturer's written recommendations, anchoring all components firmly in place for long life under hard use, and in accordance with IR (Interpretation of Regulations, "Division of the State Architect") Manual.

3.2 ADJUSTING

A. Upon completion of the installation, and as a condition of its acceptance, visually inspect the entire work of this Section, adjust all components for proper alignment and use, and touch up all abrasions and scratches to make them completely invisible.

END OF SECTION

SECTION 10 14 00 – IDENTIFYING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Identifying Devices Plastic Signs, Acrylic Signs and Decals, materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 06 10 00 ROUGH CARPENTRY
   5. 08 11 00 METAL DOORS AND FRAMES
   6. 08 80 00 GLASS
   7. 09 24 00 CEMENT PLASTER
   8. 09 29 00 GYPSUM BOARD
   9. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

A. Characters: all letters, numbers, symbols or pictograms.

1.3 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials
   1. ASTM D229 Sheet Plate Electrical Insulation Testing Equipment / Test Resources

1.4 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.
   1. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect within thirty days of receipt of the NOTICE TO PROCEED.
      a. Provide actual 2-inch x 2-inch sample colors and patterns available from the manufacturers for color selection.

C. Shop Drawings.
   1. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work, including accessibility dimensions for mounting heights.
   2. Submit drawings indicating Room numbers shown on the Contract Documents coordinated with Owner's Room Numbers.

D. Samples.
   1. Provide actual 2-inch x 2-inch sample of each sign type specified.

E. Quality Assurance/Control Submittals:
   1. Certificates:
      a. Submit four (4) copies of certificates.
      b. Upon completion of the installation, submit a Certificate from the Contractor (on the Contractor’s Letterhead) and co-endorsed by the manufacturer/supplier, sub-contractor/installer that the signage supplied for this project requiring braille complies with the California Contracted Grade 2 Braille and the CBC Section 11B-703.3.
         1) Those attesting to the compliance certificate above shall also acknowledge that they are aware of the Submission Under Penalty Of Perjury per California Government Code Section 12650, et seq, pertaining to false claims, and further know and

understand that submission of certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.

2. Manufacturer's Instructions:
   a. Submit three (3) copies of manufacturer's instructions.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
B. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
C. Warranty in accordance with Specification Section - WARRANTIES and this section.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has been approved by the manufacturer.
   2. Manufacturer's/Supplier's Qualifications:
      a. Firm's experienced in successfully producing/supplying products similar to those indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
B. Regulatory Requirements:
   1. In accordance with Specification Section - Regulatory Requirements, and the following:
      a. ADA Americans with Disabilities Act of 1990.
      b. CBC California Building Code - California Contracted Grade 2 Braille when required.
   2. Inspection: Tactile signs shall be field inspected for compliance after installation (11B-703.1.1.2).

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.
C. Storage and protection:
   1. Products shall be stored in a dry, protected area.
   2. Products shall be stored in locked storage building.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 TACTILE SIGNAGE DESIGN REQUIREMENTS

A. Characters and Graphics:

1. Finish and Contrast: Characters and their background shall have a non-glare finish. Characters shall contrast with their background, either light characters on a dark background or dark characters on a light background – CBC Section 11B-703.5.1, 11B-703.6.2, and 11B-703.7.1.
2. Character Type: Characters on signs shall be raised 1/32-inch (0.794 mm) minimum and letters and numbers shall be sans serif uppercase characters accompanied by contracted (Grade 2) Braille complying with CBC Section 11B-703.3 and Table 11B-703.3.1.
3. Character Size: Raised characters (letters and numbers) shall be a minimum of 5/8 inch (15.9 mm) and a maximum of 2 inches (51 mm) high.
4. Pictorial symbol signs (pictograms): Pictorial symbol signs (pictograms) shall be accompanied by the verbal description placed directly below the pictogram. the outside dimension of the pictogram field shall be a minimum of 6 inches (152 mm) in height.
5. Character Placement: Characters and Braille shall be in a horizontal format. Braille shall be placed a minimum of 3/8 inch (9.5 mm) and a maximum of 1/2 inch (12.7 mm) directly below the tactile characters; flush left or centered. When tactile text is multilined, all Braille shall be placed together below all lines of tactile text.
6. Proportions: Raised characters on signs shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I." Stroke thickness of the uppercase "I" shall be 15 percent maximum of the height of the character.
    a. For Braille Text, capitalization shall conform to CBC Section 11B-703.3.1.

B. Braille:
1. California Contracted Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Braille shall accompany all raised characters – CBC Section 11B-703.3 and Table 11B-703.3.1.
    a. Dots shall be rounded or domed.
    b. Below measured as a minimum in inches and maximum in inches:
    c. Dot Base Diameter: 0.059 (1.5 mm) to 0.063 (1.6 mm).
    d. Distance between two dots in the same cell (measured center-to-center): 0.100 (2.5 mm).
    e. Distance between corresponding dots in adjacent cells (measured center-to-center): 0.300 (7.6 mm).
    f. Dot Height: 0.025 (0.6 mm) to 0.037 (0.9 mm).
    g. Distance between corresponding dots from one cell directly below:
        1) 0.395 (10 mm) to 0.400 (10.2 mm).

C. Signs shall be installed on the wall adjacent to the latch side of the door.
1. Where there is no space on the latch side, including at double leaf doors, signs shall be placed on the nearest adjacent wall, preferably on the right.
2. Mounting height shall be as indicated in details on the drawings and in compliance with 11B-703.4.1 and 11B-703.4.2.

D. Inspection: Signage shall be field inspected after installation per CBC 11B-703.1.1.2.

2.2 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.3 ACRYLIC SIGNS

A. Specified: **SIGNS OF SUCCESS, INC.**

B. Frameless, Profile Material bonded to Substrate Backup Material.
1. All signs shall be made of exterior acrylic materials regardless of location (exterior or interior) within the Project.

2. Profile Material:
    a. **GRAVO-TAC** "Exterior," modified acrylic material, 1-ply, 1/32 inch, matte finish, integral color as selected by the Architect.
3. Substrate Material:
    a. 1/4-inch clear cast acrylic backup sheet.
    b. Aluminum Frames and back-up plates:
        1) Extruded aluminum angle.
        2) Back-up plates shall be manufacturer's standard 1/8" thick aluminum Plates suitable for exterior [**and interior**] use, and mechanical attachment to substrates.
        3) Corner Style: Square.
        4) Size: 1/2" deep x 1/16" thick walls.
        5) Reveal: 3/32", black color.

2.4 ACCESSORIES

A. Fasteners:
1. Concealed Attachment: Provide appropriate flathead countersunk stainless steel screws for the substrate backing in which the sign is to be applied.
2. Exposed Attachment – provide appropriate tamper resistant, flathead countersunk stainless steel screws with grommet finish washers for the substrate backing in which the sign is to be applied.
3. Adhesive:
    a. Specified: **3M** “Silastic Adhesive”.
4. Foam Tape:
    a. Specified: **3M** “Scotch Mount Foam Tape”.

2.5 FABRICATION

A. Shop Assembly:
1. Braille Compliance:
    a. See Part 1 of this specification – SYSTEM DESCRIPTION, and comply with the "Design Requirements for Tactile Signage" that requires California Contracted Grade 2 Braille.
2. Plastic Signs:
    a. Fabricate the plastic signs and backing plates, and then "Sand Carve" the MP plates in accordance with the manufacturer’s recommendations and as indicated. Comply with ADA requirement for symbols and California Contracted Grade 2 Braille characters when required, and finish in accordance to the specifications. All components of the signage system shall be ready to install in the field.
3. Acrylic Signs:
    a. Manufacturer's standard Profile Material, computer engineered, adhesive backed, raised graphics, complying with the latest CBC and ADA Accessibility Chapters and Sections, and ANSI A 117.1.
        1) Pictograms: All symbols shall match as closely as possible the published "International" symbols. Other interpretations will not be deemed acceptable. All symbols shall be approved prior to fabrication.
        2) Do not exceed the depth of profiling as recommended by the manufacturer for the thickness of the material to be profiled.

2.6 FINISHES

A. Acrylic Signs:
1. Finish: Non-glare, face and core as selected by the Architect from the manufacturer’s full color line, including any custom colors complying with the requirements for contrasting colors of field to Symbols and Braille Text.
2. Allow for two-color application – one color for the field, and one color for the characters.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work specified under this specification section.
   2. Contractor to provide internal wall blocking for all attached identifying devices.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instruction and recommendations unless specifically noted otherwise.
   2. In accordance with approved Submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Layout:
   1. Lines of all signs shall be straight and true.
   2. Set plumb, level, and square.
   3. Temporary positioning with foam tape.

C. Plastic Signs:
   1. "Blind" screw the back-up plate with four (4) flathead countersunk screws (minimum) so as not to interfere with face plate. Tape attachment is not allowed.
   2. Anchor face plate to back-up plate with Silastic Adhesive for permanent attachment.
   3. Seal all exposed edges at exterior conditions with compatible sealant, same color as sign back-up plate.

D. Acrylic Signs:
   1. "Blind" screw the back-up plate with four (4) flathead countersunk screws (minimum) so as not to interfere with face plate. Tape attachment is not allowed.
   2. Anchor face plate to back-up plate with Silastic Adhesive for permanent attachment.
      a. Tape attachment is not allowed.
   3. Seal all exposed edges at exterior conditions with compatible sealant, same color as sign substrate backup plate.

E. Mounting Conditions:
   1. Metal Stud Framed Wall: Provide solid metal backing, attached to studs, adequate for fastening at all corners of sign.

2. Wood Stud Framed Wall: Provide solid wood backing, attached to studs, adequate for fastening at all corners of sign.
3. Concrete and Concrete Masonry: Provide drilled 1/4" diameter concrete or concrete masonry stainless steel anchors at all corners of signs.
4. Glass: Provide "Silastic Adhesive" for permanent attachment of back-up plate. Provide blank plate of same material and size as the sign itself. Place on opposite side of glass and aligned with sign. Color as selected by the Architect.
5. Door: Fasten to door with tamper resistant flathead countersunk screws, minimum three (3) stainless steel screws with grommet finish washers per sign.

3.4 FIELD QUALITY CONTROL

A. Site Tests:
   1. As required by Regulatory Requirements.

3.5 CLEANING

A. Clean in accordance with Specification Sections - TEMPORARY FACILITIES AND CONTROLS and PROJECT CLOSEOUT.
   1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
   2. Clean any soiled surfaces at the end of each day, minimum.
   3. Finish shall be clean and ready for the application of any additional finishes.
   4. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

A. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

A. General:
   1. All signs with text shall have California Contracted Grade 2 Braille unless otherwise noted.
   2. Refer to Plumbing drawings for number and approximate location for "Gas Valve" signs. Signs shall be mounted +2" above Finished Floor.
   3. Refer to drawings for various backing requirements.

B. Sign Material:
   1. EM = Exterior Metal.
   2. IM = Interior Metal.
   3. EP = Exterior Plastic.
   4. IP = Interior Plastic.
   5. A = Acrylic
   6. D = Decal.

C. Mounting Condition:
   1. 1 = Metal Stud Framed Wall.
   2. 2 = Wood Stud Framed Wall.
   3. 3 = Concrete or Concrete Masonry.
   4. 4 = Glass.
   5. 5 = Door Mounted.

D. Sign Types:
   1. Sign Type 1 - Accessibility Entrance:
      a. 7"H x 7" L nominal square shape.
         1) 6" high non-Tactile International Symbol of Accessibility required.
         2) No Text or Braille required.

2. Sign Type 2 - Toilet Room:
   a. 3.5" H x 7" L nominal rectangular shape.
      1) 3/4" high Tactile Text.
         a) "XXXXXX" and "RESTROOM".
      2) Braille required.
   b. 12" diameter nominal circular shape ("FEMALE").
      1) No Text or Braille required.
   c. Equilateral triangle shape edges 12" L with vertex upward ("MALE").
      1) No Text or Braille required.
   d. Equilateral triangle shape, superimposed within 12" diameter nominal circular shape ("UNISEX").
      1) No Text or Braille required.
3. Sign Type 5 - Room Identification:
   a. 7" H x 7" L nominal square shape.
      1) 2" high Tactile Text required.
      2) Braille required.
   b. 3 1/2" H x 15" L nominal rectangular shape.
      1) 2" high Tactile Text required.
      2) Braille required.
   c. 11" H x 15"L nominal rectangular shape.
      1) 2" high Tactile Text required.
      2) Braille required.
4. Sign Type 6 - Tactile Identification:
   a. 3-1/2"H x 7"L nominal rectangular shape.
      1) 3/4" high Tactile Text required.
      2) Braille required.
   b. 3-1/2"H x 15"L nominal rectangular shape.
      1) 3/4" high Tactile Text required.
      2) Braille required.
   c. 7"H x 7"L nominal square shape.
      1) 3/4" high Tactile Text required.
      2) Braille required.
   d. 7"H x 15"L nominal rectangular shape.
      1) 3/4" high Tactile Text required.
      2) Braille required.

SECTION 10 14 53 – ROAD AND PARKING SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all walk, road and parking signage materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless (Standard Specification for)

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

1. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect and Civil Engineer.

C. Shop Drawings.

1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, the loading, required clearances, method of field assembly, components, and location and size of each field connection.

1.4 CLOSEOUT SUBMITTALS

A. In accordance with Specification Sections in Division One.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
2. Manufacturer/Supplier Qualifications:
   a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. ADA Americans with Disabilities Act.
   b. CBC California Building Code, all accessible parking signage shall be as required by CBC 11B-502.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.
C. Storage and protection:
   1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
      a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
   2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.
C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 SIGNS

A. Signs shall be permanent and reflectorized, constructed of porcelain coating on steel with beaded text or approved equivalent.
B. Sign materials shall be hot-dipped galvanized, embossed steel, with a heavy-duty baked enamel finish.
   1. 16 gage steel for all signs larger than 24" x 24".
   2. 18 gage steel for all signs smaller than 24" x 24".

2.2 BRACKETS

A. Galvanized Pipe, attached with vandal resistant fasteners.
   1. Provide Owner with tool that is compatible with vandal resistant fasteners so that maintenance can be performed on the signs.

2.3 POSTS

A. Pipe, galvanized, Schedule 40, in accordance with ASTM A53 with compatible galvanized Dome Caps.

2.4 CONCRETE

A. See Specification Section – CAST-IN-PLACE CONCRETE.

2.5 OTHER MATERIALS

A. Materials not specifically indicated but needed for proper installation shall be new and of first quality as selected by contractor subject to review by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 INSTALLATION

A. General:
   1. In accordance with Regulatory Requirements.
   2. Set plumb, level, and square.
      a. Set post plumb and at proper height.
      b. Place concrete and tamp to assure consolidation.
         1) Footings shall be 8" in diameter, 24 inches deep minimum, unless otherwise noted.
         2) Top of concrete shall be 3-1/2 inches below finished grade.
      c. Install brackets so signs are plumb and level.
      d. The accessible signage shall be centered at the interior end of the parking space at a minimum height of 80 inches from the bottom of the sign to the parking space finished grade, ground or sidewalk.
         1) In lieu of posts, the accessible parking space signage may also be centered on the wall at the interior end of the parking space (if applicable) at a minimum of 60 inches from the parking space finished grade, ground or sidewalk. Verify with Architect before using this option.

3.3 SCHEDULE

A. Parking Stall Accessible Sign:
   1. Background: blue reflectorized.
   2. Lettering: 1" high minimum, white reflectorized.
   3. Symbol: International Symbol of Accessibility.
   4. Text: MINIMUM FINE $250
   5. Add van accessible sign to the parking space identified on the contract drawings.
      a. Text: VAN ACCESSIBLE

B. Directional Accessible Sign:
   1. Size: 12" x 18".
   2. Background: blue.
   3. Lettering: 1" high minimum, white reflectorized.
   4. Graphics:
      a. Text: ACCESSIBLE PARKING
      b. Symbols: International Symbol of Accessibility and square-tipped directional arrow.

C. Bus Entrance Sign: Post in a conspicuous place at each side of the bus drop-off area
   1. Size: 17" x 22" minimum.
   2. Lettering: 1" high minimum.
   3. Text: "Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or special license plates issued for persons with disabilities will be towed away at owner's expense. Towed vehicles may be reclaimed at <insert location> or by contacting <insert contact information>."
      a. Owner of Project to provide information as a permanent part of the sign. Sign provider to verify information needed with owner prior to fabrication.

4. Text: BUS ENTRANCE ONLY

END OF SECTION

SECTION 10 21 13 – TOILET PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Toilet Partition materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
   1. Solid Color Reinforced Composite (SCRC) Toilet Partition Systems.

B. Related Sections:
   1. DIVISION 00 SPECIFICATION SECTIONS.
   2. DIVISION 01 SPECIFICATION SECTIONS.
   3. 04 22 00 CONCRETE MASONRY UNITS
   4. 06 10 00 ROUGH CARPENTRY
   5. 09 24 00 CEMENT PLASTER
   6. 09 29 00 GYPSUM BOARD
   7. 09 91 00 PAINTING
   8. 10 28 13 TOILET ACCESSORIES

1.2 REFERENCE STANDARDS

A. In accordance with the following:
   1. ASTM: American Society of Testing Materials
      a. ASTM A666 Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar (Specification for)
      b. ASTM A879 Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface (Standard Specification for)
      c. ASTM D256 Determining the Izod Pendulum Impact Resistance of Plastics (Test Methods for)
      d. ASTM D635 Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position (Test Method for)
      e. ASTM D638 Tensile Properties of Plastics (Test method for)
      f. ASTM D746 Brittleness of Plastics and Elastomers by Impact (Test Method for)
      g. ASTM D1505 Density of Plastics by the Density-Gradient Technique (Test Method for)
      h. ASTM D1822 Tensile-Impact Energy to Break Plastics and Electrical Insulating Materials (Test Method for)
      i. ASTM D1929 Determining Ignition Temperature of Plastics (Test Method for)
      j. ASTM D2240 Rubber Property – Durometer Hardness (Standard Test Method for)
      k. ASTM D2843 Density of Smoke from the Burning or Decomposition of Plastics (Test Method for)
      l. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
   2. AWS: American Welding Society

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data:
   1. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.
   2. Submit manufacturer's technical data.

C. Shop Drawings:
   1. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachment to other units of work.

D. Samples:
   1. Provide two (2) 4-inch square samples of each color selected.
   2. Provide hardware samples on request.

E. Certificates:
   1. Provide third party certification that all products comply with NFPA 286.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

B. Project Documents in accordance with Specification Section - PROJECT DOCUMENTS.

C. Warranty in accordance with Specification Section - WARRANTIES and the article in this section titled "Special Warranty."

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product in accordance with manufacturer's warranty requirements.
   2. Manufacturer Qualifications:
      a. Firm experienced in successfully producing products similar to that indicated for this Project, with sufficient production capacity to supply required units without causing delay in the work.

B. Regulatory Requirements:
   1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   2. CBC Chapter 11B Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing:
      a. Furnish Door Hardware for each accessible stall to comply with ANSI A 117.1 and the CBC Section 11B.
      b. Toe Clearance shall be in accordance with CBC Section 11B-604.8.1.4 - at least one side partition shall provide a toe clearance of 9 inches (229 mm) minimum above the finish floor and 6 inches (152 mm) deep minimum beyond the compartment-side face of the partition, exclusive of partition support members. Partition components at the clearances shall be smooth without sharp edges or abrasive surfaces.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped.
   2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name and model.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored in a locked, dry and protected area.

1.7 PROJECT CONDITIONS

A. Existing Conditions:
   1. Examine the project and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will

be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.
B. Manufacturer's Solid Color Reinforced Composite Warranty: 25 Years.
C. Manufacturer's Solid Plastic Systems Warranty: 15 Years.
D. Manufacturer's Metal Partition Systems Warranty: 3 Years.
   1. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.
E. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 SOLID COLOR REINFORCED COMPOSITE:

A. Specified: **BOBRICK** "Sierra Series 1092.67P."
B. All edges eased, tested in accordance with CBC 803.1.2, 803.12 and ASTM standards as follows:
   1. Specified Solid Color Reinforced Composite (SCRC) Toilet Partition product manufacturer:
C. Surface burning: ASTM E84, Flame Spread: 69, Smoke Density: 93.
D. Heat Sinc: Provide continuous aluminum edging strips fastened to the bottom edge at full width of doors, screens and panels.
E. Provide concealed mounting-- no exposed screw heads on exterior.
   1. Model Number suffix .67.

2.3 COMPONENTS

A. Unless otherwise stated below, all materials shall be Stainless Steel.
B. Hardware:
   1. General:
      a. Provide manufacturer's standard stainless steel, ASTM A666, Type 302 or 304, 18 gage minimum, #4 finish, unless otherwise noted.
      b. Provide Extruded Aluminum, 6063 T-5 parts with a minimum 0.125-inch wall thickness, at Head Rails and Head Rail Endcaps.
   2. Hinges: Integral type consisting of :
      a. Top Pin: 4 inch long, 1/2-inch diameter nylon.
      b. Lower Pin: "Cam Action" nylon assembly that provides "self-closing feature" for the door with 3/16-inch diameter stainless steel pin inserted in upper cam in accordance with CBC Section 11B-604.8.1.2.
   3. Door Strike and Keeper:
      a. Provide surface-mounted door strike and latch keeper for appropriate edge condition and coordinate with latch.

4. Latch:
   a. Provide surface-mounted, stainless steel slide latch conforming to accessibility requirements and pilaster and door conditions.
5. Door Bumper and Hook:
   a. At in-swinging stall doors provide surface-mounted combination hook and rubber-tipped door bumper sized to prevent door hitting mounted accessories.
   b. At out-swinging stall doors provide surface-mounted rubber-tipped door bumper sized to prevent door hitting mounted accessories.
   c. All hooks shall be mounted at +48" maximum AFF.
6. Door Pull in accordance with CBC Section 11B-404.2.7:
   a. At stalls that are not identified as accessible, provide manufacturer's standard door pulls.
   b. At stalls that are identified as accessible, provide pull (or latch assembly) equipped with a loop or "U" Shaped door pull immediately below the latch on both sides of the door conforming to the Americans with Disabilities Act. The latch shall be sliding, or other hardware not requiring the user to grasp, twist or pinch.
7. Wall Bumper:
   a. Out-swinging stall doors provide wall bumper with a rubber face.
8. Pilaster Shoes and Sleeves (Caps): 3-inches high, finished to match hardware.
   a. Furnish galvanized steel supports and leveling bolts at pilasters as recommended in writing by manufacturer to suit floor conditions. Make provisions for setting and securing continuous, extruded aluminum, antigrip, overhead bracing at top of each pilaster with a single crown to prevent the hiding of contraband. Provide shoe at each pilaster to conceal anchorage.
9. Wall Brackets - provide continuous length of panel, one-ear brackets and two-ear brackets as required.
10. Panel to Pilaster Brackets - provide continuous length of panel, "U" Shaped brackets.
11. Stirrup Brackets - provide one-ear brackets, two-ear brackets, and "U" Shaped brackets as required.
12. Head Rails - provide aluminum, anti-grip profile.
13. Head Rail Brackets - provide aluminum brackets compatible with Head Rail design.
14. Head Rail Endcaps - provide aluminum endcaps compatible with Head Rail design.

2.4 ACCESSORIES

A. Fasteners:
   1. Provide manufacturer's standard stainless steel exposed fasteners finished to match hardware, with theft-resistant heads and nuts. For concealed anchors, use hot-dip galvanized, or other rust-resistant protective coated steel.

2.5 FABRICATION

A. Toilet Partition Design shall be as follows:
   1. Floor-Anchored and Overhead-Braced.
B. Furnish standard doors, panels, screens, and pilasters fabricated for toilet partition system. Units shall be furnished with cutouts, drilled holes, and reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated on the drawings. Coordinate with Specification Section - TOILET ACCESSORIES, and schedule reinforcements for products actually provided for this project.
   1. Doors, panels, and screens shall be 55 inches high and mounted 12 inches above finished floor.
   2. Pilasters shall be 82 inches high.
   3. Unless otherwise indicated, furnish 24 inch wide in-swinging doors for non-accessible stalls, and 34 inch wide out-swinging doors for front opening accessible stalls.
      a. 36 inch for side opening accessible stalls.

4. Furnish galvanized steel supports and leveling bolts at pilasters as recommended in writing by manufacturer to suit floor conditions. Provide Pilaster Shoes to conceal anchorage.
5. Secure floor-anchored-overhead braced pilasters by providing continuous Head Rails with Head Rail brackets, and Head Rail Endcaps.
6. All floor anchoring requires a solid two inches thick of solid flooring for proper anchorage.

C. Urinal Screens: "Floor-Anchored and Overhead-Braced" of the same construction and finish as toilet partitions.

2.6 FINISHES

A. Color shall be selected from the manufacturer's full color range including standard and premium colors.

B. One color will be selected per room.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
2. Coordinate the blocking required in all walls with approved shop drawings.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) that could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. Structurally reinforce and anchor work as required.
6. Panels that contain patched holes not utilized for attachment to walls and pilasters will be rejected by the Architect.

B. Layout:

1. Lines shall be straight and true.
2. Stalls:

a. Provide clearances of not less than 1/2 inch between pilasters and panels, and not more than 1 inch between pilasters/panels and walls.
b. Secure panels to walls with continuous brackets.
c. Secure panels to pilasters with continuous brackets. Brackets are to align with continuous brackets at walls.
d. Locate wall brackets so that holes for wall anchorages occur in masonry or tile joints.
e. Secure panels to pilasters with not less than two stirrup brackets located to align with stirrup brackets at wall.
f. Secure panels in position with manufacturer's written recommended anchoring devices.
g. Secure pilasters to floor and level and plumb, and tighten installation with devices furnished.
h. Secure head rails to each pilaster with not less than two fasteners.
i. Hang doors and adjust so that tops of doors are parallel with head rail when doors are in a closed position. Clearance at vertical edge of doors shall be uniform top and bottom and shall not exceed 1/4 inch.
j. When wainscoting prevents the uninterrupted use of a continuous bracket, secure panels to walls with a continuous bracket to the top of the wainscoting and secure the top of the panels to the wall with a stirrup bracket.

3. Screens:
   a. Secure panels to walls with continuous brackets.
   b. Provide clearances of not more than 1 inch between panels and walls.
   c. Secure panels in position with manufacturer’s written recommended anchoring devices to suit supporting structure.
   d. Set units to provide support and to resist lateral impact.

3.4 ADJUSTING

A. Adjust and lubricate for proper operation.
B. Doors:
   1. Adjust and set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched.
   2. Adjust and set hinges on out-swinging doors (and entrance swinging doors) to return fully closed positions.
   3. Adjust and set hinges on doors at accessible stalls to return to fully closed positions.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Clean exposed surfaces using materials and methods recommended in writing by manufacturer.
   2. Protect as necessary to prevent damage during the remainder of the construction period.

END OF SECTION

SECTION 10 26 00 – WALL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Wall and Corner Guard materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 08 11 00 METAL DOORS AND FRAMES
4. 09 24 00 CEMENT PLASTER
5. 09 29 00 GYPSUM BOARD
6. 09 72 00 WALL COVERINGS
7. 09 91 00 PAINTING
8. 10 05 00 MISCELLANEOUS SPECIALTIES

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM D256 Determining the Izod Pendulum Impact Resistance of Plastics (Test Methods for)
2. ASTM D543 Evaluating the Resistance of Plastics to Chemical Reagents (Practices for)
3. ASTM E84 Surface Burning Characteristics of Building Materials (Test Method for)
4. ASTM G21 Determining Resistance of Synthetic Polymeric Materials to Fungi (Standard Practice for)

B. NFPA: National Fire Protection Association

1.3 SUBMITTALS

A. Submit in accordance with Project Manual Specification Section - SUBMITTAL PROCEDURES:

B. Coordination Drawings:

1. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.

C. Product Data.

1. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
    a. Provide data for each type of rigid vinyl kickplates specified.

D. Shop Drawings.

1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.

E. Samples.

1. Provide 8-inch square sample of each color and pattern selected.
2. Provide 6-inch lineal samples of each piece of trim material specified.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

B. Project Record Documents in accordance with Specification Section - PROJECT RECORD Documents.

C. Warranty in accordance with Specification Section - WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications:
      a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:
   1. In accordance with Project Manual Specification Section - REGULATORY REQUIREMENTS, and the following:
      a. ADA Americans with Disabilities Act of 1990.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
   1. Products shall be individually wrapped.
   2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
   1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
   2. Damaged products will not be accepted.

C. Storage and protection:
   1. Products shall be stored in a dry, protected area.

1.7 PROJECT CONDITIONS

A. Environmental requirements:
   1. Temperature: acclimate products in environment between sixty-five (65) degrees Fahrenheit and seventy (70) degrees Fahrenheit for one (1) day prior to installation.

B. Existing Conditions:
   1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.8 WARRANTY

A. Contractor's General Warranty:
   1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 1 Year.
   1. In accordance with manufacturer's written standard warranty.

C. Installer's Warranty: 1 Year.
   1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface burning: ASTM E84, Class A, Flame Spread: 25 or less, Smoke Developed: 450 or less.

B. Impact Strength: ASTM D256, Rigid sheet materials, Impact Strength of 30.4 ft-lbs/inch of thickness.

C. Chemical and Stain Resistance:

1. Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.

D. Fungal and Bacterial Resistance:
1. Provide material that does not support fungal or bacterial growth as tested in accordance with ASTM G21.

E. Color Consistency:
1. Provide components matched in accordance with SAE J-1545 – (Delta E) with a color difference no greater than 1.0 units using CIE Lab, CIE CMC, CIE LCh, Hunter Lab or similar color space scale systems.

F. Accessibility Compliance:
1. Comply with ADA requirements and requirements of ANSI A117.1.

2.2 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.3 HIGH IMPACT WALL COVERING

A. High Impact Wall Covering:
1. Specified: **INPRO** "Rigid Vinyl Sheet" Item protective wall covering panels".
a. Alternate: ACROVYN as manufactured by The **C/S GROUP**
b. Alternate: **KOROSEAL** (Division of **RJF INTERNATIONAL CORPORATION**)
c. Provide manufacturer's standard vinyl/ acrylic extrusions in a nominal wall thickness of 0.060".
d. Provide manufacturer's recommended adhesive for the substrate material indicated on the drawings.
e. Finish to be manufacturer's matte "Pebblette" finish in color as selected by Architect from manufacturer's full color range.
f. Provide the manufacturer's recommended trim pieces and fabricated configurations as required by the drawings.

2.4 COMPONENTS

A. End caps, outside corners and inside corners shall be made of injection molded thermoplastics.
1. Joints:
a. Inside Corners: Color to match wall protection.
b. Joint Sealants: Color to match wall protection.

2.5 ACCESSORIES

A. All mounting system accessories appropriate for substrates indicated on the drawings shall be provided.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.

3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 INSTALLATION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
      a. Provide continuous blocking in walls of similar materials as the wall construction to properly anchor the continuous handrail system at the height indicated on the drawings. Fasteners shall be placed at 32" o.c. maximum.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Minimum temperature requirements for all products must be +70 deg. F. Relative humidity shall not exceed 80 percent.

C. Layout:
   1. Lines shall be straight and true.

3.3 CLEANING

A. Clean in accordance with Project Manual Specification Section - PROJECT CLOSEOUT.
   1. Clean any soiled surfaces immediately.
   2. Clean any soiled surfaces at the end of each day, minimum.
   3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 10 28 13 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish all material, labor, equipment and services necessary to furnish Toilet Accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 06 10 00 ROUGH CARPENTRY
5. 08 80 00 GLASS
6. 09 24 00 CEMENT PLASTER
7. 09 29 00 GYPSUM BOARD
8. 09 72 00 WALL COVERINGS
9. 10 21 13 TOILET PARTITIONS

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM F2285 Standard Consumer Safety Performance
2. ASTM G21 Determining Resistance of Synthetic Polymeric Materials to Fungi (Standard Practice for)

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

C. Shop Drawings.

1. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location (including ADA Required dimensions for mounting locations), and size of each field connection.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. ADA: American's with Disabilities Act 1990.
   b. ANSI: American National Standards Institute Specifications ANSI A117.1 "Accessible and Usable Buildings and Facilities".
   c. CBC: California Building Code (California State Building Standards Code - Title 24) and the latest edition of DSA's California Access Compliance Advisory Reference Manual.

1.5 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 1 Year.

1. In accordance with manufacturer's written standard warranty.

C. Installer's Warranty: 1 Year.

1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 TOILET ACCESSORIES

A. All devices listed herein shall be installed where shown, complete, and ready for use in full compliance with all applicable codes and standards. The manufacturers listed are acceptable as approved suppliers to the Owner. Substitution of manufacturers other than those listed, must be approved by the Owner.

B. Paper Towel Dispenser:
   1. Specified: **BOBRICK** “B-262 (Classic Series) with 262-130 TowelMate”.
   2. Surface mounted, manual operation, satin finish stainless steel. Dispenses 400 c-fold or 525 multi-fold paper towels. Door has tumbler lock and piano hinge. Dimensions: 10 3/4 inches wide, 14 inches high, 4 inches deep. Provide manufacturer's accessory to facilitate single-towel dispensing.

C. Soap Dispenser:
   1. Specified: **BOBRICK** “B-2112 (Classic Series)”.
   2. Surface mounted, manual operation, satin finish type-316 stainless steel. Capacity of 40 fl oz liquid soap or antibacterial soap. Locked hinged stainless steel lid is located on top for refilling. Refill-indicator window is located on front. Black molded plastic push button dispenses soap. Dimensions: 4-3/4 inches high, 8-1/8 inches wide, 3-1/2 inches deep.

D. Seat Cover Dispenser:
   1. Specified: **BOBRICK** “B-221 (Classic Series)”.
   2. Specified: **BRADLEY** “5831”.
   3. Surface mounted, satin finish type-304 22-gage stainless steel. Capacity of 250 toilet seat covers or one box. Dispenser fills from bottom through concealed opening. Ensure 5 inches minimum clearance from bottom of dispenser to top of any horizontal projection to provide room for filling dispenser from bottom.

E. Toilet Tissue Dispenser (All Boys and Girls Restrooms):
   1. Accessible Stalls: Recessed multi-roll toilet tissue dispenser shall be Type 304, 22 gage stainless steel with all-welded construction; exposed surfaces shall have satin finish.
      a. Specified: **BOBRICK** “B-3888 -- 2-3/4" protrusion maximum”.
      b. The front of toilet tissue dispenser shall be drawn, one-piece, seamless construction. Door shall be secured to cabinet with two rivets and equipped with a tumbler lock keyed like other manufacturer's washroom accessories.
      c. Flange shall be drawn, one-piece, seamless construction. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" diameter.
      d. Extra roll shall automatically drop in place when bottom roll is depleted. Unit shall be equipped with two theft-resistant, heavy-duty, one-piece, molded ABS non-controlled delivery spindles.
      e. Manufacturer's service and parts manual shall be provided to the building owner / manager upon completion of the project.
      f. Toilet Tissue Dispenser shall not protrude into accessible space no more than 3" from the face of the wall.
   2. Non-accessible Stalls: Controlled delivery, single roll, heavy-duty cast aluminum, satin finish, with high-impact plastic spindle with concealed locking device, theft-resistant, 6-1/4" wide, projects 4-7/8" from wall, surface mounted.
      a. Specified: **BOBRICK** “B-273”.
      b. Specified: **BRADLEY** “5071”.

F. Toilet Tissue Dispenser (All Staff Restrooms):
   1. Accessible Stalls: Recessed multi-roll toilet tissue dispenser shall be Type 304, 22 gage stainless steel with all-welded construction; exposed surfaces shall have satin finish.
      a. The front of toilet tissue dispenser shall be drawn, one-piece, seamless construction. Door shall be secured to cabinet with two rivets and equipped with a tumbler lock keyed like other manufacturer's washroom accessories.

b. Flange shall be drawn, one-piece, seamless construction. Unit shall dispense two standard-core toilet tissue rolls up to 5-1/4" diameter.
c. Extra roll shall automatically drop in place when bottom roll is depleted. Unit shall be equipped with two theft-resistant, heavy-duty, one-piece, molded ABS non-controlled delivery spindles.
d. Manufacturer's service and parts manual shall be provided to the building owner / manager upon completion of the project.
e. Toilet Tissue Dispenser shall not protrude into accessible space no more than 3" from the face of the wall.
f. Specified: **BOBRICK** B-3888 -- 2-3/4" protrusion maximum.

G. Sanitary Napkins-Tampon Dispenser:
1. Specified: **BOBRICK** “B-37063C”

H. Sanitary Napkin Disposal:
1. Specified: **BOBRICK** “B-270”.
2. Specified: **BRADLEY** “4781-15”.
3. Surface mounted stainless steel.

I. Grab Bars:
1. Specified: **BOBRICK** “B-6806-99 and Partition Mounted Grab Bar Anchor 258”.
2. Specified: **BRADLEY** “812-2 and Partition Mounted Grab Bar Anchor 899-011”.
3. 1-1/2" diameter, 18 gage seamless, stainless safety-grip finish, exposed mounting, vandal resistant screws, minimum of three attachment points matching attachment configuration shown on drawings, in configuration as required.

J. Mirrors:
1. Specified: **BRADLEY** “781”. 18”x30”x3/4”.
2. Specified: **BOBRICK** “B-165 Series”.
3. One piece channel frame, galvanized steel back, wall mounted for accessibility as detailed on the drawings, 1/4" tempered glass, size as shown.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All Toilet Room Accessories shall be furnished and installed by the Contractor, in accordance with manufacturer's written recommendations, and in accordance with accessibility mounting height.

B. Install in accordance with CBC and ADA Accessibility Chapters and Sections, and ANSI A 117.1.

END OF SECTION

SECTION 10 44 00 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to furnish and install Fire Protection Specialties, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 04 22 00 CONCRETE MASONRY UNITS
4. 05 12 00 STEEL AND FABRICATIONS
5. 06 10 00 ROUGH CARPENTRY
6. 09 24 00 CEMENT PLASTER
7. 09 29 00 GYPSUM BOARD
8. 09 72 00 WALL COVERINGS
9. 09 91 00 PAINTING

1.2 REFERENCES

A. Standards:

1. In accordance with the following standards:
   a. NAAMM National Association of Architectural Metal Manufacturers

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES.

B. Product Data, indicating Project, location in Project for each Model Number for Fire Extinguishers, Fire Blankets, Cabinets, Doors and Trim

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
   a. Engage an experienced Installer who has successfully completed three [**3**] projects of similar scope and size to that indicated for this Project.
2. Manufacturer/Supplier Qualifications:
   a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
   a. NFPA National Fire Protection Association (NFPA 10).

1.5 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty: 1 Year.

1. In accordance with manufacturer's written standard warranty:
2. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.

a. Failures include, but are not limited to, the following:
1) Failure of hydrostatic test according to NFPA 10.
2) Faulty operation of valves or release levers.
a) Warranty Period: Six (6) years from date of Substantial Completion.

C. Installer's Warranty: 1 Year.
1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.
1. Specified product manufacturer, or approved equivalent:
a. Specified: **LARSEN'S MANUFACTURING CO.**
b. Alternate: **JL INDUSTRIES**

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 CABINET AND EXTINGUISHER FEC

A. Semi-Recessed FEC-1.
1. Non-Rated Cabinet at non-rated walls.
a. Specified: **LARSEN'S MANUFACTURING CO** “Architectural Series AL-FS-2409-R3”.
b. Alternate: **JL INDUSTRIES** “Academy Series”.
c. Projection: 2.5 inches.
d. Door: 1/2” thick heavy gage clear anodized aluminum.
1) Door glazing: vertical duo clear tempered safety glass.
2) Latch: roller latch.
3) Lettering: Black vertical die cut.
e. Trim: Rolled edge.
f. Box: double wall heavy gage steel, white baked enamel.

2.3 BRACKET AND EXTINGUISHER WB

A. WB-1 General.
1. Bracket:
a. Specified: **LARSEN'S MANUFACTURING CO** “821”.
b. Heavy gage steel with a white baked enamel finish.
c. Coordinate backing for bracket attachment.
2. Extinguisher:
a. Specified: **LARSEN'S MANUFACTURING CO** “MP5-A”
b. Multi-Purpose dry chemical 5 lb capacity.
c. UL 3A:40B:C.

2.4 FABRICATION

A. Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
1. Weld joints and grind smooth.
2. Prepare doors and frames to receive locks.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames of one-piece construction, with edges flanged.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.6 STEEL FINISHES

A. Baked-Enamel Finish: Immediately after cleaning and pre-treating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.
    a. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets will be installed.
    b. Examine walls and partitions for suitable blocking where surface applied brackets will be installed.
    c. Examine fire extinguishers for proper charging and tagging.
        1) Remove and replace damaged, defective, or undercharged units.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:

1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.

3. In accordance with Regulatory Requirements.
    a. Mount at height complying with applicable ADA and CBC requirements.
4. Set plumb, level, and square.
5. Identification:
    a. Apply decals, vinyl lettering, or other identification at locations indicated.

B. Layout:
1. Lines shall be straight and true.

3.4 ADJUSTING

A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
1. Replace cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. In accordance with manufacturer's written instructions and recommendations.
    a. Remove temporary protective coverings and strippable films, if any, as security fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.
    b. Adjust cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
    c. On completion of cabinet installation, clean interior and exterior surfaces as recommended in writing by manufacturer.
    d. Touch up marred finishes, or replace cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended in writing or furnished by cabinet manufacturer.

3.6 PROTECTION

A. Protection from traffic:
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 11 68 00 – PLAYFIELD EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all material, labor, equipment and services necessary to completely install all Playfield Equipment materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. Related Sections:

1. DIVISION 00 SPECIFICATION SECTIONS.
2. DIVISION 01 SPECIFICATION SECTIONS.
3. 05 12 00 STEEL AND FABRICATIONS
4. 31 20 00 EARTHWORK
5. 32 12 00 PAVEMENT
6. SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
7. SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 REFERENCE STANDARDS

A. ASTM: American Society of Testing Materials

1. ASTM F1292 Attenuation of Surface Systems Under and Around Playground Equipment (Specification for)
2. ASTM F1951 Determination of Accessibility of Surface Systems Under and Around Playground Equipment (Standard Specification for)

1.3 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Product Data.

1. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.

C. Shop Drawings.

1. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
    a. Where installed products are indicated to comply with certain design loading, include structural computations, material properties, and other information needed for structural analysis that has been signed and stamped by a registered Civil or Structural Engineer in the State of California.

1.4 QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Test Reports.

B. Manufacturer's Written Instructions.

C. Engineering Calculations: Submit engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.

B. Warranty Data in accordance with Specification Section - WARRANTIES.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:

a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

2. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. In accordance with Specification Section - REGULATORY REQUIREMENTS.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted at final inspection.

B. Acceptance at Site:

1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.

C. Storage and protection:

1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.

a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 WARRANTY

A. Contractor's General Warranty: In accordance with Specification Section – WARRANTIES.

B. Manufacturer's Warranty: 1 Year.

1. In accordance with manufacturer's written standard warranty.

C. Special Warranty for Backboards: Life of the Product.

1. Upon project completion and acceptance, the manufacturer shall issue Owner a warranty against defective materials.

D. Installer's Warranty: 1 Year.

1. In accordance with the terms of the Specification Section – WARRANTIES.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products listed herein establish the size, pattern, color range and function for this Project. Alternates and substitutions must comply with the Project requirements. If alternates or substitutions do not meet the Project specifications, the Contractor shall provide the specified products.

B. Comply with Specification Section - SUBSTITUTION PROCEDURES for manufacturers and products not listed.

2.2 PLAYCOURT EQUIPMENT

A. Basketball Backstop (Type 1):

1. Post and extensions:

a. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “00174-110”.
b. Face of Backboard shall be 4'-0" extended from the centerline of the formed upright support.
c. Upright support shall be 3-1/2" O.D. heavy-wall galvanized pipe formed to an approximate 18" radius.
d. Vertical section shall extend 3'-0" into a concrete footing and shall be secured by anchor lugs.

e. Horizontal section shall be fabricated with a special, slotted mounting plate to level the backboard and goal.
f. Bolts from the front mounted goal shall mount directly through the backboard and into the center-strut mounting plate to eliminate any strain on the bank should a player hang on the front mounted goal.

2. Backboard:
   a. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “00267-000”.
   b. Molded fiberglass fan-shaped board shall be official size (54" x 39") and shape, with orange perimeter and target area markings.
   c. Perimeter flange and structural rib pattern shall be 1-1/2" deep.
   d. Tensile strength of board shall be 8,900 – 11, 700 psi with a 23 percent to 27 percent fiberglass content by weight.
   e. Goal mounting shall be reinforced with a 3/16" x 6" wide plated steel plate secured to backside of board.
   f. Eight (8) 3/8-16 stainless steel threaded inserts shall be mounted into backside of backboard at standard mounting centers.
3. Goal:
   a. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “00201-H00”.
   b. Rim shall be fabricated from 5/8" diameter cold drawn alloy steel round formed to an 18" inside diameter ring.
   c. Inside of ring shall be positioned 6" from face of backboard by heavy-L-shaped, formed steel mounting plate with 5" x 5" mounting hole centers for front mounting on standard fiberglass type backboards.
   d. Rim shall be rigidly braced by means of a 1/2" diameter cold drawn alloy steel round formed and welded in position for maximum support.
      1) Rim shall be provided with twelve "no-tie" net attachment clips for net attachment.
   e. Goal shall be finished in a durable, official orange powder-coat finish.
   f. Goal shall be furnished complete with a high quality white nylon net and plated mounting hardware.
      1) Mounting bolts shall be SAE Grade 5.

B. Basketball Backstop (Type 2):
1. Post and extensions:
   a. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “00166-320”.
   b. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “00186-320”.
   c. Upright support shall be 5-9/16" O.D. heavy-wall galvanized pipe capped at top end.
   d. Anchor lugs shall be provided on lower end for securing into a concrete footing.
   e. Backboard shall be supported 6'-0" in front of upright support by means of special horizontal support assemblies for ease of installing goal height at any location between 8'-0" and 10'-0".
   f. Lower Horizontal Support Assemblies:
      1) Shall be fabricated from 3-1/2" O.D. heavy-wall tubing equipped with a special steel, die-formed fitting for attachment to the upright support.
      2) Lower horizontal support assembly shall extend to a mounting plate directly behind the goal mounting holes to transfer all goal impact loading directly tot he rear support structure to eliminate stress on the backboard.
      3) Lower horizontal support assembly shall be supported directly behind the goal mounting plate by means of a diagonally mounted heavy-wall 1-7/8" O.D. steel tube extending to the upper end of the upright support.
   g. Upper part of the backboards shall be further braced by dual, heavy-wall 1-7/8" O.D. steel tubes extending outward from the upper end of the center upright support into special hinge fittings mounted on 2'-11" centers on the backside of the backboards.
      1) All metal parts shall be furnished in a galvanized finish.
2. Backboard:
   a. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “00234-300”.

b. Cast aluminum fan-shaped board shall be official size (54" x 39") and shape, finished in a durable white powder-coated finish with orange perimeter and target area markings.
c. Backboard shall be cast in a permanent mold process from a high tensile #319 aluminum.
d. Backboard shall be cast with structural reinforcing ribs on backside with a heavy, 1-1/2" deep perimeter flange to provide maximum rigidity.
    1) Backside of board shall be furnished with eight (8) tapped holes (3/8-16) to fit normal mounting attachments without exposed bolt heads on front face of unit.
e. Backboard shall be drilled for a mount type goal (5" x 5" hole pattern) and compatible with direct mount type support structures.
f. Goal mounting holes (4) shall be molded with an integral, hex shaped cavity located on the front side of the backboard to independently mount the backboard to a rear support structure to provide the option of removing the goal for seasonal use or to prevent vandalism or unauthorized usage,.

3. Goal:
    a. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “00235-000”.
    b. Rim shall be fabricated from 5/8" diameter cold drawn alloy steel round formed to an 18" inside diameter ring.
    c. Inside of ring shall be positioned 6" from face of backboard by heavy-L-shaped, formed steel mounting plate with 5" x 5" mounting hole centers for front mounting on standard aluminum type backboards.
    d. Rim shall be rigidly braced by means of a 5/8" diameter cold drawn alloy steel round formed and welded in position for maximum support.
        1) Rim shall be provided with twelve "no-tie" net attachment clips for net attachment.
    e. Goal assembly shall be capable of supporting up to an 800 pound load on outer edge of the rim and under extreme dynamic loading shall flex or deflect downward up to 2-3/4" without permanent set or deformation.
    f. Goal shall be finished in a durable, official orange powder-coat finish.
    g. Goal shall be furnished complete with a high quality white nylon net and plated mounting hardware.
        1) Mounting bolts shall be SAE Grade 5.

2.3 PLAYFIELD EQUIPMENT

A. Volleyball:
1. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “00444-000”.
2. Posts:
    a. Posts shall be provided in a high strength extruded aluminum alloy (6063T6) and finished in a durable clean anodized finish for outdoor use.
    b. One pair of posts shall consist of one reel post and one tie-off post.
    c. Posts shall be 4" square x 10'-0" in length to extend 2'-0" into 00592-000 upright base extensions. Upper end of posts shall be provided with an external cap.
    d. Extruded aluminum post sections shall be provided with an integral channel/track system to accept net attachment hardware and allow for infinite net height adjustments, for all age group competition settings. Net height may also be set at heights for badminton (5'-0") or tennis (3'-0") or any other desired net height requirement.
    e. Reel post shall be provided with a heavy-duty type net tensioning reel with a removable type handle. Post shall also be provided with an adjustable upper pulley assembly. Both the tensioning reel and the pulley assembly shall be secured into the integral channel/track system with allen flat head bolts to prevent tampering by unauthorized individuals. Allen tool shall be provided with each set of uprights.
    f. Tie-off post shall be provided with two (2) adjustable d-ring net tie-off assemblies which attach to the post identical to the reel post hardware.
3. Protective Pads:
    a. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “00593-0XX”.
    b. Provide one protective pad per post (One Pair).

c. Pads shall be designed to provide additional player safety. Pad shall be constructed of a rugged tear proof polyester reinforced red vinyl material (14 oz. per sq. yd.) with a resilient, 1-1/2" thick, soft urethane close cell type foam filler to minimize moisture absorption.
d. Pads shall be 6'-0" in height by 1'-6" in width with grommets spaced at approximately 5-3/8" centers for lacing to 4" square uprights with weather resistant cords provided.

4. Net:
   a. Specified: **PORTER ATHLETIC EQUIPMENT COMPANY** “02254-000”.
   b. Provide Volleyball Net (32" x 36") as provided by the manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
   1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
   2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
   3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
   1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
   1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:
   1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
   2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 ERECTION

A. General:
   1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
   2. In accordance with approved submittals.
   3. In accordance with Regulatory Requirements.
   4. Set plumb, level, and square.

B. Layout:
   1. Lines shall be straight and true.

3.4 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
   1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
   2. Clean any soiled surfaces immediately.
   3. Finish shall be clean and ready for the application of any additional finishes.
   4. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 22 00 00 – PLUMBING

PART 1: - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Sanitary sewer system.
2. Domestic water system.
3. Fuel gas system.
4. Drain system (including condensate drain).
5. All equipment as shown or noted on the drawings or as specified.
6. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, braces, housekeeping pads, supports and related items no longer required.
7. Lead Free: All equipment, fixtures, valves and fixture stops providing water for human consumption installed after January 1, 2010, must meet the “Lead Free” requirements for the State of California.

B. Work Specified Elsewhere:
1. Line voltage power wiring, disconnect switches and installation of all starters are included in the Electrical Section unless otherwise noted.
2. Concrete and reinforcing steel unless specifically called for on the drawings or specifications.
3. Painting unless specifically called for in the drawings or specifications.
4. Carpentry.
5. Circulating water piping for heating and air conditioning work.

PART 2: - PRODUCTS

2.1 PIPING MATERIALS:

A. Sanitary Sewer:
1. Soil, Waste and Vent Piping (Non-Pressurized) - Inside Building, Within Five Feet of Building Walls to P.O.C.: Standard weight coated cast iron pipe and fittings. Plain end, CISPI 301, ASTM A888, or hub end with rubber gaskets, ASTM A74, ASTM C564. ABI, Charlotte, Tyler. Couplings shall be heavy-duty shielded couplings, Type 304 stainless steel, with neoprene gasket, ASTM C-1540. Husky HD 2000, Clamp-All 80, Mission HeavyWeight. MG Couplings are also acceptable. 2" and smaller exposed to view shall be galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12.
Below grade cast iron pipe and fittings shall have 8 mil (minimum) Polyethylene Encasement (Poly Wrap), Per ANSI/AWWA C105/A21.5.

2. Cleanouts: Comparable models of Josam, Wade, Mifab or Zurn are acceptable. Grease plug prior to installation. Floor Cleanouts: Smith 4023 with nickel bronze top in finished areas; Smith 4223 in utility areas. Wall Cleanouts: Smith 4532 with stainless steel cover and screw. Pipe Cleanouts: Iron body with threaded brass plug. Site cleanouts more than 5’ outside building may be PVC with PVC plug.
3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

B. Water and Gas:
1. Hot and Cold Water Piping - Inside Building, Within Five Feet of Building Walls to Civil P.O.C., and All Above Grade: Materials used in the water system, except valves and similar devices, shall be of like material, except where otherwise approved by Engineer and Authority Having Jurisdiction, prior to start of work. **For existing water systems of galvanized steel or copper, materials shall match existing.**
   a. Inside Building, Within Five Feet of Building Walls, and All Above Grade:
      (1) Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3. Galvanized steel below grade shall have protective coating.

   -or-
      (2) Hard temper seamless copper, ASTM B88. Wrought copper fittings, ANSI B16.22. Type L with brazed joints (1100F, min.). 1-1/2" and smaller above grade may be soldered, 95-5 tin-antimony solder. All nipples shall be red brass (85% copper). Above grade fittings may be copper press fittings, ASME B16.18 or ASME B16.22. EPDM O-rings. Installation shall be in accordance with the manufacturer’s installation instructions. ProPress.
2. Gas Piping:
   a. Inside Building and All Above Grade: Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3, ANSI B31.8.
3. Valves and Specialties:
   a. Valves:
      (1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Kitz, Milwaukee, Nibco, Stockham, Walworth or Watts are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer.
      (2) Gate Valve: 2" and Smaller: All bronze. Non-rising stem. Threaded bonnet. Wedge disk. Malleable iron handwheel. 200 psi CWP. Nibco T-113-LF.
      (3) Ball Valve: Full port. Lead free brass body, cap, stem, disk and ball. Screwed connection. Lever handle. PTFE seat and stem packing. Min. 400 psi CWP. CSA-US and UL listed. Nibco T-FP-600A-LF.
      (4) Plug Valve: Valves in gas piping systems must be UL or CSA listed for gas distribution. . 4" and Smaller: Eccentric bronze or nickel plated semi-steel plug. Semi-steel body. Bronze bushings. Buna-N-rings. 175 psi WOG. KeyPort Valve Series 400. 2" and

smaller above grade may be listed full port ball valves, except in publicly accessible locations. Apollo, Jomar, Nibco.

(5) Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

b. Miscellaneous Specialties:

(1) Temperature and Pressure Relief Valve: ASME rated fully automatic, reseating combination temperature and pressure relief valve sized in accordance with energy input. Sensing element immersed within upper 6" of tank. Watts.

(2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Unions for copper piping shall be copper or lead free cast bronze. Anvil. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. EPDM gasket, NSF 61 rated. Victaulic Style 77, Gruvlok.

(3) Dielectric Coupling: Insulating union or flange rated for 250 psig. Wilkins DUXL Series.

(4) Shock Absorber: Multiple bellows. All stainless steel construction. Designed and applied in accordance with PDI WH201. Amtrol, Smith, Wade, Zurn.

C. Drain Piping (including Condensate): Same as inside building cold water piping. Piping at ground mounted units shall be galvanized steel.

D. Miscellaneous Piping Items:

1. Pipe Support:

a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendation. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Anvil, Unistrut.

b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco, Superstrut.

c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.

2. Flashing: Vent flashing shall be 4 lb/ft2 lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Flashing for other piping through roof shall be prefabricated galvanized steel roof jacks with 16" sq. flange. Provide clamp-on storm collar and seal water tight with mastic. For cold process built-up roof, material shall be 4 lb/ft^2 lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer’s recommended flashing material.

2.2 PIPING INSULATION MATERIALS:

A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Pre-Molded Fiberglass: Heavy density sectional pre molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu in/hr ft2 F at a mean temperature of 50F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. For hot water piping to 140□F, thickness shall be 1" for pipe sizes less than 1”; 1 1/2" thickness for pipe sizes 1" and 1-1/2”; 2” thickness for 2” and larger. See Title 24, Part 6 “California Energy Code” for temperatures above 140°F. Knauf, Johns-Manville, Owens-Corning.

C. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-F at a mean temperature of 50F. 1-1/2" thickness. Knauf, Johns-Manville, Owens-Corning.

D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.

E. Stretchable Glass Fabric: Reinforcing mesh. 10 X 20 continuous filament glass yarns per inch. Johns-Manville.

F. Vapor Barrier Coating: Childers CP-30, Foster 30-25.

G. Lagging Adhesive: Childers CP-50A, Foster 30-36.

H. Aluminum Jacketing: Aluminum pipe and fitting jacketing, 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Stucco-Embossed finish. Provide pre fabricated aluminum strapping and seals by same manufacturer. ITW or RPR.

I. Outdoor Weather Barrier Mastic: Childers CP-10/11, Foster 46-50.

J. Metal Jacketing Sealant: Childers CP-76, Foster 95-44.

K. Molded Closed Cell Vinyl (Piping Insulation Under Lavatories and Sinks): Fully molded closed cell vinyl, 1/8” thick, minimum. Thermal conductivity shall not exceed 1.17 BTU-in/hr-ft2-ºF at an average temperature of 73ºF. Weep hole in cleanout nut enclosure. Hinged cap over valve to allow access for servicing. Out of sight nylon fastening system and internal ribs on drain insulation to provide air gap (Lav-Guard Only). Truebro Lav-guard, McGuire Pro Wrap, Plumberex.

2.3 FIXTURES:

A. General: Provide rough-in for and install all plumbing fixtures shown on drawings. Except in equipment rooms, all trim, valves and piping not concealed in wall structure, above ceiling or below floors, shall be brass with polished chrome plate finish, unless noted otherwise. All enameled fixtures shall be acid resisting. Standard color is white unless otherwise noted.

B. Schedule: Refer to Plumbing Fixture Schedule on the drawings for list of fixtures and trim. Manufacturer's model numbers are listed to complete description. Equivalent models of American Standard, Eljer, Elkay, Haws, Just, Kohler, T&S Brass, Willoughby or Zurn are acceptable. For drainage fixtures, equivalent models of Josam, Mifab, Smith, Wade or Zurn are acceptable.

C. Stops and P-Traps: All fixtures shall be provided with stops and P-Traps as applicable. Wall mounted faucets, valves, etc. shall have integral stops or wall mounted stops.
   1. Stops: All hot and cold water supplies shall be 1/2" I.P.S. inlet angle stops with stuffing box, loose key lock shield, and brass riser (3/8" for 2-1/2 gpm and less, otherwise 1/2"). ¼ turn ball stops do not require stuffing box. Dahl, McGuire, Speedway.
   2. P-Traps: Semi-cast brass, ground joint. 17-gage. Clean-out plug. Unobstructed waterway. California Tubular, McGuire.

D. Caulking: Caulk fixtures with white G.E. "Sanitary SCS1700", mildew resistant silicone sealant with EPA listed anti-microbial.

2.4 EQUIPMENT:

A. General Requirements:
   1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
   2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
   3. Ratings - Electrical: Electrical equipment shall be in accordance with NEMA standards and UL or ETL listed where applicable standards have been established.
   4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
   5. Electrical:
      a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
      b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
      c. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.

B. Water Heater: Electric. Glass lined tank with magnesium anode protection. 150 psi working pressure. Fully insulated. Automatic temperature control. High limit control. Provide ASME rated temperature and pressure relief valve sized in accordance with energy input, dielectric couplings and drain cock. UL listed. A.O. Smith, American Appliance, State Industries.

C. Instantaneous Electric Water Heater: Shall be as scheduled on Plumbing Drawings.

PART 3: - EXECUTION

3.1 PIPING INSTALLATION:

A. General:

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted.
2. Joints:
   a. Threaded: Pipe shall be cut square and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
   b. Brazed: Filler rod shall be of suitable or the same alloy as pipe. Brazing filler metal shall have a minimum melting point of 1100F. Brazing shall be performed by a Certified Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
   c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
   d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.
3. Fittings and Valves:
   a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
   b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
   c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
   d. Valves: All valves shall be full line size. Provide shut-off valve for each building and each equipment connection. Provide shut-off valve at each point of connection to existing piping. At equipment connections, valves shall be full size of upstream piping, except that gas valves within 18" of the point of connection to the equipment may be the same size as the equipment connection.
   e. Valve Accessibility: All valves shall be located so that they are easily accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are

greater than 10' above the floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must have prior review by the Engineer.

4. Pipe Support:
   a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes in direction. Support individual pipes with pipe hanger. Copper piping systems which protrude through a surface for connection to a fixture stop or other outlet shall be secured with a drop ell, Nibco 707-3-5, to a Holdrite Model #SB1 bracket; nipple through surface shall be threaded brass.
      (1) Pressure Pipe:

Pipe Size (Inches)	Maximum Spacing* Between Supports (ft.)	
	Copper	Sch. 40 steel
1/2	6	6
3/4	6	8
1	6	8
1-1/4	6	10
1-1/2	6	10
2	10	10
2-1/2	10	10
3	10	10
4	10	10
6	10	10

*Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Seismic requirements may reduce maximum spacing.

      (2) Gravity Drain Pipe: Piping shall be supported at each length of pipe or fitting, but in no case at greater spacing than indicated above for pressure pipe.
   b. Hot and Cold Water Piping: All hot and cold water piping shall have isolating shield; no portion of this piping shall touch the structure without an isolating shield except at anchor points for fixture rough-in.
   c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.
5. Miscellaneous:
   a. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
   b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller, otherwise 2" annular clearance. Piping through walls or footings below grade shall be sealed with Link Seal.
   c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire rated walls, floors, ceilings, partitions, etc. shall have the annular space

surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2022 CBC Section 714.

d. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.

B. Sanitary Sewer Piping:

1. General: Where inverts are not indicated, piping shall be installed at 1/4" per foot pitch. Piping 4" and larger may be installed at 1/8" per foot pitch where structural or other limitations prevent installation at a greater pitch. Bell and spigot piping shall be installed with barrel on sand bed; excavate hole for bell.
2. Cleanouts: Install cleanouts at ends of lines, at changes of direction greater than 45 degrees, and at not greater than 100 foot intervals. Locate interior cleanouts in accessible locations and bring flush to finished surface.
3. Vents: Vents shall terminate not less than 6" above the roof nor less than 12" from any vertical surface nor within 10' of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2' minimum from gutters, parapets, ridges and roof flashing.

C. Water Piping: Connections to branches and risers shall be made from top of main. Supply header in fixture battery shall be full size to last fixture, reducing in size only on individual connections to each fixture in battery. Minimum pipe size shall be 1/2", unless otherwise noted. Exposed fixture stops and flush valves shall be installed with brass nipples for copper piping and galvanized nipples for galvanized piping. Nipples are to extend from outside of wall to fitting at header or drop behind finish wall surfaces. Pipe nipples shall be same size as stop or flush valve. Provide shut off for each building and each connection to equipment. Shock absorbers shall be installed in a vertical position as indicated on drawings. Only equipment mounted on vibration isolators shall be connected with flexible connections.

D. Gas Piping: Installation shall comply with CPC and NFPA 54 (National Fuel Gas Code). Shall be pitched to drain to drip legs at low points where other than dry gas conditions exist. No unions shall be installed except at connections to equipment. Provide shutoff and dirt leg (sediment trap) at each equipment connection. Only equipment mounted on vibration isolators shall be connected with flexible connectors.
Odor Fade Warning – The odorant in propane (LP) and natural gas is colorless and the intensity of its odor can fade under some circumstances. Contact the utility company for more information.

E. Drain Piping (Including Condensate): Install with constant pitch to receptacle, 1/4" per foot where possible, otherwise 1/8" per foot minimum. Provide TEE with clean-out plug at all changes of direction. Provide trap at each air handling unit to prevent air leakage. Only equipment mounted on vibration isolators shall be connected with flexible connection. Piping not concealed in wall structure, above ceilings or below floors shall be chrome plated brass, except in equipment rooms, piping shall be galvanized steel. P&T relief and water heater drain piping shall be galvanized steel. Provide secondary drain piping where required.

3.2 PIPING INSULATION INSTALLATION:

A. Domestic Hot Water:

1. General: All domestic hot water piping, fittings and accessories shall be insulated.
2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.
3. Fittings and Valves:
   a. Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket in accordance with manufacturer's recommendations. Solvent weld. Seal all joints with factory supplied pressure sealing vapor barrier tape with 1-1/2" (min.) overlap on both sides of joint. Insulate valves to stem. Do not insulate unions, flanges or valves unless water temperature exceeds 140F or the piping is exposed to weather.
   b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating. All exposed ends of insulation shall be adequately sealed.
4. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets.

B. Cold Water Piping-Freeze Protection: All cold water piping exposed to weather or other areas subject to freezing (i.e. ventilated attics, uninsulated exterior soffits, etc.) shall be insulated same as hot water piping. Cover with PVC jacketing where exposed to view, aluminum jacketing where exposed to weather.

C. Piping Insulation Under Accessible Lavatories and Sinks: Water piping, water stops and drain piping under accessible lavatories and sinks shall be insulated with 1/8" thick molded closed cell vinyl. Installation shall be in accordance with manufacturer's instructions.

3.3 FIXTURE INSTALLATION:

A. Fixture Height: Shall be as indicated on Architectural drawings.

B. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor, and adjusted to proper height to drain. Cover openings during construction to keep all foreign matter out of drain line.

C. Wall Hung Fixtures: Shall be provided with proper backing and hanger plates secured to wall. Fixtures mounted on carriers shall bear against stop nuts, clear of wall surface. Caulk fixtures against walls with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).

D. Floor Mounted Fixtures: Shall be provided with proper support plates. Caulk floor mounted fixtures with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).

E. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.

3.4 EQUIPMENT INSTALLATION:

A. General: It shall be the responsibility of the equipment installer to insure that no work done under other specification sections shall in any way block, or otherwise hinder the equipment. All equipment shall be securely anchored in place.

B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.5 TESTS AND ADJUSTMENTS:

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested. Tests may be made in sections, however, all connections between sections previously tested and new section shall be included in the new test.

B. Gravity Systems:
1. Sanitary Sewer: All ends of the sanitary sewer system shall be capped and lines filled with water to the top of the highest vent, 10' above grade minimum. This test shall be made before any fixtures are installed. Test shall be maintained until all joints have been inspected, but no less than 2 hours.
2. Drains (Including Condensate): Similar to Sanitary Sewer.

C. Pressure Systems:
1. General: There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
2. Domestic Hot and Cold Water Piping: Maintain 100 psig water pressure for 4 hours.
3. Gas Piping: Maintain 100 psig air pressure for 4 hours.

3.6 DISINFECTION:

A. Disinfect all domestic water piping in accordance with 2022 CPC Section 609.10, and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by a representative of the Architect. During procedure signs shall be posted at each water outlet stating, "Chlorination Do Not Drink". After disinfection, one set of water samples shall be collected by Contractor for bacteriological analysis in presence of Inspector. If the water fails the bacteriological test, Contractor shall disinfect the piping again and pay for any retesting required, at no additional cost to owner. Bacteriological testing results shall be obtained by Contractor and delivered to the Owner through the Architect before project completion. Contractor shall include copy of Bacteriological Test Results at closeout with operation and maintenance manuals.

END OF SECTION

SECTION 23 00 00 - GENERAL MECHANICAL PROVISIONS

PART 1: - GENERAL

1.1 GENERAL CONDITIONS:

A. The preceding General and Special Conditions and Divisions 00 and 01 requirements shall form a part of this Section with the same force and effect as though repeated here. The provisions of this Section shall apply to all of the Sections of Divisions 22 and 23 of these Specifications and shall be considered a part of these sections.

1.2 CODES AND REGULATIONS:

A. All work and materials shall be in full accordance with the rules and regulations of all applicable codes as noted below. Nothing in these Drawings or Specifications is to be construed to permit work not conforming to these codes. Should the Drawings or Specifications call for material or methods of construction of a higher quality or standard than required by these codes, the Drawings and Specifications shall govern. Applicable codes and regulations include, but are not necessarily limited to, the following:

1. California Code of Regulations (CCR):
    a. Title 8, Industrial Relations
    b. Title 24, Part 1, Administrative Regulations, 2025 Edition
    c. Title 24, Part 6, California Energy Code, 2022 Edition
    d. Title 24, Part 11, California Green Building Code, 2022 Edition
2. California Building Code - CBC - 2022
3. California Mechanical Code - CMC - 2022
4. California Plumbing Code - CPC - 2022
5. California Fire Code - CFC - 2022
6. California Electrical Code - CEC - 2022
7. Air Diffusion Council - ADC
8. American Gas Association - AGA
9. Air Movement and Control Association - AMCA
10. American National Standards Institute - ANSI
11. Air Conditioning and Refrigeration Institute - ARI
12. American Society of Heating, Refrigerating, and Air Conditioning Engineers - ASHRAE
13. American Society of Mechanical Engineers - ASME
14. American Society for Testing and Materials - ASTM
15. American Water Works Association - AWWA
16. Cast Iron Soil Pipe Institute - CISPI
17. National Electrical Manufacturers Association - NEMA
18. National Fire Protection Association - NFPA
19. National Sanitation Foundation - NSF
20. Occupational Safety and Health Act - OSHA
21. Plumbing and Drainage Institute - PDI
22. Sheet Metal and Air Conditioning Contractors National Association - SMACNA
23. Underwriters' Laboratory - UL

1.3 PERMITS AND FEES:

A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as part of the work included under each system. All charges or fees for service connections, meters, etc. shall be included in the work.

1.4 COORDINATION OF WORK:

A. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. Some work may be shown offset for clarity. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc. shall be carefully planned prior to installation of any work in order to avoid all interference with each other, or with structural, electrical, architectural or other elements. Verify the proper voltage and phase of all equipment with the electrical plans. If discrepancies are discovered between drawing and specification requirements, the more stringent requirement shall apply. All conflicts shall be called to the attention of the Architect and the Engineer prior to the installation of any work or the ordering of any equipment. No work shall be prefabricated or installed prior to this coordination. No costs will be allowed to the Contractor for any prefabrication or installation performed prior to this coordination.

B. Mandatory Coordination and Shop Drawings:

1. Prepare or have prepared high level detailed Shop Drawings in plan view, with cross-sections as necessary, indicating the proposed installation plan for all HVAC, mechanical, fire sprinkler, and plumbing installations for the project. These Drawings should depict actual elevations and linear dimensions, as well as all routing changes, transitions, major offsets, deck and structural attachments deemed necessary to accomplish the installation. Individual Shop Drawings may be prepared for each trade working within the designated space or area; however, the coordination of the consolidated installation shall remain the responsibility of the Contractor. These Shop Drawings shall be provided to each Subcontractor having Work in each area for coordination. Any fittings, offsets or other changes due to coordination shall be at no additional cost to District.
2. Whereas the Drawings are diagrammatic, showing only the general arrangement of the systems, Contractor shall have responsibility for the fitting of materials and equipment to other parts of the equipment and structure, and to make adjustments as necessary or required to resolve space problems, preserve service room, and avoid architectural and structural elements and the Work of other trades. Contractor may be required to identify certain areas to relocate installations within the spaces depicted on the Drawings, e.g., ductwork and/or piping may be shifted within the space shown to accommodate other systems. Such functional relocations shall not be deemed a change to the requirements of the Contract. In the event a major re-routing of a system appears necessary, Contractor shall prepare and submit for approval, Shop Drawings of the proposed rearrangement.
3. Because of the diagrammatic nature and small scale of the Drawings, all necessary offsets, adjustments, and transitions required for the complete installation are not shown. Contractor shall carefully investigate the conditions affecting all the Work and shall arrange such Work accordingly, furnishing such fittings, equipment, valves, accessories, etc., as may be required to meet such conditions, at no additional cost to the District.

4. Resolve differences or disputes between subcontractors and materials suppliers concerning coordination, interference, or extent of work between sections. The Contractor's decisions, if consistent with the Contract Documents, shall be final. The Architect and their Consultants are not required to coordinate work between sections and will not do so. Any changes required that affect the design intent shall be presented to and approved by the Architect and Engineer of Record.
5. The coordinated Shop Drawings must be signed off by HVAC, Plumbing, Fire Sprinkler, Electrical, Framing, Ceiling Installation, and Data and Low Voltage Subcontractors.
6. The signed off Shop Drawings shall be submitted to the District's Representative for review and approval prior to commencement of installation.
7. Provide reviewed Shop Drawings to each Subcontractor having Work in each area.

1.5 GUARANTEE:

A. Guarantee shall be in accordance with the General Conditions. These Specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the certificate of guarantee shall be furnished to the Owner through the Architect. Equipment that is started and operated prior to acceptance shall have the guarantee extended to cover that period. Owner guarantee shall start at acceptance.

1.6 QUIETNESS:

A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a minimum and is not transmitted to the structure.

1.7 DAMAGES BY LEAKS:

A. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping systems prior to completion of work and during the period of the guarantee, and for damages caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

1.8 EXAMINATION OF SITE:

A. The Contractor shall examine the site, compare it with Plans and Specifications, and shall have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.9 COMPATIBILITY WITH EXISTING SYSTEMS:

A. Any work which is done as an addition, expansion or remodel of an existing system shall be compatible with that system.

1.10 MATERIALS AND EQUIPMENT:

A. Materials and equipment shall be new unless otherwise noted. Materials and equipment of a given type shall be by the same manufacturer. Materials and equipment shall be free of

dents, scratches, marks, shipping tags and all defacing features at time of project acceptance. Materials and equipment shall be covered or otherwise protected during construction as required to maintain the material and equipment in new factory condition until project acceptance.

1.11 SUBMITTALS:

A. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project (this includes deferred approval items). Material or equipment shall not be ordered or installed until written review is processed by the Engineer. Any item omitted from the submittal shall be provided as specified without substitution.
All shop drawings must comply with the following:

1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be current factory brochures and submittal sheets. Capacities shall be certified by the factory. FAX submittals are not acceptable.
2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer and Contractor, table of contents, and indexed tabs dividing each group of materials or item of equipment. All items shall be identified by the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on drawings.
3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be high-lighted, circled or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.
4. Drawings shall be submitted in both hard copy and electronic form, electronic files shall be in their native format (i.e. DWG for AutoCAD, RVT for Revit, etc).
5. Electronic Submittals: Where allowed by Division 01, electronic submittals are acceptable providing the following requirements are met. Electronic submittals which do not comply with these requirements will be rejected.
    a. Submittal shall be a single file in PDF format, with bookmarks for table of contents and each tab, and sub-bookmarks for each item.
    b. All text shall be searchable (except text that is part of a graphic).
    c. Submittal shall include all items noted in 1 through 3 above, except a binder is not required.
    d. Electronic submittals shall be processed through normal channels. Do not submit directly to the Engineer unless the Engineer is the prime consultant for the project.
    e. Contractor shall provide Owner and Owner’s Representative with hard copies of the final submittal. Coordinate exact number required with Owner through Architect/Engineer.

B. Substitutions:

1. Manufacturers and model numbers listed in the specifications or on the drawings establish the size, standard of quality, features and function selected by the Engineer for this Project. Alternate manufacturers may be submitted for review by the Engineer as allowed by Section 01 33 00 “Submittal Procedures” or Section 01 25 00 “Substitution Procedures”, as applicable. If the alternate manufacturers are not approved, then the Contractor shall submit product specified. Calculations and other detailed data indicating how the item was selected shall be included.
2. Due to the complexity of mechanical equipment, features and functions, where equipment is scheduled on the drawings, any equipment submitted other than scheduled equipment is considered a substitution, and shall comply with the requirements of Section 01 25 00 “Substitution Procedures”. It is understood that because of this complexity, subsequent reviews of Substitution Requests may be unavoidable. The Mechanical Engineer waives the fees identified in Section 01 25 00, for the initial and first subsequent review of a Substitution Request for mechanical equipment scheduled on the Drawings.
3. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items. At the Engineer's request, furnish locations where equipment similar to the substituted equipment is installed and operating along with the user's phone numbers and contact person. Satisfactory operation and service history will be considered in the acceptance or rejection of the proposed substitution.

C. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. If a resubmittal is required, submit a complete copy of the Engineer's review letter requiring such with the resubmittal.

1.12 MANUFACTURER'S RECOMMENDATIONS:

A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

1.13 SCHEDULING OF WORK:

A. All work shall be scheduled subject to the review of the Architect, Engineer and the Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work, and shall cause no delay to other Contractors engaged upon this project or to the Owner.

1.14 OPENINGS, CUTTING AND PATCHING:

A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. Except as noted below, the actual openings and the required cutting and patching shall be provided by other Divisions. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall be provided by other Divisions. Cutting or coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Architect.

1.15 EXCAVATION AND BACKFILL:

A. General: Barrel of pipe shall have uniform support on sand bed. Sand shall be free from clay or organic material, suitable for the purpose intended and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve. Unless otherwise noted, minimum earth cover above top of pipe or tubing outside building walls shall be 24", not including base and paving in paved areas.

B. Excavation: Width of trenches at top of pipe shall be minimum of 16", plus the outside diameter of the pipe. Provide all shoring required by site conditions. Where over excavation occurs, provide compacted sand backfill to pipe bottom. Where groundwater is encountered, remove to keep excavation dry, using well points and pumps as required.

C. Backfill:
1. 6" Below, Around, and to 12" Above Pipe: Material shall be sand. Place carefully around and on top of pipe, taking care not to disturb piping, consolidate with vibrator. Native soil may be used where allowed by Geotechnical (Soils) Report. Where native soil is used, trenching for gravity drain pipe shall be done using a laser-level and trencher.
2. One Foot Above Pipe to Grade: Material shall be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.

D. Compaction: Compact to density of 95% within building and under walkways, driveways, traffic areas, paved areas, etc. and to 90% elsewhere. Demonstrate proper compaction by testing at top, bottom and one-half of the trench depth. Perform these tests at three locations per 100' of trench.

1.16 PROTECTIVE COATING FOR UNDERGROUND PIPING:

A. All metal pipe below grade shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, X-Tru-Coat, Scotchkote. All fittings and areas of damaged coating shall be covered with two layer double wrap of 10 mil polyvinyl tape to total thickness of 40 mils. Johns-Manville. Protective coating shall be extended 6" above surrounding grade.

1.17 ACCESS DOORS:

A. Provide access doors as required where equipment, piping, valves, ductwork, etc. are not otherwise accessible. Access doors shall match the wall or ceiling finish and fire rating as indicated on the Architectural drawings. 16-gage steel frame and 14-gage steel door with paintable finish, except in ceramic tile, where door shall be 16-gage stainless steel with satin finish. Continuous hinge. Key and cylinder lock (except quick-opening type for Emergency Gas Shutoff Valve). Deliver doors to the General Contractor for installation. Milcor. Unless otherwise noted, the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12" x 12"
1 valve up to 3"	16" x 16"

1.18 HOUSEKEEPING PAD:

A. Housekeeping pads shall be minimum 6" high concrete, 3000 PSI strength, unless shown otherwise on drawings. Pad shall extend 6" beyond the largest dimensions of the equipment, unless otherwise noted. The top edge of the pad shall have a 3/4" chamfer. The pad shall have #4 reinforcing bars at 12" on center, each way, located at the mid-depth of the pad. If not poured at the same time as the floor slab with pad rebar tied to floor rebar, the pad shall be anchored as follows: Drill 1" diameter, 4" deep hole in floor. Fill hole with "Por-Rok", then insert 8" long, #4 rebar into hole. Provide a minimum of 4 of these anchors per pad, but no more than 4 feet apart in either direction. Anchor points shall be 12" from the edge of the pad.

1.19 CONCRETE ANCHORS:

A. Steel bolt with expansion anchor requiring a drilled hole - powder driven anchors, adhesive anchors and concrete screws are not acceptable. Re-use of screw anchor holes shall not be permitted. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 12 diameters center to center and 6 diameters center to edge of concrete. Post-installed anchors in concrete used for component anchorage shall be pre-qualified for seismic application in accordance with ACI 355.2 and ICC-ES AC193. Post-installed anchors in masonry used for component anchorage shall be pre-qualified for seismic applications in accordance with ICC-ES AC01. Maximum allowable loads for tension and shear shall be as determined by Calculation in compliance with ACI 318-19, Chapter 17, and the anchor’s ICC or IAPMO evaluation report. Hilti, Powers, Red Head.

1.20 EQUIPMENT ANCHORING:

A. All equipment shall be securely anchored in accordance with ASCE 07-16, Chapter 13, as amended by CBC Section 1617A.1. All equipment mounted on concrete shall be secured with a concrete anchor as shown on drawings at each mounting point.

1.21 SEISMIC SUPPORT AND RESTRAINT DESIGN SERVICE:

A. All mechanical systems (equipment, ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with ASCE 07-16, Chapter 13, as amended by CBC Section 1617A.1. Brace spacing shall be reduced by 50% for cast iron, plastic, no-hub, or other non-ductile piping. A copy of this manual shall be kept on site at all times during construction.

B. Contractor shall obtain the services of a Seismic Design service to provide engineered seismic supports and restraints for the project **(for Design Team review, not a DSA Deferred Approval)**. Mason Industries, or pre-approved equal. **Note: Use of the "12 inch rule" does not exempt Contractor from this requirement.**

1. All seismic designs, including designs using HCAI pre-approvals, shall be submitted as project specific engineered designs sealed and signed by a licensed California structural engineer. All seismic designs shall include project / application specific seismic design demand calculations. Said seismic design demand calculations shall account for seismic forces in all applicable direction including axial, lateral, vertical tension, vertical compression, etc. Designs shall account for prying, eccentricity, uneven loading, weak axis bending, etc.
2. Seismic restraint layouts for piping, ductwork and electrical raceways shall be furnished on shop drawings or added to the contractor's shop drawings and shall include:
    a. The number, size and location of seismic braces.
    b. Maximum support loads and seismic loads at the seismic brace locations.
    c. Reference to specific details or pages from the HCAI pre-approved system (OPM).
    d. **If use of the "12 inch rule" is intended by Contractor, design service shall verify locations where it is intended to be used is feasible and specifically identify these locations on the shop drawings, along with appropriate hanger details.**
3. Installations not addressed by the OPM approval must be designed, detailed and submitted along with the shop drawings.
4 Submit seismic restraint layout drawings and special details for approval of the project structural engineer per the requirements listed in the HCAI pre-approval (OPM).
5. Seismic restraint layout drawings shall bear the stamp and signature of the registered professional structural engineer licensed in the state of California who designed the layout of the braces.

1.22 ASBESTOS CONTAINING MATERIALS AND ASBESTOS REMOVAL:

A. No materials or material coatings containing asbestos shall be allowed on this project.

B. All asbestos removal shall be by Owner. Asbestos is to be removed before the work is started. If the Contractor discovers asbestos which has not been removed, the Contractor shall immediately cease work in that area and promptly notify the Owner.

1.23 SYSTEM IDENTIFICATION:

A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by pre-printed markers or stenciled marking, and include arrows to show direction of flow. Pre-printed markers shall be the type that wrap completely around the pipe, requiring no other means of fastening such as tape, adhesive, etc. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floors, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portions of lines. Marking of short branches and repetitive branches for equipment connections is not required.

B. Below Grade Piping: Bury a continuous, pre-printed, bright-colored, metallic ribbon marker capable of being located with a metal detector with each underground pipe. Locate directly over buried pipe, 6" to 8" below finished grade.

C. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-4) and identifies the area or space served by the equipment. Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the exterior of the unit.

1.24 CLEANING:

A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work. This includes but is not limited to building surfaces, piping, equipment and ductwork, inside and out. Surfaces shall be free of dirt, grease, labels, tags, tape, rust, and all foreign material.

B. At the end of each work day, the Contractor shall cover all open ends of piping and ductwork with protective plastic.

1.25 ACCEPTANCE TESTING:

A. All acceptance testing as required by California Code of Regulations, Title 24, and as noted on the Certificate of Compliance form, (where applicable), shall be performed and documented by an Acceptance Test Technician (ATT). These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP). The Contractor shall submit a copy of the documentation to the Engineer for review (hardcopy or electronic), prior to submitting to Administrative Authority.

1.26 OPERATION AND MAINTENANCE INSTRUCTIONS:

A. Printed: Three copies of Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts list for all faucets, trim, valves, etc. shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-3). All Wiring Diagrams shall agree with reviewed Shop Drawings and indicate the exact field installation. All

instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Pumps, Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included. Electronic O & M's shall comply with the Electronic submittal requirements in this Section.

B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instructions that apply to the control system. The Engineer's office shall be notified 48 hours prior to this meeting.

1.27 RECORD DRAWINGS:

A. The Contractor shall obtain one set of blue line prints for the project, upon which a record of all construction changes shall be made. As the work progresses, the Contractor shall maintain a record of all deviations in the work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. building, curbs, walks. In addition, the water, gas, sewer, underfloor duct, etc. within the building shall be recorded by offset distances from building walls. As part of the Contractor's overhead expense, request a full set of reproducible drawings to transfer the changes, notations, etc. from the marked-up prints to the reproducible drawings. The record drawings (marked-up prints and reproducibles) shall be submitted to the Engineer for review.

PART 2: - PRODUCTS (not used)

PART 3: - EXECUTION (not used)

END OF SECTION

SECTION 23 00 01 - HEATING, VENTILATING AND AIR CONDITIONING

PART 1: - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 0000, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
1. Air distribution system.
2. All equipment as shown or noted on the drawings or as specified. Furnish motor starters except where motor control centers are used. Coordinate with Division 26.
3. System energy balance.
4. Direct digital control and energy management system (DDC/EMS).
5. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, ductwork, braces, supports, housekeeping pads, temperature controls and related items no longer required.

B. Work Specified Elsewhere:
1. Line voltage power wiring, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Section, unless otherwise noted.
2. Connection of condensate drains to equipment.
3. Concrete and reinforcing steel unless specifically called for in the drawings or specifications.
4. Painting unless specifically called for in the drawings or specifications.
5. Carpentry.

PART 2: - PRODUCTS

2.1 DUCTWORK MATERIALS:

A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50. Shall comply with 2022 CMC.

B. Metal Ductwork: Metal ductwork shall be galvanized sheet steel, lock forming quality, ASTM A-653, with gage and construction to match SMACNA Standard for pressure required (26 gage minimum).

C. Flexible Ductwork: Insulated flexible ductwork. One pound per cubic foot glass fiber insulation, 1-1/2" thick (R-6), 2” thick (R-8) where ductwork is outside the building thermal insulation envelope. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-ºF at a mean temperature of 75ºF. Seamless metalized reinforced polyester vapor barrier jacket.

Continuous internal liner bonded to galvanized steel wire helix. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. Duct shall comply with NFPA 90A. JP Lamborn.

D. Duct Sealants: All Joints Exposed to Weather: Sealant shall be water based, Foster 32-19/32-17, Childers CP-146/148, United Duct Sealer WB or G.E. “SilPruf” SCS2000 silicone sealant. Joints Not Exposed to Weather: Fiber reinforced. White in color. Foster 32-17, Childers CP-148, Design Polymerics DP1030, Hardcast Versa-Grip 181, Hardcast CCWI-181.

2.2 AIR TERMINALS AND DUCT FITTINGS:

A. Grilles: (Grilles, Registers, Diffusers and Louvers)

1. Information on Drawings: Refer to Grille Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description. Titus. Equivalent models of Anemostat or Krueger are acceptable. Refer to the floor plans for neck size, CFM, air diffusion pattern and fire damper, if required.
2. Performance: Submit complete performance data (throw, pressure drop, noise level, etc.) for all grilles proposed, other than those scheduled. Testing shall be in accordance with ANSI/ASHRAE 70-1991. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be reselected by the Contractor for the proper diffusion, spread, pressure drop, throw and noise level.
3. Frame and Accessories: All supply, return, and exhaust grilles shall not have an opposed blade volume control damper unless otherwise noted. All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces designated by the architectural drawings. Key or screwdriver operated, no slide bars.
4. Finish: All ceiling and wall grilles and all louvers shall have a paintable white finish unless otherwise noted. Interior components (everything behind the face plate) shall be flat black. Floor grilles shall have an anodized aluminum finish unless otherwise noted.

B. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).

C. Extractor: Curved blade turns in adjustable position rigid frame. Tuttle and Bailey Deflectrol.

D. Turning Vanes: Double wall, hollow metal, air foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne HEP.

2.3 DUCTWORK INSULATION MATERIALS:

A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.

B. Fiberglass Blanket: **Installed** thermal resistance at a mean temperature of 75ºF shall meet or exceed indicated value. 3/4 lb/ft3 or 1 lb/ft3, **R-6** where ductwork is within the building thermal insulation envelope. 3/4 lb/ft3 **R-8** where ductwork is outside the building thermal insulation envelope and/or above the roof. Faced with glass reinforced foil laminated to Kraft paper. Certainteed, Knauf, Johns-Manville, Owens-Corning.

C. Acoustic Lining: Glass fiber duct liner. **Installed** thermal resistance at a mean temperature of 75ºF shall meet or exceed indicated value. One side coated with anti-microbial coating to prevent mold growth and fiber erosion up to 6000 ft/min. Average noise reduction coefficient of 0.80. 1.5 lb/ft^3 density. 1" thick (**R-4.2**) where ductwork is within the building thermal insulation envelope. 2" thick (**R-8**) where ductwork is outside the building thermal insulation envelope and/or above the roof. Certainteed, Knauf, Johns-Manville, Owens-Corning.

D. Bonding Adhesive: Design Polymerics DP2501, Foster 85-60.

2.4 EQUIPMENT:

A. General Requirements:
1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
3. Ratings:
   a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be CSA (US) certified, except that boilers shall be CSA (US) certified or UL listed.
   b. Electrical: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.
4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided.
5. Electrical:
   a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in

all ungrounded conductors. Magnetic starters shall be manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.

b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.

c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors 1 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Motors in a fan air stream shall be TEFC or TEAO. Vertical motors outdoors shall be ODP or TEFC and shall have rain caps.

d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.

e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.

f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.

6. Fan Selection - Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.

7. Filters:

a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and Title 24, C.C.R. Furnish and install one complete change of all filters after air balance is completed and prior to acceptance.

b. Filter Media: 2" media. MERV-13. Clean filter resistance 0.41" water at 500 fpm. Throw-away frame. Class 2. Camfil AP-Thirteen.

8. Screens: All duct or louver openings to the outside shall be covered with 1/2", 16-gage, galvanized wire mesh screen.

9. Mixing Dampers: Opposed blade, 16-gage. Six-inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One-half inch diameter pin shaft. 16-gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.

10. Sound Ratings: Shall be in accordance with ASHRAE 36 - 72. Sound ratings shall not exceed scheduled values.
11. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%, selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.

B. Packaged Hybrid Heat Pump/Gas Heat:
1. General: Self-contained hybrid heat pump/gas heat unit designed for outdoor installation. Factory assembled and tested. Refer to Paragraph 2.4A for general requirements. Provide all starters and relays required for operation. 24-volt control circuit from integral transformer. Weatherproof cabinet, galvanized steel with enamel finish. Indoor air section fully insulated. Outside air inlet. Drain pan. Multivane centrifugal supply fan. ARI certified. Trane.
2. Refrigeration: Sealed hermetic compressor with internal vibration isolating mount. Crankcase heater, high/low pressure switch, recycling timer. Suction line accumulator. Air-cooled condenser with propeller fan. Non-ferrous finned coil. Low ambient control to 35 degrees. 5-year extended warranty on compressor(s).
3. Gas Heat: Natural gas fired. Low NOx. Aluminized or ceramic coated welded steel heat exchanger. Electric ignition. Automatic gas valve. Fan and limit controls.
4. Controls: Compressor and fan motors shall have both thermal and current sensitive overload devices. Automatic defrost control (only if required) every 90 minutes for a period of not more than 10 minutes.

C. Exhaust Fan:
1. General: All exhaust and supply shall be tested according to AMCA Standard 210 in an AMCA registered laboratory. Fans exposed to weather shall have ventilated weatherproof housing over motor and drive assembly. Refer to Paragraph 2.4A for general requirements. All direct drive fans shall be provided with unit mounted speed controllers, unless otherwise noted. All motors 1 horsepower and larger shall be the premium efficiency type.
2. Ceiling Fan (Direct): Direct driven, centrifugal exhaust fan. Fan housing shall be minimum 20 gauge galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted on vibration isolators. Unit shall be supplied with integral wiring box and disconnect receptacle. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. Outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings. Provide an adjustable prepunched mounting bracket to accommodate different ceiling thickness. Provide a powder painted white aluminum egg-crate grille. Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Motor shall be open drip proof type with permanently lubricated sealed bearings, built-in thermal overload protection and disconnect plug. Greenheck.

PART 3: - EXECUTION

3.1 DUCTWORK INSTALLATION:

A. General:
1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA Standards. Ductwork shall be built to a pressure classification equal to or greater than the maximum operating pressure at that point in the ductwork. A copy of these standards shall be maintained at the job site at all times. Duct work and accessories shall be installed in a manner to prevent vibration and rattling.
2. Access: Provide duct access doors as required to adjust equipment and dampers. Provide wall or ceiling access panels, or remote actuators as required where equipment and dampers are not otherwise accessible. Remote regulator shall be as detailed on drawings.
3. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.

B. Low Velocity-Low Pressure (up to 2,000 ft/min and up to 2.0 in water):
1. Sheet Metal Ductwork:
a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
b. Tees: Tees in supply ductwork shall be straight tap-in with extractor or 45 degree take-off as shown on drawings. Grilles or branches in supply ductwork shall be a minimum of 8 duct diameters downstream of tees.
c. Duct Joints and Seams: All joints and seams which are not exposed to weather shall be sealed airtight with duct sealant. All joints and seams exposed to weather shall be sealed air and water tight with silicone sealant. (See Part 2 of this Specification). All joints on metal ductwork not exposed to weather but exposed to view shall be sealed air tight with grey duct sealant.
d. Dampers: Install volume control damper and damper regulator in all branch ducts.
2. Flexible Glass Fiber Ductwork: The use of flexible duct is limited to the last 5 feet of each branch duct (i.e. one 5 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct). No joints are permitted in this 5' length. Hangers shall be 4" wide metal straps spaced to prevent sagging, 42" spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, Duro Dyne Dyn-O-Tie. Minimum turn radius of duct centerline not less than 1.5 times the duct diameter. Install without excess length. Ducts shall not be compressed.

3.2 AIR TERMINALS AND DUCT FITTINGS INSTALLATION:

A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA Standards. Terminals and fittings shall be installed in a manner to prevent vibration and rattling. Metal surfaces exposed to view behind grilles and registers shall be painted flat black.

3.3 DUCTWORK INSULATION INSTALLATION:

A. General: Insulate all sheet metal supply, return and outside air intake ductwork except as noted below. Insulation shall be continuous through walls and floors except at fire dampers.

B. Where Insulation Is Not Required: Do not insulate factory-insulated ducts or casings, acoustic lined ducts, fibrous glass ducts, underground ductwork, supply or return ductwork exposed to view in the space that it serves, or exhaust ductwork.

C. Concealed Ductwork: Wrap concealed ductwork including outside air intakes with fiberglass blanket lapped 2" minimum. Secure with staples 4" on centers maximum on straight runs and 3" maximum at elbows and fittings. Insulation on bottom of ducts wider than 36" shall also be secured with mechanical fasteners at 24" on center.

D. Acoustic Lining: Unless otherwise indicated, all supply and return ductwork in equipment rooms, all ductwork exposed to weather and other ducts as indicated on drawings, shall have acoustic lining. Do not acoustic line outside air intakes or evaporative cooling ductwork. Where acoustic lining is installed, increase each sheet metal dimension to accommodate lining and maintain clear inside duct dimensions shown on drawings. Apply lining with bonding adhesive in accordance with manufacturer's recommendations and also secure with mechanical fasteners in accordance with SMACNA Standards. Seal exposed edges of lining with bonding adhesive.

3.4 EQUIPMENT INSTALLATION:

A. General: It shall be the responsibility of the equipment installer to ensure that no work done under other specification sections shall in any way block or otherwise hinder the equipment. All equipment shall be securely anchored in place. All equipment shall be installed level.

B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.5 TESTS AND ADJUSTMENTS:

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested.

3.6 SYSTEM ENERGY BALANCE:

A. Scope: Provide the services of an independent test and balance agency to test, adjust and balance, retest and record performance of the system to obtain design quantities as specified. The agency must prove that they have no affiliation with any equipment manufacturer, design engineer, installing contractor, or any other party which might lead to a conflict of interest, in order to provide an unbiased, third-party system balance and report.

B. Qualifications: Prior to commencing work, the agency shall be reviewed by the Engineer and shall be certified by the Associated Air Balance Council, National Environmental Balancing Bureau or Testing, Adjusting and Balancing Bureau. The agency shall provide documentation of having successfully completed at least five projects of similar size and scope.

C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC, NEBB or TABB standards.

D. Submittals: Include in shop drawings copies of forms to be used for testing and balancing showing all data which is to be recorded. Three copies of completed balance report shall be submitted to and reviewed by the Mechanical Engineer prior to the final mechanical construction review.

E. Procedure - General: Procedure shall be in accordance with Associated Air Balance Council's "National Standards for Field Measurements and Instrumentation - Total System Balance", Volume Two, No. 12173, or equivalent NEBB or TABB standards. System shall be in full, continuous operation during test. Balanced quantities shall be plus 10%, minus 0% of design quantities. All nameplate data, manufacturer, model and serial numbers shall be recorded for each item tested.

F. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Engineer in making any tests he may require during this period of time.

G. Verify that the controls contractor has commissioned and documented their work before the TAB work begins.

H. Air Balance Procedure (For Each Air Handling System):
1. All air filters shall be clean when air balance is performed.
2. Provide a sketch of the equipment showing exactly where all pressure readings were taken.
3. Adjust blower RPM to design requirements.
4. Record motor full load amperes.
5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
6. Record system static pressures, inlet and discharge.
7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
8. Adjust system for design CFM recirculated air.
9. Adjust system for design CFM outside air.
10. Record entering air temperatures. (DB heating, DB and WB cooling.)
11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
12. Adjust all main supply and return air ducts to design CFM.
13. Adjust all zones to design CFM, supply and return.
14. Adjust all diffusers, grilles and registers to plus 10%, minus 0% of design requirements.

15. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where applicable). Record applicable data from items 1 through 11 above.
16. Each grille, diffuser and register shall be identified as to location.
17. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are set for 5 degrees upward deflection unless otherwise noted. Make a notation of any that are not set properly.
18. Size, type and manufacturer of diffusers, grilles, registers and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
19. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
20. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
21. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
22. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts and dampers or the addition of dampers required for correct balance as recommended by air balance agency, at no additional cost to Owner.
23. Set, test and adjust packaged heating/cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

3.7 DIRECT DIGITAL CONTROL AND ENERGY MANAGEMENT SYSTEM:

A. Scope: The direct digital control system includes control panels, control devices, line and low voltage control and interlock wiring, conduit and related equipment as required for proper operation of all controlled systems. Control and interlock wiring includes wiring to controllers, switches, timers, relays, etc. Power wiring and disconnect switches are included in the Electrical Specifications except that power wiring required for control devices such as thermostats, etc., is included in the control system.
   1. Provide access to hardware and software or onsite technical support required to assist the TAB effort. The hardware and software or the onsite technical support shall be provided at no cost to the TAB Firm.

B. Type of system: The control system shall be direct digital. **Trane, without substitution, to match existing.**

C. Contractor Qualifications: All controls shall be furnished and installed by a Contractor who is licensed, certified or contracted by the controls manufacturer for design, installation, start-up and service of their product. The Contractor must have factory supplied training and support. The Contractor must have sufficient personnel to respond to a trouble call at the site within two hours. The Contractor's local manager shall have a minimum of five years’ experience in the design, installation, start-up and service of similar systems. The Contractor shall submit a list of at least five projects which are similar in size, scope and contract value to this project. This list shall include the Owner's contact person, phone number and controls contract value.

D. Submittals: Submittals shall include the following:
   1. Contractor qualifications. Manufacturer licenses, contracts or certifications for the installer shall be submitted on manufacturer's letterhead.
   2. Manufacturer's data for all devices.
   3. Manufacturer's data for all software.
   4. Diagrams showing control schematics. Diagrams shall include all sensors, terminal strips, panels and control devices. Locations of all devices shall be indicated.
   5. Sequence of operation.

E. System Components:
   1. Room Sensors: Reconnect to existing.
   2. Wall Switches: Plates for all wall switches and timers shall match those specified in Division 16.
   3. Labels: All labels, signs, etc. shall be engraved, laminated plastic, white on black background, 1/8" high lettering, minimum.

F. System Shall Function as Follows:
   1. Heating/Cooling Units: Reuse existing unitary controllers and reconnect to existing controls.
   2. Exhaust Fans: See Schedule for control.

G. Installation: All electrical work shall be in accordance with the California Electrical Code and the Electrical Specification Sections. All electric/electronic systems shall be hardwired in conduit. Wiring shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed wiring shall run parallel to room surfaces; location shall be approved by the Architect. No structural member shall be weakened by cutting, notching, boring or otherwise. Provide a 120 volt circuit for each device requiring external power. Dedicated circuits shall be provided where required. Any devices or wiring exposed to the weather shall be protected in weatherproof enclosures such as NEMA 3R and weatherproof conduit. Set, test and adjust the system for proper operation.

H. Programming: The Contractor shall be responsible for programming the system and shall coordinate the scheduling (on/off times) with the Owner.

END OF SECTION

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

All work under Divisions 26, 27, and 28 is subject to the General, Supplementary, Special Conditions and other Division 1 Specification Sections preceding this section. The Contractor will be responsible for and governed by all requirements. Drawings indicate the general arrangement of the electrical layout and work included. The Contractor will follow these drawings to lay out and check the drawings of other trades to verify locations and spaces in which work will be installed.

1.02 SUMMARY OF WORK

A. This portion of the work includes furnishing of all labor and materials necessary for a complete wiring system to outlets and all equipment shown on the Drawings or covered by this section of the Specifications. In general, the work includes the following:

1. Complete Fire Alarm system replacements to voice evacuation.

2. Power service and distribution system as shown, complete with switchboards, panelboards, feeders and motor control centers.

3. Complete system of branch circuit wiring and equipment including all wiring devices and plates on all outlets. Connections for all new and replaced HVAC units.

4. A new lighting fixture system complete with lighting controls, as shown on Plans, including factory commissioning and acceptance testing.

5. AV, Telephone, and Data systems, including conductors, cable, and equipment, for complete working systems. Each system shall be terminated, tested, calibrated, and programmed by a factory authorized installer. The same installer shall terminate and test any peripheral equipment required for the operation of the system.

6. Raceways, wiring, fused disconnect switches, etc., for equipment covered by other sections of these Specifications.

7. All hangers, anchors, sleeves, chases and supports for fixtures, electrical equipment and materials including earthquake bracing.

8. All excavating, backfill, concrete pads and bases as required for electrical work.

9. All disconnection and removal of existing electrical facilities not to be reused or noted to be demolished.

10. Include payment of all required insurances, electrical permits, fees and taxes unless specifically shown "BY OTHERS".

B. The electrical drawings are diagrammatic and do not necessarily show all raceway, wiring, number or types of fittings, offsets, bends or exact locations of items required by the electrical systems. Items not shown or indicated which are clearly necessary for proper operation, payment or installation of systems shown shall be provided at no-increase in contract price.

C. The exact routing of systems and location of devices and equipment shall be governed by coordination with other trades, structural and architectural conditions. The Architect or Electrical Engineer reserves the right, at no increase in contract price, to make reasonable changes in location of electrical equipment or wiring systems; so as to coordinate with other systems, group them into orderly relationships, or to increase their utility. Contractor shall verify requirements in this regard prior to roughing in.

D. Install electrical work in cooperation with other trades and make proper provisions to avoid interferences and coordinate with structural and architectural features, in a manner approved by the Architect or Electrical Engineer. All changes caused by neglect to make such provisions shall be at Contractor's expense. Provide offsets and special fittings, as required to facilitate installation of the work.

E. When a particular product or type of product is specified with a manufacturer's designation, the latest published specifications, installation, and construction information of the manufacturer shall constitute the minimum acceptable standard. Any substitutions shall be made in accordance with the SUBSTITUTIONS sections of the Specifications.

1.04 RULES AND REGULATIONS

A. All work and materials shall be in full accordance with the latest rules and regulations of the following:

1. California Electrical Code (CEC), 2022 Edition

2. California Energy Commission, Title 24, 2022 Standards

3. California Fire Code, 2022 Editions

4. National Fire Alarm and Signaling Code NFPA

5. California Building, Mechanical and Plumbing Codes, 2022 Editions

6. California Code of Regulations

a. Title 8, Safety Orders

b. Title 19, Fire and Panic Safety Standard

c. Title 24, Part 1, Administrative Regulations

7. Occupational Health and Safety Act (OSHA)

8. California State Fire Marshal Rules

B. Where two or more codes conflict, the most restrictive shall apply.

C. Nothing in these Plans and Specifications is to be construed to permit work not conforming to these codes.

D. Before the Final Certificate of Payment will be issued, the Contractor shall deliver to the Owner all Certificates, Permits, Record Drawings and Instructions/Parts Manuals.

1.05 TESTS AND STANDARDS

A. The tests, standards, or recommended procedures of the following agencies shall relate to all parts of these Specifications and shall be considered a minimum:

1. American National Standards Institute (ANSI).

2. Underwriters Laboratories, Inc. (UL).

3. National Electric Manufacturers Association (NEMA).

4. Electrical Testing Laboratories (ETL).

5. National Fire Protection Association (NFPA).

6. Insulated Power Cable Engineers Association (IPCEA).

7. Institute of Electrical and Electronic Engineers (IEEE).

8. Illumination Engineering Society (IES).

1.06 EXAMINATION OF DOCUMENTS AND SITE

A. Before submitting a proposal, each bidder shall carefully examine the electrical, mechanical, architectural, and structural drawings and specifications. He shall also visit the site and fully inform himself as to all existing conditions and limitations applying to the work. If, after such examination and study, it appears that any change from the

drawings and specifications should be allowed, the bidder shall so state in writing together with any change in cost involved.

B. By the act of submitting a proposal, each bidder shall be deemed to have made such examinations of the drawings and specifications and premises, and it will be assumed that he is therefore familiar with the entire scope of the project and has based his proposal upon the work described in the Drawings and Specifications and upon all existing conditions and limitations applying to his work.

1.07 IMPLEMENTATION

A. Workmanship: The work shall be performed by competent workmen, skilled in the particular phase of the work entailed. The work shall be first class throughout, neat, accurate and in full accordance with the intent of these Specifications and the satisfaction of the Architect or Electrical Engineer.

B. Safety: All standard safety procedures as set forth by OSHA, CCR, and California Division of Industrial Safety shall be strictly adhered to.

C. Coordination: The Contractor shall familiarize himself with the work of other crafts so as to be able to provide electrical service of correct size and voltage and other requirements to any equipment to be installed.

D. Scheduling: The installations shall be coordinated as to location and time, and interference causing delays and non-acceptable construction shall be avoided. Order equipment in a timely manner to prevent any delays in the construction schedule and he shall bear any penalty by vendors to meet schedules.

E. Collaboration: Prior to commencing construction the Electrical Contractor shall arrange a conference with the general and sub-contractors as well as equipment suppliers and shall verify types, sizes, locations, requirements, controls, and diagrams of all equipment furnished by them.

F. Materials: All equipment and materials shall be new, UL (Underwriters Laboratories) approved, and of the best quality. When specific trade names are used in connection with materials they are mentioned as standards but, this implies no right upon the part of the Contractor to substitute other materials or methods without prior approval.

G. Excavation: The Contractor shall provide all excavating and backfill required for the proper installation of electrical work, whether or not shown on the Drawings or as specified. This shall be done per the EXCAVATION portion of the Specifications.

H. Cutting and Repairing: The Electrical Contractor shall do all cutting necessary for the proper installation of his work, repair any damage done by himself or his workmen, and coordinate his work with that of others. Do no cutting or patching without approval of the Architect or Electrical Engineer. Round holes through concrete slabs or walls shall

be core drilled with a diamond drill, rectangular openings shall be cut with a diamond saw. In no case shall any concrete beam or column be cut.

I. Sleeves and Openings: Electrical Contractor shall be responsible for all sleeves and openings through walls and floors required by electrical work. All openings around conduits in sleeves shall be sealed with a material of equal fire rating as the surface penetrated. Openings not utilized shall be temporarily sealed in a similar manner. All required sleeves shall be furnished to and coordinated with the General Contractor.

J. Cleaning and Painting: All exposed work shall be thoroughly cleaned upon completion of work. All panelboards and equipment not located in electrical or mechanical rooms or closets shall be field painted per painting specifications, color as selected by Architect. Panelboard enclosures, fixtures, and equipment, where finish has been marred in shipment or installation, shall be completely refinished. Minor finish damage shall be rectified as indicated by the Architect or Electrical Engineer. Contractor shall remove all waste and rubbish resulting from his work from the site.

K. Earthquake Restraint: All electrical equipment shall have a means to prohibit excessive motion during an earthquake. Equipment that vibrates during normal operation shall have isolators with mechanical stops. All transformers are considered to vibrate during operation. All electrical equipment and connections shall be designed to resist lateral seismic forces equal to value shown on Drawings of equipment weight with allowable working code capacity increased by 1/3 or 1.5 times the same value for the weight yield capacity. Connections shall be the same except the 1/3 increase will not be allowed.

L. Mechanical Equipment and Other Special Equipment:

1. Prior to commencing construction, the Contractor shall arrange a conference with the Mechanical and Plumbing Contractors, and the Equipment Suppliers, to verify type, sizes, locations, requirements, controls and diagrams of all equipment furnished by them. In writing, he shall inform the Electrical Engineer that all phases of coordination of this equipment have been covered. If any unusual conditions or problems arise, they are to be enumerated them at this time.

2. The Contractor shall furnish all electrical line voltage wiring, fused disconnects and conduits, unless otherwise shown.

3. The Contractor shall be responsible for electrical hook-up and connection to all electrical equipment furnished by all Contractors of this Project. This includes all mechanical equipment, plumbing equipment, and special equipment furnished by other contractors.

M. Portable and Detachable Parts: The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of the installation such as

fuses, keys, locks, adapters, locking clips, and inserts until final completion of his work. These parts shall be itemized and delivered to the Owner at Project Closeout.

1.08 QUALITY CONTROL

A. Supervision: The Contractor shall personally, or through a competent representative, constantly supervise the work from beginning to completion and final acceptance. He shall cooperate fully with the inspection authorities in the provision of information and access to the work. He shall, to the best of his ability, maintain the same job foreman throughout the life of the project unless a replacement is requested or authorized by the Architect or Electrical Engineer.

B. Inspection and Tests: The Contractor shall furnish all labor and test equipment required to fully test and adjust the equipment installed under this specification and demonstrate its proper operation.

1. Arrange for all tests and inspections and provide minimum 48 hours' notice to the Architect or Electrical Engineer.

2. A test must demonstrate that each piece of equipment, outlet, fixture, device, and appurtenance is in sound operating condition and in proper cooperative relation to associated equipment.

3. All tests shall be conducted under supervision of the Architect or Electrical Engineer, and any defects of any nature which are apparent as a result of such test shall be made correct to the satisfaction of the Architect or Electrical Engineer before final acceptance is made.

4. No equipment shall be tested, or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions.

C. Warranty: The Contractor agrees to replace or repair, to the satisfaction of the Owner, any part of the installation which may fail due to defective material and/or workmanship or failure to follow Drawings and Specifications, for a period of one year after final acceptance. Any damage to other work resulting from such failure or the correction thereof shall be remedied at the Contractor's expense. The Contractor shall, further, secure from the manufacturers of special equipment, such as signal systems, their respective guarantees and deliver same to Owner. Guarantees between Contractor and his suppliers shall not affect warranties between Contractor and Owner.

1.09 SUBMITTAL

A. Make submittal for all material to be used on the project, whether as specified or substitutions, within thirty five (35) days after award of Contract by the Owner, in accordance with Section 01-300, SUBMITTAL, and the following:

1. All submittal shall be neat and bound in a suitable folder or binder.

2. Identify each item by manufacturer, brand, trade, name, number, size, rating, and whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.

3. Identify each submittal item by reference to specifications section paragraph in which item is specified, or Drawings and Detail Number.

4. All submittal shall be submitted in coherent groups, e.g. all light fixtures at one time. No partial, or incomplete submittal will be accepted.

5. Organize submittal in same sequence as they appear in specification sections, articles or paragraphs.

B. Product Data: Submit eight copies, in groups, as follows:

1. Boxes, pullboxes, conduits, and raceway types required, including fittings

2. Electric Wire, cable and connectors

3. Circuit breakers, Panelboards, Transformers, and disconnects.

4. Lighting fixtures

5. Wiring Devices

6. Fire Alarm, PA / Clock, Data/Comm Special System Equipment

C. Shop Drawings: Shop drawings shall show physical arrangement, wiring diagram, construction details, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, weight, power sources, circuit numbers, and shall be compatible with the Contract Drawings and Specifications.

D. Show wiring as actually installed, connected, and identified for this specific project. Include identification of cables and cable conductors.

E. Shop and instruction drawings shall cover the equipment or device to be installed and not merely the general class of such equipment or device.

1.10 SUBSTITUTIONS

A. The Specifications or Drawings are in no way to be construed as being proprietary toward one product. Those products, or types of products, listed are intended to set the standard

for quality, design, and installation procedure. However, no right is implied upon the part of the Contractor to substitute other materials, products or systems without the written approval of the Architect or Engineer.

B. All requests for substitution shall be made in accordance with the SUBSTITUTIONS section of the Specifications.

C. All requests for substitutions shall be in writing, received at least 14 days prior to bid date, and shall indicate all information required thereon including differences from the specified item. The request for substitution shall be accompanied by cuts, product literature, performance data, specifications, drawings, samples or other means as may be required for proper evaluation by the Architect or Electrical Engineer.

D. All proposed substitutions shall be standard product of the firm under current manufacture and be a catalog item at time of bid.

E. Acceptance of substitution shall not relieve the Contractor from responsibility for complying with requirements of the Contract Documents. The Contractor shall be responsible for changes in other parts of the work occasioned by his substitutions and shall bear their expense.

F. Representative samples may be required for determination of equality. It is understood that the samples may be subjected to destructive testing and will not be returned.

1.12 GUARANTEE

This Contractor agrees to replace or repair to the satisfaction of the Owner, any part of the installation that may fail due to defective material and/or workmanship, or failure to follow Plans and Specifications for one year after final acceptance. He shall further obtain from the manufacturers of special equipment (i.e., control systems) their respective guarantees and service manuals and deliver to Owner.

1.13 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

The Engineer's decision will be final on interpretation of the Drawings and Specifications. Whenever "AS MAY BE DIRECTED", "SUITABLE", "APPROVED EQUAL", “AS REQUIRED”, or other words of similar intent and meaning are used which infer that judgment is to be exercised, it is understood that it is the judgment of the Engineer being referred to.

1.14 GROUNDING:

A. The conduit system supports, cabinets, switchboards, etc., and neutral conductors must be permanently and effectively grounded by means of approved ground clamp, in accordance with the electrical safety orders of the Department of Industrial Relations of the State of California.

B. This Contractor shall exercise every precaution to obtain good contacts at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded around the boxes with a #6 B&S gauge, rubber covered, double braided wire with ground clamps.

C. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.

D. A separate grounding conductor shall be run in all receptacle circuits.

PART 2 – PRODUCTS

2.01 RACEWAYS:

A. Except where specifically shown otherwise in this section, the Contractor shall furnish and install a complete steel, rigid thread galvanized rigid steel conduit system for all wiring, including control and signal wiring.

B. Galvanized Rigid Steel (GRS)

1. All conduits shall be rigid threaded hot dipped galvanized type.

2. Joints are to be sealed with conductive pipe compound T&B "Kopr-Shield" before making up.

3. Conduits installed below grade shall be wrapped with 3M "Scotchrap #51" corrosion protection tape using half-laps for double thickness. Conduit surfaces are to be clean and dry before wrapping.

C. Steel Electrical Metal Tubing (EMT)

1. EMT may be used within the hollow dry spaces of buildings, minimum 96” above the finished floor. Trade sizes 4" and smaller may be used within hollow dry spaces of the building.

2. EMT conduit shall be Allied True Color E-Z Pull, or equal, with a colored finish specific to the following systems:

a. Natural: 0-150V-to-Ground Power & Lighting

b. Yellow: > 150V-to-Ground Power and Lighting

c. Blue: Copper Data & Communications

d. Orange: Fiber Optic Cable

e. Red: Fire Alarm

3. All raceway fittings, locknuts, couplings, elbows, etc., shall be hot dipped galvanized steel finish with plastic throats or bushings. Cast-type fittings shall not be used.

D. Non-Metallic Polyvinylchloride Conduit (PVC):

1. Rigid nonmetallic PVC, UL labeled and fittings approved for the purpose may be used for electrical systems 0-600V-to-ground under the following conditions:

a. All conduits in earth under buildings or protected by permanent paving may be Schedule 40 PVC. Any conduits running through planters or unprotected are to be encased in 3" of concrete. All raceways above grade are to be steel.

b. Risers shal be blue color, factory PVC coated T&B "Ocal" steel ells. Bends less than 45 degrees and offsets may be field bent.

2. All nonmetallic runs shall have a bond wire for the interconnecting of all conducting portions per Article 250 of the California Electric Code.

3. PVC shall never be used above grade.

E. Liquid-Tight Flexible Metal Conduit (LFMC):

LMFC may be used in lengths not greater than 36" at motors and other machinery to prevent the transmission of vibration. LFMC shall be supported at both ends.

F. Surface raceways and fastenings are to be two-piece steel type, complete with all fittings of the same manufacturer and factory finished in gray. Surface plug-in strips shall be two circuit type with NEMA grounded receptacles every 12" with wiring space provided.

G. The minimum size conduit for lighting, power, and signal wiring shall be 3/4" trade size.

H. Conduits installed underground shall have a minimum coverage of 24" below a finished grade. Provide a magnetically traceable warning tape at 12" below grade. Electrical systems rated greater than 150V to Ground shall have a 3" concrete envelope.

2.02 CONDUCTORS:

A. All conductors shall arrive to the project in their original, unbroken packages plainly marked as follows:

1. Packaging shall indicated underwriter’s labels, size, conductor material, insulation of wire, names of the manufacturer and the trade name of the wire.

2. Wire or cable shall have factory markings every 24". Markings shall show its maximum allowable voltage, wire size and insulation.

B. All conductors shall be a minimum of 98% conductivity, soft drawn copper, minimum #12 AWG unless shown otherwise. Conductors sized #8 and larger shall be stranded. Conductors sized #10 and smaller shall be solid type, except wiring within fixtures. Insulation shall be 600 Volt, type "THWN."

C. Control circuits for mechanical equipment in locations subject to abnormal temperatures on or under furnaces and heaters shall be Type "RHH" 600 Volt insulation conductors.

D. All branch circuits, fixture wiring joints, splices and taps for conductors #10 and smaller to be made with "Scotchlok" connectors.

E. Two-bolt type solderless connectors or T&B "ColorKeyed" compression lugs shall be used on #8 and larger conductors.

2.03 WIRING DEVICES:

A. Furnish and install wiring devices and plates as shown on the Drawings and described in these Specifications. Where more than one wiring device is mounted in the same location, such devices shall be mounted in a multi-gang plate. Wiring devices shall be specification grade or better.

B. Wiring devices shall be of the color selected by the Architect.

C. Convenience outlets to consist of a specification grade duplex receptacle mounted in an outlet box in the wall, flush with the finished plaster or surface. Outlet rating to be 20 AMPS, 125 Volts, 3-wire, back and side wired.

D. All outlets shown outdoors or in damp locations shall be GFI type, installed in a weatherproof box and cover equipped with rubber gaskets. Surface outlets shall be weatherproof type FS boxes with hubs as required and equipped with rubber gaskets and weatherproof covers.

E. Local switches shall be quiet toggle type, totally enclosed, 20 AMPS, 277 Volts AC rated.

F. Device plates shall be provided for all devices with the number of gangs and openings necessary. They shall be satin brushed 302 stainless steel, unless specified otherwise.

G. Switch plates for all outlets not in sight of a switch shall be labeled with filled etched letters showing locations of the outlet controlled.

H. Pilot lights shall be the type with an indicating neon lamp in a handle.

2.04 OUTLET BOXES:

A. Outlet boxes for concealed work shall be one piece pressed steel knock-out type with zinc or cadmium coating. Boxes shall not be smaller than 4" square nominal size unless otherwise indicated. Provide extension rings, extenders, plaster rings and covers necessary for flush finish. No back-to-back or through-boxes shall be used.

B. Bar hangers shall be used to support outlet boxes in stud or furred partitions and ceilings. Attachment screws, devices, etc., shall be of the proper type to secure boxes to metal studs. Use expansion shields in concrete and masonry. Where used for lighting fixtures, outlet boxes shall be equipped with fixture studs.

C. Provide approved knock-out seals on all unused open knock-out holes.

D. Outlet boxes installed in concrete slabs shall be two-piece concrete boxes, not less than 4" nominal size with a minimum depth of 2 ½".

E. Surface boxes of cast metal threaded hub-type with suitable gasketed covers shall be used for exposed conduit runs less than 5' above finished floor, or where waterproof boxes are required.

2.05 PULL BOXES AND WIREWAYS:

A. Pull and junction boxes shall be installed as shown to ease the pulling of wire and to comply with CEC requirements.

B. Wireways shall be constructed in accordance with UL 870 for wireways, auxiliary gutters and associated fittings. Every component, including lengths, connectors, and fittings, shall be UL listed.

2.06 TERMINAL CABINETS AND CLOSETS:

A. Cabinets and fronts shall be in accordance with NEMA Standard Publication No. PB 1-1971 and UL Standard No. 67. Fronts shall include doors and have flush brushed stainless steel, cylinder tumbler-type locks with catches and spring loaded door pulls. The flush lock shall not protrude beyond the front of the door. All locks shall be keyed like the panelboard locks. Fronts are to be adjustable indicating trim clamps that shall be completely concealed when the doors are closed.

B. Doors shall be mounted by completely concealed steel hinges. Fronts shall not be removable with the door in the locked position. A frame and card with a clear plastic covering shall be provided on the inside of the door. Fronts shall be of code gauge full finish steel with rust inhibiting primer and baked enamel finish.

C. Install finish grade 3/4" plywood board, primed and painted light gray on both sides and the edges, at the interior rear surface of telephone and signal cabinets.

D. Provide solderless box lugs, terminal blocks with a white marking strip for conductors sized #16 and larger. Punch-down terminals shall be used for No. 18 and smaller and shall be used for all public address, intercom and other electrical terminations.

2.07 FLOOR BOXES AND UNDERFLOOR DUCTS:

A. Provide fully adjustable Type 1, Class 1 watertight floor boxes complete with pedestal and wiring device where shown on Plans.

B. Furnish and install a complete duct system as shown on Plans. The system shall consist of separate ducts: No. 2 duct for electrical power service; No. 4 duct for telephone; No. 4 duct for data. Ducts shall have 2" inserts on 24" centers. Furnish and install the necessary junction boxes, couplings, supports, adapters, etc., to form a complete assembly made watertight with sealing compound.

C. Ducts and junction boxes shall be manufactured from 14 gauge steel. They shall be UL listed and finished with a corrosion resistant coating. The junction boxes must be furnished with the proper depth to accommodate floor finish. Junction box cover plates to have an upward adjustment of 3/8". Cover plates must be leveled flush with the finished cement floor before and after the concrete has hardened.

D. Furnish and install, where shown, telephone, data and power service fittings. All service fittings shall be furnished with receptacles, adapters and no spin locking nipples or supports.

E. Fittings for floor boxes or ducts shall be brushed aluminum finish.

F. Provide carpet flanges of proper size in carpeted or tiled areas.

2.08 PANELBOARDS:

A. Furnish panelboards shown on Plans and described herein. All cans shall be a minimum of 20" wide and 5.75" deep unless otherwise shown. They shall be totally flat or equal with flush keyed locks.

B. Panelboards shall be listed by Underwriters Laboratories, Inc.

C. Fronts are to be sheet steel painted standard gray over a rust inhibitor. They shall be equipped with a door, flush hinges, flushed proper cylinder, tumbler-lock metal circuit card holder, and quarter turn adjustable trim clamps.

D. Panels shall consist of a reinforced galvanized sheet steel frame with copper bus bars and circuit breakers properly supported to prevent vibration breakage in handling. All

terminals shall be solderless type, suitable for specified conductors of sizes shown. Bus bars shall be sequenced phased. Provide separate blocks for neutrals and grounds.

E. Branch circuit breakers shall be "bolt-on" and fully interchangeable without disturbing adjacent units. All two and three-pole breakers shall have common trips. Minimum IC shall be 10,000 AIC.

F. Breakers used for switching lights shall be rated for switching duty and shall have padlock handle lock-off devices.

G. Breakers serving mechanical equipment shall be rated HACR.

H. All spaces shall have hardware.

2.09 MOTOR CONTROL CENTERS

A. Furnish and install line voltage starters, RVSSs, or VFDs as required or shown on the Drawings. Furnish line connections only for integrally wired equipment furnished and installed by other sections. All starters, whether separate or mounted in Motor Control Centers, shall be furnished complete with stop/start pushbuttons, hand-off-auto switches, and two push-to-test pilot lights unless otherwise noted. They shall be in the proper NEMA enclosure.

2.10 MAGNETIC MOTOR STARTERS

A. Magnetic motor starters, unless otherwise shown, shall be size 1 minimum, AC line voltage, HP rated across-the-line voltage in proper NEMA enclosure. They shall be equipped with three properly sized overload elements. Magnetic starters shall be listed by Underwriters Laboratories, Inc.

B. Verify the exact motor current and voltage characteristics with the Contractor supplying the motor before installation of a starter.

C. All magnetic starters to have a minimum of two auxiliary convertible contacts. Additional auxiliary contacts shall be provided as required to comply with the wiring diagrams of the electrical and mechanical requirements.

D. Manual motor starters shall be flush or surface mounting type as required with number of poles and properly sized overload heaters as required for the motor being controlled. Where pilot light is called for with a starter, the pilot light shall be mounted in a separate adjacent box.

E. Individual control relays shall have convertible contacts rated a minimum of 15 amps, 600 volts, regardless of usage voltage. Coil voltage and number and type of contacts shall be verified and supplied to suit the specific usage as shown in the wiring diagram and/or schedules on the electrical and mechanical drawings. Furnish in a proper NEMA

enclosure.

2.11 DISCONNECTING DEVICES:

A. Disconnecting devices shall be provided as shown or as required by CEC. Switches shall be motor rated and in proper NEMA enclosure.

B. Motors 1/3 HP and less: Switches shall be the toggle-type quick make and break rated 2 HP, 250 Volts AC with the number of poles required provided with flush mounting wall plates or in suitable surface mounting NEMA enclosures.

C. Motors ½ HP and larger: Disconnecting switches shall be Type HD fused multi-pole 600 Volts in proper NEMA enclosures with proper size FRS fuses. Provide three spare fuses of each type to the owner.

D. Circuit breakers utilized as disconnecting devices must comply with the requirements stated in other articles of this section and CEC.

2.12 CONCRETE PADS, PULL HOLES AND MANHOLES:

A. At the Contractor's option, he shall provide cast-in-place or precast structures.

B. Where applicable, concrete structures shall be submitted to the serving utility for their approval before installation.

C. Cast-in-place concrete shall be per the concrete section of the Specifications.

D. Provide 8" concrete pads under all exterior switchboards, transformers, etc.

2.13 NOISE CONTROL:

A. Outlet boxes at opposite sides of partitions shall not be placed back-to-back or through-boxes employed except where specifically permitted on the Drawings by note to reduce transmission of noise between occupied spaces.

B. Contactors, starters, and similar noise-producing devices shall not be placed on walls that are common to occupied spaces unless specifically called for on the Drawings. Where such devices must be mounted on walls common to occupied spaces, they shall be shock mounted or isolated in such a manner to effectively prevent the transmission of their inherent noise to the occupied space.

C. Contactors, starters, drivers, and like equipment found noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced at Engineer's request.

PART 3 – EXECUTION

3.01 INSTALLATION - GENERAL:

A. The layout and installation of electrical work shall be coordinated with the overall construction schedule to prevent delay in completion of the project. Checking these Drawings before organizing the electrical work schedule or installing material and equipment shall be obligatory.

B. Dimensions and information regarding accurate locations of equipment and structural limitations and finish shall be verified with other sections.

C. The Drawings do not show all the offsets, bends, special fittings, junction boxes, or pull boxes necessary to meet job conditions and the CEC. They shall be provided as required.

D. Electrical equipment, outlets, junction and pull boxes shall be installed in accessible locations avoiding obstructions, preserving headroom and keeping openings and passageways clear.

E. Minor adjustments in the locations of equipment shall be made where necessary, providing such adjustments do not adversely affect function of the equipment. Major adjustments for the location of equipment shall be approved by the Architect and detailed on the Record Drawings.

F. Structural Fittings: Furnish and install the necessary sleeved, inserts, hangers, anchor bolts and related structural items. Install at the proper time.

G. Openings have been shown on the Architectural and Structural Drawings. Should any additional openings or holes be required for the work of this section, the cost shall be the obligation of this section.

H. Contractors shall inspect and account for existing conditions affecting his work.

I. Sleeves for electrical conduits passing through walls or slabs shall be placed under the work of this section before concrete is poured. Where conduits pass through suspended floor slabs, sleeves shall be standard weight galvanized steel pipe extending 2" above the finished floor level.

J. Sleeves at other locations shall be either light weight galvanized steel pipe or galvanized sheet steel. Clearance between conduits and sleeves shall not be less than ½".

K. Sleeves through outside walls and below grade shall be caulked tight with oakum and the ends sealed with an approved semi-plastic coal tar base compound or shall be of the stuffing box type. Other sleeves shall be packed with glass wood ends sealed with Duxseal and covered with chrome plated escutcheon plates.

L. Conduits entering through floor slabs at grade level will not require sleeves and shall be placed with tops of couplings flush at floor level.

M. Sleeves for electrical conduit passing outside walls below grade shall be the through-wall and floor seal type.

3.02 INSTALLATION OF CONDUITS AND RACEWAYS:

A. Raceways for electrical or signal systems run in earth that are not protected by permanent paving shall be encased in concrete with the encasement extending under the building. Branch circuit and signal system conduits installed underground between outlets, terminals, and panels within the building shall be liquid and gas tight.

B. Conduits shall be concealed unless otherwise shown. All conduit runs exposed to view, except those in attic spaces, shall be installed parallel or at right angles to structural members, walls, or lines of the building.

C. All conduit runs shall be mechanically and electrically continuous from outlet to outlet. Conduit size or type shall not be changed between outlets.

D. No conduits shall be run on the roof unless specifically shown on the roof. They shall be full weight rigid steel on PVC sleepers. Install roof jacks at penetrations.

E. Conduit stubs installed for future extensions shall be rigid steel for at least 5' of a conduit run. The conduit ends shall be terminated with couplings and pipe plugs. The closed end shall be double wrapped with Scotchrap #50 for the last 12". The concrete envelope shall leave 3" of the wrapped conduit exposed for future connection.

F. Conduit for equipment connected permanently to the floor shall be installed with a 6" rigid conduit nipple to a flush coupling to ensure a watertight connection at the floor.

G. All conduits shall be sloping to drain and shall be sealed with JM Clipper "Duxseal" on the high end.

H. All conduit bends shall be carefully made so that the conduit is not flattened, kinked or otherwise compromised. The inner radius of any conduit bend shall be not less than eight times the inside diameter. Where conduits are run exposed in groups, bends of all conduits shall have a common center. Use of standard elbows will not be allowed at these locations.

I. Each run of a conduit shall be finished before concrete, plaster, etc., is installed to ensure against obstruction or omissions. After installation, the ends of all conduits shall be plugged with metal pennies. All conduit systems shall be completed and thoroughly cleaned and dried inside before installation of any conductors.

J. Conduits shall enter at right angles and be connected to all outlet boxes, pull boxes, and

cabinets with locknuts and plastic throated grounding bushings, providing a continuous grounding system in accordance with CEC Article 250.

K. Use Erikson couplings where a union is necessary. Running threads will not be permitted.

L. Pull 1/8" stranded nylon pull ropes with 18" coiled at each end in all empty conduits with identification tags indicating source and destination.

M. Furnish and install seal-offs in all conduit runs through areas of different temperature.

N. All concealed conduits shall be installed in as direct a line as possible between outlets. No more than four (4) quarter bends or their equivalent will be allowed between outlets. Feeder conduits shall follow arrangement shown on Plans unless a change is authorized. In general, branch circuit conduits shall follow the arrangement as shown insofar as structural conditions permit.

O. All exposed runs shall parallel buildings, walls, or partitions, and shall be supported on Kindorf Hangers to meet Title 24 Part 6, California Code of Regulations.

P. All telephone, data, and other signal conduits shall be installed with long radius sweeps. No factory ells will be permitted.

Q. Chrome escutcheon plates are to be used on all conduit penetrating walls, floors or ceilings.

R. Expansion joints shall be provided at building structural expansions or as required due to length of run or difference in temperatures.

S. All fittings exposed or in damp areas shall have sealing glands and proper gaskets. Fittings in hazardous areas shall be of the type approved for the particular hazard.

T. Provide two 1" conduit stubs out of all panels and terminal cabinets to above a hung ceiling or as otherwise shown.

U. Roof Penetrations:

1. Where raceways penetrate roofing or any similar structural area, provide iron roof jacks sized to fit tightly to a raceway for a weather-tight seal with the flange extending a minimum of 9" under roofing on all sides. Completely seal the opening between the inside diameters of the roof flashing and the outside diameters of the penetrating raceways. Coordinate all work with the roofing section of Specifications.

V. Fire Penetration Seals:

1. Seal all penetrations for work of this section through fire rated floors, walls and

ceilings to prevent the spread of smoke, fire, toxic gas or water through the penetration before, during or after a fire. The fire rating of the penetration seal shall be at least that of which it is installed so that the original fire rating is maintained as required by CEC Article 300.21.

2. Where applicable, provide OZ Type CFSF/1 and CAFSF/1 fire seal fittings for conduit and cable penetrations through concrete and masonry walls, floors, slabs and similar structures. Apply an approved firestopping system, including wall wrap, partitions, caps and other accessories as required. All manufacturers' instructions and recommendations for installation of sealing fittings and barrier sealing systems.

3.03 CONDUCTORS AND CONNECTIONS:

A. General Requirements:

1. All branch circuit and fixture wiring joints, splices and taps for conductors #10 and smaller shall be made with UL approved connectors listed for 600 Volts. Connector bodies shall consist of a cone shape rotating expandable coil spring inserts insulated with phenolic or plastic shell.

3. Do not install wire in conduits until all work of any nature that may cause injury (including pouring of concrete) is completed. Use care in pulling in wires to prevent damage to wire or insulation. Do not use blocks, tackle or other mechanical means to pull #8 AWG or smaller conductors.

4. Splices are not permitted except in outlet boxes, pull boxes, junction boxes, panelboard gutters and auxiliary gutters. No splices shall be made in underground boxes.

5. Use only wire pulling compounds listed by the UL as a lubricant for pulling conductors through raceways. The use of cleaning agents that have deleterious effect on conductor coverings are not permitted.

6. Unless otherwise shown on Plans or specified elsewhere, leave at least 12" of free conductors at each connected outlet (outlets connected to equipment or device) and 9" of free conductors and coil neatly in outlet box for future connection.

B. Terminations:

1. Circuit and signal terminations to single screw or push on terminals shall be done with insulated “Sta-Kons” or approved equal terminals.

2. Bolt type solderless connectors shall be torqued with a torque wrench according to the manufacturer's recommendations and then retightened after 24-48 hours

before taping. Owners' inspector shall be informed of this procedure during the waiting period and shall witness the act of retightening.

C. Feeders and Branch Circuits:

1. Connectors and lugs for terminating stranded conductors sized #8 and larger shall be machine crimp compression type.

2. All splices shall be taped with Scotch "Super 88" vinyl electrical tape, and "Scotch Fill" tape putty where necessary for a smooth joint. For other than normal temperatures or conditions, Scotch #27 or #2520 shall be used.

3. No splices shall be made below grade in a manhole or pull holes without the Engineer's written approval. When approved, these shall be encapsulated with 3M potting kits per 3M Specifications.

4. Wires in panels, cabinets, pullboxes and wiring gutters shall be squared, labeled, and neatly grouped with Ty-raps and fanned out to the terminals.

5. Support all conductors in hand holes/manholes and label with plastic rope. Tag all conductors with plastic waterproof tags.

3.04 WIRING DEVICES:

A. Wiring devices shall be securely fastened to the outlet box. Where the outlet box covers are back from the finished walls, the device shall be built-out with washers so that it is rigidly held in place to the box. Provide metal extenders in flammable construction per CEC.

B. All device screw slots shall be left in a vertical orientation.

3.05 OUTLET BOXES:

A. Boxes shall be securely fastened in position to the ceiling or walls with screws or bolts. Nails are not acceptable. The Contractor shall set and align all equipment, level, bolt down, or otherwise secure in place. No back-to-back or through-boxes shall be used.

B. Boxes shall be accurately located and set square and true with exposed edges of a box or plaster ring flush with finished surface of walls or ceiling. All unused boxes shall be equipped with blank covers that shall match existing covers.

C. Boxes shall have no unused openings.

D. Boxes shall be cleaned of all direct plaster, etc., before conductors are installed. Rust spots shall be scraped to bare metal and painted with Rust-Oleum "Cold Galvanizing

Compound".

E. Suspended fixture outlets shall be equipped with 3/8" fixture mounting stud bolted to wood backing or metal studs to safely support fixture weight.

F. Make any change in outlet location necessary to all job conditions and rearrange fixtures and equipment as directed.

G. Study all Plans as to relation of spaces surrounding outlets so that this work may be installed at the proper time with others. Fixtures and equipment shall be symmetrically located. Conflicts and discrepancies shall be referred to the Architect immediately and prior to box installation.

3.06 JUNCTION AND PULL BOXES AND WIREWAYS:

A. Boxes shall be installed square and plumb. An engraved nameplate shall be installed indicating the function of each box on the exterior in unfinished areas and on the interior in finished areas. Permanent markers are not acceptable.

B. Pullboxes and wireways shall be concealed or installed flush in finished areas. They shall be surface mounted in machine rooms or unfinished areas.

3.07 TERMINAL CABINETS AND CLOSETS:

A. Install, level and identify per schedule.

3.08 FLOOR BOXES AND PEDESTALS:

A. Floor boxes are to be installed level and plumb. Fill with paper prior to pouring concrete. Re-level after concrete has set, then raise to accommodate the floor finish.

B. The installation of pedestals shall be coordinated with cabinet work.

3.09 PANELBOARDS:

A. Location:

1. Unless otherwise indicated on the Drawings, install all panels with the top of the trip 6'- 0" above the finished floor.

2. Space permitting, surface mount the panels where they are not visible to the public.

3. Panels to have a protective cover over any electrical panel with overhead water piping. Cover to be 18" by width of a panel.

B. Directory:

1. Mount a typewritten directory behind glass or plastic in a metal holder welded to the inside of each panel door. Directory shall indicated circuit numbers and complete description of all loads on each circuit.

3.10 DISCONNECT DEVICES:

A. Disconnect devices shall be identify the location of the controlled device.

3.11 GROUNDING:

A. The conduit system supports, cabinets, switchboards, etc., and neutral conductors must be permanently and effectively grounded by means of approved ground clamp, in accordance with the electrical safety orders of the Department of Industrial Relations of the State of California.

B. This Contractor shall exercise every precaution to obtain good contacts at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded around the boxes with a #6B&S gauge, rubber covered, double braided wire with ground clamps.

C. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.

D. A separate grounding conductor shall be run in all receptacle circuits.

3.12 IDENTIFICATION

A. Conductors:

1. All power and low voltage systems conductors and cabling shall be identified in accordance with the following schedule:

a. 120/208 Volts, 3-phase, 4-wire Wye: Red-Black-Blue, Neutral White

b. 120/240 Volts, 3-phase, 4-wire Delta: Black-Blue for single-phase, Orange for 3-phase stinger, Neutral White

c. 480/277 Volts, 3-phase, 4-wire Wye: Yellow-Brown-Purple-, Neutral Grey

d. Bond or grounding conductor (GWG): Green

e. Special system conductors shall be color coded and labeled

2. Brady Labels shall be used to identify terminals and destination of feeders, branch circuits, signal and control circuits, etc., at all terminations and junction boxes and shall be coordinated with the nameplates in all boxes and equipment.

3. All terminals in the switchboards, panels, relays, switches, devices, starter terminals, etc., shall have Brady Labels for identification to identify both ends of all wiring. Wires #8 and smaller to be terminated on terminal strips squared-type 9080K with white marking strip and screw lugs for wire size.

B. Nameplates: The Contractor shall furnish and install 1" x 3" x 3/32" thick laminated black Nylon nameplates with a white core, unless specifically shown as red with a white core, engraved to produce white letters on black background for all items of electrical equipment including 2-pole and 3-pole circuit breakers, panelboards, starters, relays, time switches and disconnect switches. The plates shall screwed in place with stainless steel screws. Adhesive backed plates are not acceptable.

C. Panels: Panels having single-pole circuit breakers shall be provided with typed schedules mounted in welded metal holders behind plastic.

D. Devices: All devices shall have their branch circuit identified on the back side of device plate with a permanent type black marker, i.e., CKT A-21.

3.13 CONCRETE PADS, PULL HOLES AND MANHOLES:

A. Contractor shall provide a minimum of 3'-6" of sand or base material suitable to receive the manhole. The base material shall be compacted, graded level, and at proper elevation to receive the manhole in relation to the conduit grade or ground cover requirements as designated in the Plans.

3.14 SUPPORTS AND ANCHORS:

A. Provide inserts, anchors, supports, rods, brackets and miscellaneous items to adequately support and secure the electrical systems and equipment.

B. Secure hangers, brackets, conduit straps, supports and electrical equipment to surfaces by means of toggle bolts on hollow masonry. Utilize expansion shields and machine screws or standard preset inserts on concrete or solid masonry. Utilize machine screws or bolts on metal surfaces. Utilize wood screws on wood construction. Wood, fiber plugs, or concrete nails are not acceptable.

C. Power or velocity driven inserts may not be used for any anchorage unless specifically approved by the Engineer and where the use does not affect the finished appearance of work. Under no circumstance shall these be used in pre-stressed slabs, beams, purlins, or precast members in

tension.

D. Seismic Requirements: Provide vertical and lateral supporting equipment to resist the application of seismic forces per California Code of Regulations, Title 24 Chapter 23.

END OF SECTION

SECTION 26 20 00 – LOW VOLTAGE ELECTRICAL TRANSMISSION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 - Specification sections, apply to work of this section.

B. Section 26 05 00 - Basic Materials and Methods section and other Division 26 sections apply to work specified in this section.

1.02 SCOPE:

A. Work included: Furnishing and installation of a complete electrical service, distribution, and grounding system. Conditions of this section apply to all other 26 40 00 series sections included.

B. Related Work: Refer to other sections, particularly those listed below, so as to properly coordinate work specified herein with that specified elsewhere to produce a finished, workmanlike, fully functioning installation.

C. All other Electrical Sections: Division 26

1.03 QUALITY ASSURANCE:

See Section 26 05 00.

1.04 SUBMITTAL:

A. Product Data: Submit manufacturer's data on service entrance equipment, switchboards, motor control centers and/or individual starters, transformers, panelboards, disconnect switches and grounding components.

B. Trip Curves: When requested, submit trip timing curves for all circuit interrupting devices.

C. Nameplate Schedule: Submit nameplate schedule for approval.

1.05 COMPONENT COORDINATION:

In order to maintain close control and coordinate the various components of the distribution systems, the number of manufacturers shall be kept to a minimum. Equipment manufacturer shall be General Electric or Square D. It shall be the manufacturer's responsibility though the Electrical Contractor to coordinate all components of the system in order to ensure systems that

will provide maximum protection of equipment and reliable safe operation.

1.06 NAMEPLATES:

Laminated phenolic plastic, color coded black for 120/208 volt equipment, with white letters. Provide for identification of each transformer, panelboard and motor control center, secure to face with two (2) chrome plated screws each. A schedule of nameplates shall be included with the shop drawings for approval.

1.07 FEEDER CONNECTIONS:

Provide cast, saddle type bolted lugs or hydraulically set compression lugs for all bus connections. Manufacturer shall be Thomas and Betts, Burndy, O.Z. or approved equal. Lugs in which the set of screw embeds directly into feeder conductor shall not be used.

1.08 MISCELLANEOUS:

A. Equipment Bases: Provide appropriately sized concrete housekeeping bases for all floor-mounted equipment.

B. Hoisting Lifting Lugs: Provide on all heavy equipment as required to ensure safe hoisting.

C. Space for Future Protective Device: Provide as indicated on drawings; shall be completely equipped for the future addition of a circuit breaker or fused switch, including all connections.

PART 2 – PRODUCTS

2.01 PANELBOARDS:

A. Panelboards shall be Bolt-down Circuit Breaker type, with voltage, phase, and breakers as specified in panelboard schedules. Panelboards shall be installed flush or surface or specified, at locations as indicated on plans. Panelboards shall be installed in code gauge rust proof steel cabinets with flush door having flush locks all keyed alike and with trim cut square and true.

1. Panelboards: General Electric A-Series and Spectra Series; Square D, type NQ, NQOB, and NF; or approved equal.

B. All panelboards and breakers shall meet the requirements of the indicated available symmetrical short circuit current or have a minimum bus bracing to meet figure shown.

C. All interiors shall be completely factory assembled. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without

machining, drilling or tapping.

D. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings.

E. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug or each outgoing feeder requiring a neutral connection. A ground bus will be included in all panels.

F. Boxes shall be at least 20 inches wide made from galvanized steel. Provided minimum gutter space in accordance with California Electric Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.

G. Door hinges shall be concealed. All locks shall be flush, stainless steel, cylinder tumbler type locks with catches and spring loaded door pulls, keyed alike and directory frame and card having a transparent cover shall be furnished with each door.

H. All exterior and interior steel surfaces of the trim shall be properly cleaned, primed with a rust inhibiting phosphatized coating and finish with a gray ANSI 61 paint. Trims for flush panels shall overlap the box for at least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim clamps shall not be accessible when the panel door is closed and locked.

I. All main bus bars shall be cooper or tin plated aluminum sized in accordance with UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above an ambient of 40 degrees C maximum.

J. Circuit breakers shall be quick-make, quick-break, thermal-magnetic, trip indicating, and have common trip on all multipole breakers. (Trip indication shall be clearly shown by the breaker handle taking position between ON and OFF when the breaker is tripped). Branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the trip rating of the breaker to prevent repeated arcing shorts resulting from frayed appliance cords. Single pole 15 and 20 ampere circuit breakers shall be UL listed as "Switching Breakers" and carry the SWD marking. UL Class A (5 milliampere sensitivity) ground fault circuit protection shall be provided on 120V ac branch circuits as specified on the plans or panel board schedule. This protection shall be an integral part of the branch circuit breaker which also provided overload and short circuit protection for branch circuit wiring. Tripping of a branch circuit breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard

branch circuit space than a conventional slide pole circuit breaker. Connections to the bus shall be bolt on.

2.04 DISCONNECTS:

A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.

B. Disconnect switches shall be suitable for area where they are installed, i.e., weatherproof, and shall be rated heavy duty. Use only 600 volt class with proper number of poles. Switches shall be fused unless indicated on plans. Fuses shall be of type specified on plans.

C. When a disconnect switch is not clearly visible from the control location, provide an operating handle which is lockable in the open position.

2.05 GROUNDING:

A. Clamps, bonds, etc. suitable and as necessary to provide continuous ground system.

B. Ground Rods: "Copperweld" 3/4" diameter 8' long.

C. All grounding conductors shall be copper, sizes not less than that required under CEC Table 250.122.

D. All grounding electrode conductors shall be copper, sizes not less than that required under CEC Table 260.66.

2.06 SWITCHBOARDS:

A. Manufacturer's: Subject to compliance with requirements, provide switchboards of one of the following:

General Electric Company
Square D Company

B. General: Except as otherwise indicated, provide switchboards of types, sizes, characteristics, and ratings indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for complete installation. Service entrance switchboards shall comply with serving utility requirements.

C. AC Dead-Front Distribution Switchboards: Provide factory assembled, dead-front, metal enclosed, self-supporting secondary power switchboards, of types, sizes and electrical ratings and characteristics indicated; consisting of panel (vertical) units, and containing circuit breakers of quantities, ratings and types indicated. Provide copper or tin plated aluminum main bus and connections to switching devices of sufficient capacity to limit rated continuous operating temperature rise to 54 degrees F, and 90 degrees F for circuit

breaker branches; with main bus and tap connections silver-surfaced and tightly bolted for maximum conductivity. Brace bus for short circuit stresses up to maximum interrupting capacity. Prime and paint switchboard with manufacturer's finish and color. Construct units for outdoor, NEMA Type 3R.

D. Enclosures: Construct dead-front switchboards, suitable for floor mounting, with front cable/wire and conduit accessibility as indicated. Provide welded steel channel framework, hinge wireway front covers to permit ready access to branch circuit breaker load slide terminals. Coat enclosures with manufacturer's standard corrosive resistant finish.

E. Bussing: Provide switchboard with sufficient cross-sectional area to fulfill U.L. Standard 891 pertaining to temperature rise.

2.06 MOTOR STARTERS:

A. Manual motor starters to be quick-make, quick break, with overload protection. General Electric cr 101 for 120/240 volt 1 hp or less.

B. Magnetic motor starters shall be across the line unless indicated with control power transformer (120 volt coil) and with overload relay protection. Combination type shall have integral fused switch or circuit breaker as indicated.

2.07 TRANSFORMERS:

A. Transformers, Dry Type: Distribution transformers shall be constructed and tested in accordance with ASA and NEMA Standards, TP-1 minimum, and shall be wound with copper conductors. Performance of transformers shall be equal to or exceed ASA and NEMA published criteria.

B. Transformers shall be self-cooled type with Class H, NEMA, Group 111 insulation and a temperature rise of 150°C under continuous full load conditions with an ambient of 400°C.

C. Transformers supplying voltage to wave altering devices (computers, electronic ballasts, etc.) shall be K3 rated minimum, or as noted otherwise on plans.

D. Transformers shall be equipped with four 2 1/2% taps (2 taps above and 2 taps below normal voltage). Windings shall be of the fire-resistant type, designed for natural convection cooling through normal air circulation.

E. Core mounting frames and enclosures shall be of welded and bolted construction with sufficient mechanical strength and rigidity to withstand shipping, erection and short circuit stresses.

F. Enclosure cover plates shall be Code gauge sheet steel, captive bolted to the enclosure framework. Enclosure shall have suitable ventilating openings with rodent-proof screens.

Enclosure shall be provided with lifting lugs and jacking plates as required.

G. Transformers shall be furnished complete with mounting channels and mounting bolts. Metal parts, except cores and core mounting frames, shall be cleaned, rust-proofed and given a heavy coating of an inert primer.

H. Transformers used indoors shall be “low noise.” They shall be provided with vibration dampers. Size and number of shock mounts shall be in accordance with manufacturer's recommendations.

I. Transformers shall be manufactured by General Electric, Square D, or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION OF SWITCHGEAR AND SWITCHBOARDS:

A. Install switchgear and switchboards as indicated, in accordance with manufacturer's written instruction, and with recognized industry practices to ensure that switchboards comply with requirements of NEMA and CEC standards, and applicable portions of NECA's "Standard of Installation".

B. Prior to energization of circuitry, check all accessible connections to manufacturer's torque specifications. Subsequent to wire and cable hook-ups, energize switchboards and demonstrate functioning in accordance with requirements.

3.02 INSTALLATION OF PANELBOARDS:

A. Provide mounting brackets, busbar drilling, and filler pieces for unused spaces.

B. Branch circuits shall be connected as shown in line diagrams and/or panelboard schedules, with wires neatly tie wrapped in panel.

C. All distribution panelboards shall have all sub feeders and main breakers marked with 1" x 3" plastic name tags secured with two self tapping screws.

D. All panelboards shall be provided with a 2" x 3-1/2" plastic name tag on the front of the panel door or on the trim, indicating panel designation and distribution panel and circuit feeding above panel, secured with two self tapping screws.

E. Branch circuit panelboards shall have a plastic covered circuit directory card on the inside of each door with all circuit destinations neatly typed.

F. Contractor shall check and tighten all factory made wire or lug connections. 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 Standard 486A.

G. Install four (4) spare 3/4" conduits from all panelboards to accessible ceiling space.

3.03 INSTALLATION OF DISCONNECTS:

Install disconnects for all equipment and motors of the size required and as recommended by manufacturer.

3.04 INSTALLATION OF GROUNDING:

A. Scope: Provide grounding system complying with the codes and ordinances specified. Grounding system shall provide continuity through the entire electrical system.

1. Panelboard ground buses.

2. PVC conduit or other raceways.

3. All motors.

4. All lighting fixtures.

5. Grounding terminals of all receptacles.

6. Miscellaneous grounds required by code.

B. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.

C. Good, electrically continuous, metal to metal contacts shall be made wherever possible at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded round the boxes with a 6 BS gauge, rubber covered, double braided wire with ground clamps.

D. A separate grounding conductor shall be run in all conduit runs from distribution, lighting, and power, etc. panelboards, motor control outlets, etc., back to their respective service or distribution panelboards.

E. Flexible Conduit Grounding: Provide a separate grounding conductor in all flexible conduit runs to include watertight flexible conduit with integral grounding straps. Install ground conductors inside conduit with ungrounded conductors. Extend from nearest panel to device being connected.

F. Receptacle Circuits: Provide a separate grounding conductor in all receptacle circuit conduit runs, back to serving panelboard.

3.05 INSTALLATION OF MOTOR STARTERS:

A. In finished areas, mount motor protection switches flush and install suitable cover plates.

B. Install heaters correlated with full load current of motors provided.

C. Set overload devices to suit motor provided.

3.06 INSTALLATION OF TRANSFORMERS

A. Transformer core frame shall be installed level on shock absorbing pads within the enclosure.

B. Mounting bolts on floor-mounted transformers shall be extended into pads only and shall not be in direct contact with building structural members.

C. Flexible jumpers shall be installed for grounding continuity from enclosure to conduits.

D. Voltage Check:

1. The Contractor shall set the taps on all transformers (which are a part of this contract) as necessary to provide satisfactory operating voltages with all present loads energized. A check shall be made in the presence of the District Inspector at a panel fed from each transformer and which is the farthest from the transformer. Voltages at the transformers ranging from 118 to 122 volts inclusive, for 120-volt systems and proportionately equivalent for higher voltage systems, are acceptable.

2. The Contractor shall provide all instruments and accessories required to perform the checks. Volt meters shall be accurate within 1% and shall have scales permitting the voltage readings to be made on the upper half of the scale.

3.07 CONNECTIONS TO NEW MANHOLES

Construct concrete-encased duct lines connecting to underground structures to have a flared section adjacent to the manhole to provide shear strength. Construct underground structures to provide for keying the concrete encasement of the duct line into the wall of the structure. Use vibrators when this portion of the encasement is poured to ensure a seal between the encasement and the wall of the structure.

3.08 CONNECTIONS TO EXISTING MANHOLES

For duct line connections to existing structures, break the structure wall out to the dimensions required and preserve steel in the structure wall. Cut steel and bend out to tie into the reinforcing of the duct line encasement. Chip out the structure wall to form a key for the duct line encasement.

END OF SECTION

SECTION 26 50 00 – LIGHTING FIXTURES

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Furnish and install lighting fixtures including lamps; connect fixtures to circuits, occupancy sensors, relays, room controllers, contactors, control panels, and gateways, where applicable.

B. Related Work:
   1. Common Work Results for Electrical: Section 26 05 00.
   2. Low Voltage Electrical Transmission: Section 26 20 00.

1.02 SUBMITTALS

A. All submittals shall be made in accordance with Division 1 Submittal Procedures.

B. List of Materials: Submit a complete list of material proposed for this Section.

C. Shop Drawings for Lighting Fixtures: Provide detailed and dimensioned working drawings showing kind, weight and thickness of materials, method of fitting and fastening parts together, location and number of sockets, size and color of lamps, and complete details of the method of fitting, suspension and securing the fixtures in place. Drawings shall contain sufficient information to enable a workman to construct and install the fixtures without further instructions.

D. Shop Drawings for Lighting Controls: Provide detailed and complete wiring diagrams and plans for lighting controls. Provide cut sheets for lighting control devices and cabling.

1.03 MOUNTING REQUIREMENTS

Comply with State of California earthquake requirements and CEC requirements for lighting fixture installations and support.

1.04 GUARANTEE

A. Guarantee lighting components against service failure for five years

PART 2 – PRODUCTS

2.01 MATERIAL AND FABRICATION

A. Each lighting fixture shall be the type indicated on the drawings and as specified herein. Fixtures of the same type shall be of identical make, design and appearance. The size of each lighting fixture shall be as specified herein for the lamp or fixture wattage indicated on the drawings.

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B. The design of all lighting fixtures, accessories and supports, as well as the method of hanging fixtures, shall comply with all requirements for earthquake resistant construction of the State of California.

2.02 LIGHT FIXTURES

A. LED Drivers: Drivers shall be electronic type specifically designed to save energy while maintaining full light output. Drivers shall have "A" sound rating, thermal protectors and guaranteed against service failure for three years. Drivers shall comply with FCC and NEMA limits governing electromagnetic and Radio Frequency Interference and meet all applicable ANSI, State and Federal standards. Drivers shall be noiseless, high power factor type and shall be ETL certified under CBM Standards and Underwriters' Laboratory listed.

B. LED Diodes shall have the following minimum characteristics:

1. Efficacy – 100 lumens per watt or greater

2. Color rendition index – 80 or greater

3. Standard deviation color matching for diodes shall fall within 1 MacAdam ellipse.

2.03 LIGHTING CONTROLS

A. Lighting controls and control systems shall meet all requirements of the State of California Title 24 energy code.

B. Lighting control systems shall be commissioned by a Title 24 Certified Commissioning Agent.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install lighting fixtures where shown on plans.

B. Fixture voltage shall be as shown on drawings and in the fixture schedule.

C. Install recessed and surface-mounted fixtures with mounts or plaster frames compatible with the ceiling and wall systems employed and secure fixtures mechanically to frames.

D. Align rows of surface-mounted fluorescent fixtures to form straight lines at uniform elevations. Provide factory joiner bands for contiguous fixtures, and end caps on ends.

E. Recessed fixtures shall fit snugly against ceilings to prevent light leakage.

F. Support suspended recessed fixtures in a T-bar ceiling as follows: All fixtures shall be attached to the ceiling grid to resist a horizontal force equal to the weight of the fixtures. For heavy duty grid systems, fixtures weighing less than 56 pounds must also have two 12

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gauge slack safety wires from diagonal corners to the structure above; fixtures weighing more than 56 pounds shall be independently supported by not less than 4 taut No. 12 gauge wires capable of supporting four times the load. For intermediate duty grid systems, fixtures shall be independently supported by not less than four taut No. 12 gauge wires capable of supporting four times the load. All fixture hanger wire ends shall be twisted three tight turns within a 2" distance. Fixture installation shall be coordinated with the acoustical ceiling installation.

G. Light Pole Installation:

1. Set in concrete footings; set poles plumb and straight. Grout and drypack after leveling poles. Concrete, grout and drypack are specified under Section 03 30 00, Cast-in-Place Concrete.

2. Electrically ground the fixtures and poles.

3. Solder and tape splices as required for the floodlight fixture installations.

4. Each standard shall be tapered galvanized steel, with handhole, anchor bolts, fixture mounting brackets and all accessories.

5. Poles shall be designed to withstand a minimum wind velocity of 80 mph sustained, 104 mph gusts.

H. Provide factory commissioning for lighting controls and devices. The completed installation shall comply in every way with the requirements of Title 24.

3.02 CLEANING

A. Clean surfaces of all dirt, cement, plaster and other debris. Use cleansers compatible with material surfaces being cleaned.
B. Clean lenses, reflectors, and the like of dust, fingerprints, and grime.

3.03 TESTING

A. Check and adjust fixtures for even illumination.

B. Replace defective fixtures and fixture components with new.

C. The lighting control system shall be acceptance tested by a Title 24 Certified Commissioning Agent. The contractor is responsible for passing the acceptance tests.

END OF SECTION

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SECTION 270000 – COMMUNICATIONS

PART 1 – GENERAL

1.1 Related Sections

A. This specification section provides general conditions for all division 27 specifications. All contractors working with in the division 27 specification shall adhere to this specification and these related specifications:

Section 270528 - Communication Infrastructure Systems
Section 271000 - Structured Cabling System
Section 271704 – PA Clock

1.2 Statement of Work

A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing Structured Cabling and Communications Systems.

B. Contractor will provide a bid including all labor, materials, tools and equipment required for the complete installation of work called for on the Construction Drawings and described in this Document. It is the responsibility of the Contractor to provide all material necessary to provide a complete and operable system. If the contractor feels that the system described is incomplete, they must address this in writing to the Owner/Owner's Representative before providing a bid.

C. All questions concerning non-specified product and services will be address to the Owner's Representative before Contactor provides a bid. Owner expects that by accepting the Contractor's bid proposal that the Contractor has provided a competent bid for a complete solution.

D. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of devices, typical installation details, and mounting details will be provided as an attachment to this document. The successful vendor shall meet or exceed all requirements for the systems described in this document.

E. Contractors DO NOT remove Owner network equipment without written approval from the Owner.

1.3 Existing cabling and systems equipment (when existing systems are in scope)

A. Demolition of cabling systems per 2019 CEC:

1. Remove all cabling defined for demolition per CEC 640.2, 640.6.C, 645.2, 645.5.F, 725.2, 725.25, 770.2, 770.25, 770.154.A, 800.2, 800.25, 800.154.A, 820.2, 820.25, 820.154, 830.2, 830.25,
2. The owner shall be given “first right of refusal” for all decommissioned equipment and removed cable.
3. The owner may wish to keep, recycle or destroy these items. If the items are refused by the owner the contractor may keep, recycle or destroy these items.
4. Owner will establish a location for all materials it wishes to keep, recycle or destroy.

B. Contractor SHALL NOT demo any existing analog telephone cables or outlets, except where complete reconstruction occurs. The existing telephone cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any telephone cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.

C. Contractor SHALL NOT demo any existing intercom cables or outlets, except where complete reconstruction occurs. The existing intercom cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any intercom cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.

D. Contractor SHALL NOT demo any existing coaxial CATV cables or outlets, except where complete reconstruction occurs. The cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.

E. Contractor SHALL NOT demo any existing CCTV cables, outlets, or cameras except where complete reconstruction occurs. The existing cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed. Coordinate with Owner for the removal of any cameras in the way of the scope of work. Owner will remove existing cameras.

F. Contractor to coordinate with the Owner for the scheduled removal of any existing network equipment, such as, but not limited to, wireless access points, access point mounting brackets, network switches, and network routers. All equipment is to removed by Owner and NOT the contractor. Owner will remove and re-install any network equipment unless specifically coordinated with Contractor.

1.4 Regulatory References

A. Contractor will comply will all Federal, State, Local Codes/Regulations and Industries Standards.

1. Federal:

- California Electric Code(CEC) 2019, Chapter 8: “Communications Systems” Article 250: “Grounding”

- FCC - Part 15, Part 68
- ADA – Americans with Disabilities Act

2. State of California:

- CCR Part 2 - California Building Code.
- CCR Part 3 - California Electrical Code
- Occupational Safety and Health Act (OSHA).
- Title 24, Building Standards, State of California.
- Title 19, California Code of Regulations.
- Title 8, Electrical Safety, State of California

3. ANSI Standards:

- ANSI C2-2001 National Electrical Safety Code.
- ANSI C80.3 Specification for Zinc-coated Electrical Metallic Tubing.
- ANSI/UL 797 Electrical Metallic Tubing.
- ANSI/ICEA S-83-596-2001 - Fiber Optic Premises Distribution Cable Technical Requirements.

4. Industry Standards:

- Telecommunications Industry Associations/Electronics Industry Association (TIA/EIA)

TIA/EIA-568.0-D	Commercial Building Telecommunications Cabling Standard
TIA/EIA-568-1.D	General Requirements
TIA/EIA-568-C.2	Balanced Twisted Pair Cabling Components Standard
TIA/EIA-568-3-D	Optical Fiber Cabling Components Standard
TIA/EIA-569-A	Commercial Building Standard for Telecom Pathways and Spaces
TIA/EIA-606	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA-607	Commercial Building Grounding/Bonding Requirements
TIA/EIA-758	Customer-Owned Outside Plant Telecommunications Cabling Standard
TIA/EIA-758-1	Addendum No. 1 to TIA/EIA-758, Customer-Owned Outside Plant Telecommunications Cabling Standard

- National Electrical Manufacturer's Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
  802.3 (Ethernet)
  802.3ab (Gigabit Ethernet over 4-pair Category 5e, 6 & 6A or higher)
  802.3Z (Gigabit Ethernet over optical fiber)
  802.11ac (Wireless LAN Specfications)
- Underwriters Laboratories Inc. (UL)
- International Organization for Standardization/International Electromagnetic Commission (ISO/IEC) ISO 11801 Generic Cabling for Customer Premises
- Building Industry Consulting Services International (BICSI) Telecommunications Distribution Methods Manual (TDMM 13th Edition or

latest).
- ASCII - American Standard Code for information Interchange
- ASTM - American Society for Testing and Materials

B. If there is a conflict between applicable documents, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.

C. This document does not replace any code, either partially or wholly. The contractor must be aware of and comply with all local codes that may impact this project.

1.5 Safety/Contractor Qualifications/Quality Assurance

A. Safety and Indemnity

1. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of persons and property during performance of work.

2. The Contractor shall ensure that all personnel working in or anywhere on the site shall be provided a hard hat, safety shoes, a face shield or safety goggles, etc. for their protection.

3. No act, service, drawing review or construction observance by the owner's representative or any other party employed by the campus is intended to include review or approval of adequacy of the Contractor's safety measures, in, on or near the construction site.

B. Contractor Qualifications

1. Each low voltage contractor/sub-contractor shall submit their qualifications to the district prior to award of contracts.

2. Contractor shall have been in business for no less than five (5) years and have installed of a minimum of 3 projects of similar size and scope.

3. A Manufacturer Certified Installer contractor, currently certified in the Owner’s standard solutions, shall complete the System installation. The contractor shall have completed standards-based product and installation training. A copy of the Contractor’s Manufacturer Certified Installer certificate shall be submitted with their submittal.

4. Sub-Contractor Qualifications
   - All Contractors shall submit a list of at least three (3) projects of similar dollar volume completed within the past 24 months for reference purposes.
   - The Contractor shall compile detailed information relating to similar work completed, including corporate references sufficient to enable the Owner to evaluate and agree to the Contractors' responsibility, experience and capacity to perform the work.
   - Each Contractor to perform telecommunications work on this project shall possess a C-10 or C-7 (formerly C-61) Limited Specialty License for

Telecommunications and must be certified for the installation, termination, splicing, and testing of copper cables, fiber optic cable, riser cable, and inside wiring. The appropriate contractor's license for underground construction and conduit installation is also required.

- An on-site Contractor superintendent must be available at all times. Contact can be by person or telephone.

5. Contractors who do not meet the minimum specified requirements will not be accepted.

C. Quality Assurance

Contractors are required to comply with the following without exception:

1. The winning Contractor will assign this project to a competent Project Manager who has demonstrated their ability to supervise a telecommunications project of the same size and scope.
   - The contractor will make this person available to the Owner/Owner's Representative before the start of this project for an interview. This person must be deemed acceptable by the Owner and/or their Representative before work can begin.
   - Project Manager will be required to be available for scheduled on site project meetings at no additional cost to the Owner.
   - Project Manager will be required to be available to meet on site with the Owner/Owner's representative with a minimum of 24 hours' notice for non-emergency issues, and a minimum of 4 hours for emergency issues at no additional cost to the Owner.

2. All material and equipment to be installed on this project shall be "new". If the Owner/Owner's Representative discovers that "used" material or equipment has been installed on this project the Contractor will be required to replace said materials and/or equipment with "new" products at no additional cost to the Owner.
   - "New" - Materials and products shall be manufactured within one (1) year prior to installation and meet or exceed the latest published specifications of the manufacturer. Also, these materials and equipment may not have been in use before installation on this project unless directed otherwise in the project documents.

3. Contractor must warranty all materials, equipment and labor for a minimum of one (1) year from the Owner's acceptance of the work.
   - Warranty will provide repair/replacement of all defective or improperly installed materials at no additional cost to the Owner (including Labor, drive time, shipping, taxes, etc.).
   - Contractor is required to keep in stock replacement parts for all items covered in this specification and provide a competent service technician to be on site to repair/replace defective items no later than 24hours after receiving trouble call.
   - Warranty will cover normal Business hours, 8am – 5pm, Monday thru Friday. All calls received on a Friday or the day before a holiday will be held until the following regular business day.

4. Contractor must submit for full manufacturer extended warranty upon completion of the project. Warranty certificate to be sent directly to Owner.

1.6 Submittal Documentation

A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule

B. The successful contractor shall provide three (3) copies of their submittal package.

C. The Submittal Package will include:

1. All documentation given will be in a Bond Cover or in a Three (3) Ring Binder.

2. A coversheet on the Contractor's Company Letterhead including:
   - Contractor's Name
   - Contractor's License Number
   - The Project Name
   - The Specification Number and Description
   - The date documentation was submitted.

3. A spreadsheet with a full material list of products and equipment included in the Contractor's bid price. Spreadsheet will provide:
   - Manufacture Name
   - Part Number
   - Description
   - Quantity to be installed for each part.

4. A legible copy of the Manufacturer's Catalog Cut sheet for each part included in the Contractor's bid.
   - The Catalog Cut sheets shall be placed in the same order as shown on the spreadsheet.

5. Copies of the Manufacturer's Certification for a minimum of the Project Forman and 50% of the installation crew.

6. Sample of Labeling Scheme. Contractor will provide a sample for each identifier to be used on this project. Labels are to be approved by Owner prior to printing.

D. LEED/CHIPS/HPSA (when applicable to project provide additional submittal information)

1. Recycled content, segregated by pre- and post-consumer percentages.

2. Rapidly renewable material content.

3. VOC content

4. Distances from site to follow material process locations.
   - Raw material harvest, collection or extraction

- Product or component fabrication
- Final material manufacture, if different than component fabrication

1.7 Equivalent Products

A. Pre-Approved Equals:

1. All pre-approved products shall be listed in the relevant specification section.

B. Contractors wishing to approve a system other than those specified in this document will be required to perform the following:
- Provide System specifications and cut sheets for all system components for the proposed new system(s).
- Provide an itemized comparison to each of the system functions as described in this specification. Include in that document how the proposed system compares to the specified system described in this document on a line by line basis, using one of the following three criteria: "exceeds"/"matches"/ "unequal".

C. All other products than those specifically address in the bid document that the Contractor is seeking approvals for must be *received* by the Owner's Representative *no later than 5 business days before the bid date*. All Approved Equals will be published in addendum form prior to the bid date.

D. Failure to received written approval for product installed that deviates from the products called for in this specification and/or on the project drawings will result in the contractor having to replace the unapproved materials and equipment with the originally specified products at no additional cost to the Owner.

1.8 All proposed system documentation must be sent to the Owner's Representative via one of the following: mail, fax or email. The Contractor will include the project name, their contact information, and the specification section number that the proposed system is comparable to.

1.9 Acceptance and Warranties

A. Project Acceptance

1. The Owner and the Contractor shall accept the project as complete based on the following criteria:
- Before executing any performance testing, the Contractor shall present a test plan to the Project Engineer for their approval.
- The Contractor has completed all testing and delivered copies of all test results to the owner's representative.
- All test results have been examined and approved by the Contractor and the Project Engineer.
- Copies of all documentation required by this section have been delivered to the Project Engineer.
- All punch list items are completed to the satisfaction of the Inspector-of-Record.
- Manufacturer Warranty Certification Certificates are provided to the Owner.

2. Following completion and/or compliance with the requirements listed above, the Contractor shall issue a Notice of Completion confirming that the project is complete. A 45-day acceptance period shall begin immediately following the issuance of the Notice of Completion.

3. Minor failures shall be responded to at the Owner's discretion or within one business day.

B. Manufacturer Warranties

1. The installed 271000 structured wiring (as applicable for given cable media) system, including both inter-building and intra-building sub-systems, shall be warranted by a manufacturer for a 15-year period or greater. Lifetime warranty is the warranty period preferred by the Owner and will be given preference where applicable.

2. The warranty certified systems will be a complete system comprised of products from a single solution manufacturer, warranted to operate as a guaranteed system for the entire channel (cords, telecommunications outlet/connectors, cables, cross-connects, patch panels, etc.). The Solution Manufacturer shall administer a follow-on program through the Vendor to provide support and service to the purchaser, and a single extended warranty point of contact. In the event that the certified system ceases to support the certified application(s), whether at the time of cutover, during normal use or when upgrading, the manufacturer and vendor shall commit to promptly implement corrective action.

3. The Contractor shall be responsible for correcting any problems and malfunctions that are warranty-related for the entire warranty period. In the event that a Contractor should not be in business at the time of an issue, the manufacturer shall be responsible for all corrections, if deemed the responsible party.

4. Copies of any extended material warranties shall be passed through to the Owner.

5. During the installation and up to the date of final acceptance, the Contractor shall protect all finished and unfinished work against damage and loss. In the event of such damage or loss, the Contractor shall replace or repair such work at no cost to the Owner or any other Trade Partnership working on the project.

END OF SECTION

SECTION 270528 – COMMUNICATIONS INFRASTRUCTURE SYSTEM

PART 1 – GENERAL

1.1 Statement of Work

A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing Underground Ducts and Raceway systems. All systems described herein shall be governed by the Division 16000 specifications, should these two documents be in conflict the more stringent shall prevail.

B. The locations of vaults and pull boxes on the drawings are approximate and reflect the best information available. The Contractor is responsible for locating all existing utilities within the areas to be excavated prior to excavation. Final location of all trenches, communications utility vaults, and pull boxes must be verified and signed off on by the Owner/Owner's Representative.

C. The contractor shall furnish and install all work necessary to make compete systems, whether or not such details are mentioned in these specifications or shown on the drawings, but which are necessary in order to complete working systems, excepting those portions that are specifically mentioned therein or plainly marked on the accompanying drawings as being installed or supplied by others.

1.2 Contractor Qualifications/Quality Assurance

A. Safety and Indemnity
1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 A. Safety & Indemnity".

B. Contractor Qualifications
1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 B. Contractor Qualification".

C. Quality Assurance
1. Contractor shall comply with all requirements as specified in Section 270000 "1.5 C. Quality Assurance".

D. Warranty
1. Contractor shall comply with all requirements as specified in Section 270000 "1.8. Acceptance & Warranties".

1.3 Submittal Documentation

A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule, and Section 270000 "1.6 Submittal Documentation".

1.4 Equivalent Products

A. All Products described and Part Numbers given in this Specification are those of Leviton, Berk-Tek, Superior Essex, and Cooper B-Line unless otherwise noted.

B. Pre-Approved Equals:
1. Utility Vault Company, Christy Concrete, BES
2. Hoffman, B-Line, Circle AW
3. CARLON, Allied Tubing, MaxCell
4. RANDL Inc , Thomas & Betts, Bridgeport, Appleton, Erico, Minerallac
5. Wiremold, Hubbell

C. Contractors wishing to approve a system other than those specified in this document shall do so in accordance with Section 270000 “1.7 Equivalent Products”.

PART 2 – PRODUCTS

2.1 Pathways & Fittings

A. Communication Underground Boxes

1. Communication Pull Boxes
   - Provide separate pre-cast concrete pull boxes, with lids labeled "communications" (for TV, telephone, data, security).
   - Type equal to “Christy N16, N30, N40, N44” steel reinforced solid concrete box, concrete lid & 12” extension box shall be used. See project drawings for locations & additional requirements.
   - Shall be constructed out of 3000 PSI steel reinforced concrete.
   - Install on 6” gravel pad and provide drain. See project details for more info.
   - Pull boxes in traffic areas and along roads shall be designed and installed for H20-44 loading.
   - Pull boxes shall be located and provided with grade rings as necessary to ensure that water is drained from conduits.
   - Pull boxes shall be installed to minimize surface drainage entry as follows:
     1. Pull boxes should not be located in paths or streets. If such location cannot be avoided, pull boxes should not be located in low spots or drainage channels.
     2. Pull boxes not located in paths or streets should be installed so that the top is approximately 2" above final grade.
   - All pull boxes shall be installed with a mow strip minimum of 6”.
   - Non-slip lids shall be provided for pull boxes in sidewalk areas. Use concrete or fiberglass-no metal lids in sidewalks.
   - Quantity: Contractor will provide pull boxes and covers in the sizes and quantities as shown on the drawings.

2. Communication Vaults
   - Provide separate pre-cast concrete vault, with lids labeled "communications" (for TV, telephone, data, intrusion alarm).
   - Vaults shall be equipped with a cable racking on the long walls suitable to support large copper cables as called for on the design documents.
   - Vaults shall include; Anchorage, Lifting Inserts and Racking Devices.

- All Vaults shall be equipped with traffic-rated lids with a locking mechanism. All lids shall have the identification marking of "Communications" permanently affixed to the cover.
- All pull boxes shall be installed with a mow strip minimum of 12".
- Quantity: Contractor will provide vaults and covers in the sizes and quantities as shown on the drawings.
- Standard Vault size 24"x36"x36" equal to Old Castle 2436-STD
- Large Vault size 36"x60"x36" equal to Old Castle 3660-STD

3. Communication Vault Accessories
   UNDERGROUND CABLE RACK
   HOOKS Lite Duty Extension
   - Formed from 3/16 inch steel
   - Hot dipped galvanized per ASTM A123 / A153
   - Smooth top surface to protect cables from damage
   - Insulator 11A31 fits these hooks
   - Part numbers Inwesco or equal

Catalog	Extension From
10A35	4
10A36	7-1/2
10A37	10
10A38	14
10A39	18

4. Heavy Duty Extension
   - Formed from 10 ga. steel
   - Hot dipped galvanized per ASTM A123 / A153
   - Unique design locks hook into rack
   - Part numbers Inwesco or equal

Catalog No.	Extension From Face of Rack (Inches)
10C38	14

5. J-Hook Cradle
   - Curved design to cradle cable
   - Available in fusion bonded epoxy coated steel
   - Available in injection molded ABS plastic
   - Steel used is 1/4 inch thick x 15/16 inch wide
   - ABS plastic hooks are 1-3/8 inch wide
   - ABS plastic hooks furnished with locking tab
   - Part numbers Inwesco or equal

Catalog No.	Type	Diameter Of Curve
10A60	Coated Steel	2-1/2
10B60	Plastic	2-1/2
10A61	Coated Steel	5
10B61	Plastic	5

6. Surface-Mounted Entrance Cabinets Type 1 & 12
   - The Contractor shall provide a minimum of a NEMA 1 type enclosure that meets the UL 50, File No. E27567: Type 1 NEMA/EEMAC Type 1 CSA, File No. LL42184: Type 1 IEC 60529, IP30 standards for indoor applications.
   - The Enclosure shall be constructed from 16 awg galvanized steel, with a drip shield top and seam free side, front and back.
   - The Enclosure shall have a “slip-on” removable front cover held in place with steel screws.
   - Enclose shall incorporate pre-punched knockouts for standard trade size conduits up to 1”.
   - The size of cabinets mounted on an outside wall to serve a smaller building shall be as indicated on the construction plans.
   - Quantity: Contractor will provide boxes in the sizes and quantities as shown on the drawings.

7. Surface-Mounted Entrance Cabinets Type 3R and 4X
   - The Contractor shall provide a minimum of a NEMA 3R type enclosure that meets the UL 50 for outdoor applications.
   - The Enclosure shall be constructed from 16 awg galvanized steel, with a drip shield top and seam free side, front and back.
   - The Enclosure shall have a “slip-on” removable front cover held in place with steel screws.
   - Enclose shall incorporate pre-punched knockouts for standard trade size conduits up to 1”.
   - The size of cabinets mounted on an outside wall to serve a smaller building shall be as indicated on the construction plans.
   - Quantity: Contractor will provide boxes in the sizes and quantities as shown on the drawings.

B. Metallic Pull Boxes and Terminal Cans

1. NEMA Type 1 – Screw Cover Cans
   - Used for indoor use only
   - NEMA/EEMAC Type 1, IEC 60529, IP30
   - UL 50, 50E Listed; Type 1; File No. E27525, cUL Listed per CSA C22.2 No 40; Type 1; File No. E27525
   - 16, 14 or 12 gauge steel or plated steel
   - ANSI 61 gray polyester powder paint finish inside and out.
   - Minimum size 6x6x4
   - Pre-Approved Sizes

Hoffman ASE6X6X4, ASE10X10X4, ASE12X12X4, ASE18X12X4, ASE18X18X4
Hoffman ASE6X6X6, ASE10X10X6, ASE12X12X6, ASE18X12X6, ASE18X18X6, ASE24X18X6, ASE24X24X6

- Provide “NK” for No Knock-Outs as required.
- Provide “AFE” Flush Covers as required.
- Provide “AFDF” Flush Doors on all cans in user accessible areas IE; Data Closets, Electrical Rooms, Janitor Rooms, and Mechanical Rooms.
- Provide “ACLFDF” Lock Kits for all cans in student areas.

2. NEMA 3R Terminal Cans
   - Used for outdoor use under-eve, breezeway or parapet
   - NEMA/EEMAC Type 3R, IEC 60529, IP32
   - UL 50, 50E Listed; Type 3R; File No. E27567, cUL Listed per CSA C22.2 No 94; Type 3R File No. E27567
   - 16 gauge galvanized steel
   - ANSI 61 gray polyester powder paint finish inside and out over galvanized steel.
   - Minimum size 12x12x6
   - Hoffman A12R126HCR, A18R186HCR, A20R208HCR, A30R308HCR

3. NEMA 4 Terminal Cans
   - Used for outdoor use vertical or Horizontal under-eve, breezeway or parapet
   - 16 or 14 gauge steel (see table)
   - Seams continuously welded and ground smooth
   - Stainless steel door clamps on three sides of door
   - ANSI 61 gray polyester powder paint finish inside and out over galvanized steel.
   - Minimum size 16x16x6
   - Hoffman A16H16ALP, A20H20ALP, A24H24ALP, A36H24ALP

C. Conduit

1. Rigid Steel Conduit
   - Rigid steel conduit shall comply with Underwriter's Laboratories UL-6 Specification, ANSI C80.1 and Federal specification WW-C-581E or latest
   - revisions. Conduit shall be hot dip galvanized on the exterior, with zinc or enamel on the interior.
   - Couplings, locknuts, and all other fittings shall be galvanized or sheardized, waterproof and threaded type only. Rigid conduit shall terminate with two locknuts; one outside and one inside enclosures and specified bushings. No running threads or chase nipples shall be issued without approval.
   - Bushings shall be non-metallic for 1 inch and smaller and insulated metallic for conduits larger than 1 inch.
   - Galvanized rigid steel conduits (GRC) way be used in all locations.
     For underground runs in direct contact with earth, conduit shall be wrapped in10mil PVC tape or shall be factory PVC-over-GRS conduit.
   - Intermediate metallic conduit (IMC) may be used indoor and outdoor locations, not underground.

2. Electrical Metallic Tubing (EMT)
   - EMT conduit shall comply with Underwriter's Laboratories UL 797, ANSI

C80.3 and Federal Specification WW-C-563 or latest revision. EMT shall be galvanized or sheardized.

- Couplings and connectors for EMT shall be galvanized or cadmium plated and shall be of the compression type requiring the tightening of a nut on a gland ring. No die cast type shall be allowed. All connections shall have permanent insulated throats.
- Electrical metallic conduit (EMT) may be used indoor and outdoor locations, not underground, not in areas subject to physical damage, not in concrete slabs, not in hazardous areas, not in masonry walls.

3. Schedule 40 PVC:
   - The minimum conduit trade size allowed for this project will 2". Contractor will increase to the next higher trade size if conduit fill ration will exceed 40%.
   - Conduit shall be Carlon or equal, rated for use with 90° C conductors, UL Listed or approved equal. Material shall comply to NEMA Specification TC-2 (Conduit), TC-3 (Fittings) and UL 651 (Conduit) and 514b (Fittings).
   - Conduit and fittings shall carry a UL label (Conduit - on each 10 foot length; Fittings - stamped or molded on each fitting).
   - Conduit and fittings shall be identified for type and manufacturer and shall be traceable to location of plant and date manufactured. The markings shall be legible and permanent.
   - The Conduit shall be made from polyvinyl chloride compound (recognized by UL) which includes inert modifiers to improve weatherability and heat distortion. Clean rework material, generated by the manufacturer's own conduit production, may be used by the same manufacturer, provided the end products meet the requirements of this specification.
   - The conduit and fittings shall be homogeneous plastic material free from visible cracks, holes or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks or other imperfections which could mar conductors or Cables.
   - Conduit, fittings and cement shall be produced by the same manufacturer to assure system integrity.
   - Testing and Acceptance Criteria: Conduit and fittings shall be tested in accordance with the testing requirements defined in NEMA TC-2, NEMA TC- 3 and UL-651 and 514. The acceptance criteria shall be given in the same standards.
   - All conduit and fittings shall be solvent cemented in applications in accordance with instructions from the manufacturer.
   - Conduit Spacers
   - High impact spacers shall be used in all multi-conduit duct banks (five or more conduits). The spacers shall conform to NEMA TC-2, TC-6, TC-8, and ASTM F 512.
   - Spacers shall be installed and secured following the manufacturer's suggested guidelines, the BICSI CO-OSP Manual, or TIA/EIA 578, whichever is more stringent.

4. Pipe hangers for individual conduits shall be factory made, consisting of a pipe ring and threaded suspension rod. The pipe ring shall be malleable iron, split and hinged, or shall be interlocked with the suspension rod socket.

5. Pipe racks for a group of parallel conduits shall be galvanized structural steel preformed channels of length as required, suspended on threaded rods and secured thereto with nuts above and below the cross bar. All offsets shall be in the same plane and shall be parallel.

6. Factory made pipe straps shall be one-hole malleable iron or two-hole galvanized clamps.

7. Manufacturer: Appleton, Crouse-Hinds, B-Line, Unistrut, T&B, or an approved equivalent product.

8. Conduit Terminations and Plugs
   - All conduits entering a vault or pullbox shall be equipped with a bell-end securely attached to the structure.
   - All metal conduits shall be equipped with a bushing or end collar to protect cable during placement.
   - All unused conduits placed on this project or cleaned and modified by the Contractor shall be equipped with reusable rubber or plastic expansion seal plugs in all utility vaults/pull boxes and within all buildings.
9. Conduit Flexible Type
   - Flexible conduit “Steel Flex or Aluminum Flex” may only be used for attic j-box to device connection, where specified in the project drawings or with consent of the owner/consultant representative.
   - Liquidtight flexible conduit may only be used where specified in the project drawings or with consent of the owner/consultant representative.
   - GRC & IMC fittings shall be galvanized rigid steel threaded type. Provide insulated grounding bushings at all enclosures.
   - EMT fittings shall be die cast or steel set screw type for dry locations, die cast or steel compression type for wet locations. Provide insulated grounding bushings at all enclosures.
   - PVC fittings shall be schedule 40 or schedule 80, provide adapters at all enclosures and transitions to GRC, IMC or EMT conduits.
   - Flexible fittings shall be die cast or steel type.
   - Liquidtight fittings shall be steel compression type.
   - Provide insulated screw on bushings on all conduit connections.
   - Provide insulated push on bushings for all stubb-out conduits.
   - Quantity: Contractor will provide conduits in the sizes and quantities as shown on the drawings.

10. Textile Innerduct - MaxCell
    - Made from White Polyester and Nylon resin polymer
    - Standard Outdoor Textile Innerduct: Micro (33mm), 2-inch, 3-inch and 4-inch single or multi-cell polyester/nylon textile innerduct containing 1250lb polyester flat woven pull tape.
    - Detectable Outdoor Textile Innerduct: Micro (33mm), 2-inch, 3-inch and 4-inch single or multi-cell polyester/nylon textile innerduct containing 1250lb polyester flat woven pull tape, and a solid copper, polyvinyl color coated conductor (19AWG minimum) for tracing and rated for a minimum of 6 amps and 600 volts. Conductor shall be placed in the sidewall edge fold of the textile sleeve.
    - Indoor Textile Innerduct (Riser-listed): Micro (33mm), 2-inch, 3-inch and 4-inch single or multi-cell nylon textile innerduct containing 1250lb polyester

flat woven pull tape which meets UL2024A for flame propagation and smoke density values for general applications.

- Plenum-Listed Textile Innerduct: Micro (33mm), 2-inch and 3-inch single or multi-cell nylon textile innerduct containing 200lb nylon-resin flat woven pull tape which meets UL2024A for flame propagation and smoke density values for use in air handling spaces.
- Conduit Plugs: Compression-type conduit plugs with locking nuts for sealing and securing one or more textile innerducts within a 4-inch inside diameter conduit, e.g.: 4-inch plug with nine holes for cables in a 3 pack (9-cell) configuration
- Termination Bags: Inflation-type bags for sealing and securing around one or more textile innerducts and cables within 2-inch outside diameter or larger conduit.
- Pull Tape: measuring and pulling tape constructed of synthetic fiber, printed with accurate sequential footage marks. Color-coded.
- Duct Water Seal: products suitable for closing underground and entrance conduit openings where innerduct or cable is installed, to prevent entry of gases, liquids, or rodents into the structure.
- Approved Textile Innerduct #'s MXC4003, MXR4003 MXC3456, MXP3456, MXR3456 MXC2003, MXP2003, MXR2003 MXC2002, MXP2002, MXR2002

D. Duct Bank Locating Cable (Detectable Warning Tape)

1. Warning tape
   - Warning Tape shall be a minimum of 3" wide, orange in color, 4 mils thick, and shall have an imprint as follows:
   - "Caution Telephone Cable Buried Below" or,
   - "Caution Fiber Optic Cable Buried Below"

E. Inter-duct

1. Plenum
   - White or orange Kynar PVDF Resin, a fluoropolymer compound.
   - Plenum rated flexible optical fiber/communication raceway.
   - Provide wire management in a building for fiber optic and data and communications cabling.
   - Recognized per CEC Articles, 770 and 800 for Plenum, Riser and General Purpose Raceway for optical fiber, and telecommunications cables.
   - UL Listed
   - Meets UL 910 standards for Plenum Optical Fiber/Communications raceways.
   - Provide all fittings to form a complete integrated raceway system.
   - Extrude raceway from precision extruded PVDF resin
   - 1"-2"diameter raceway shall have a 1/4" wide 1250 lb. tensile pull tape preinstalled.
   - Shall be available in ¾" through 2" diameters.
   - Footage shall be sequentially marked.
   - Threaded Aluminum Coupling: Molded Aluminum fitting which connect two pieces of corrugated tubing equipped with threaded ends.
   - Quick-Connect Couplings: Molded Part which allows two pieces of 1"

diameter corrugated tubing to be quickly snapped together. Available only in 1" diameter.
- Quick-Connect Threaded Male Adapters: Molded fitting which quickly snaps onto a 1" diameter piece of corrugated tubing to produce a threaded end. Available only in 1" diameter.
- Quick-Connect Male Snap-In Adapters: Molded fitting which snaps onto a 1" diameter piece of corrugated tubing to connect to an outlet or switch box. Available only in 1" diameter.
- Metallic Terminal Adapters: Molded metal part which allows a piece of corrugated tubing to connect to metallic conduit and metallic boxes.
- Spool Length: Varies, contractor shall field verify prior to ordering.
- Color: Orange
- Part #: Carlon
  ¾" CE4X1-1000
  1" CF4X1C-1000
  1-1/4" CG4X1C-900
  1-1/2" CH4X1C-1200
  2" CJ4X1C-1400

2. Riser
   - Orange polyvinyl chloride (PVC)
   - Riser rated Flexible Optical Fiber/Communication Raceway.
   - Provides wire management for fiber optic and data and communications cabling in Riser applications and/or General Purpose applications within a building or for direct burial or concrete encasement.
   - Recognized per CEC Articles, 770 and 800 for Plenum, Riser and General Purpose applications for optical fiber, and telecommunications cables.
   - UL Listed
   - Listed under UL 1666 - Standard for Riser Application for Optical Fiber Raceway.
   - Provide all fittings to form a complete integrated raceway system.
   - Fabricate Raceway from precision extruded PVC resin.
   - Kevlar_ pull tape can be preinstalled in the 1" through 2" diameter.
   - The footage shall be sequentially marked.
   - Shall be available in ¾" through 2" diameters.
   - Threaded Aluminum Coupling: molded Aluminum fitting which connect two pieces of corrugated tubing equipped with threaded ends.
   - Quick-Connect Couplings: Molded Part which allows two pieces of corrugated tubing to be quickly snapped together. Available only in ½"-1" diameter.
   - Quick-Connect Threaded Male Adapters: Molded fitting which quickly snaps onto a piece of corrugated tubing to produce a threaded end. Available only in ½"-1" diameter.
   - Quick-Connect Male Snap-In Adapters: Molded fitting which snaps onto a piece of corrugated tubing to connect to an outlet or switch box. Available only in ½"-1".
   - Metallic Terminal Adapters: Molded metal part which allows a piece of corrugated tubing to connect to metallic conduit and metallic boxes.
   - Schedule 40 Fittings: Molded fitting that is solvent cemented to the raceways. Schedule 40 fittings are commonly used with PVC Schedule 40 rigid conduit.

- Spool Length: Varies, contractor shall field verify prior to ordering.
- Color: Orange
- Part #: Carlon
  ¾” DE4X1-1000
  1” DF4X1C-1000
  1-1/4” DG4X1C-900
  1-1/2” DH4X1C-1200
  2” DJ4X1C-700

3. General Purpose for use in Underground Conduit
   - Orange polyvinyl chloride (PVC)
   - General Purpose is nonmetallic flexible raceway for use in General Purpose applications only. It is UL Listed and available with tape pre- installed.
   - General Purpose raceway is listed to UL 2024 in accordance with the California Electrical Code per Articles 725, 770, 800 and 820 for General Purpose and other cabling optical fiber/telecommunication applications.
   - For use in General Purpose areas per Articles 725, 770, 800 and 820 of the CEC.
   - Available in sizes 3/4" through 2"
   - Pull tape can be factory pre-installed in 1" through 2"
   - Outside Diameters meet IPS Dimensions
   - Footage sequentially marked
   - Spool Length: Varies, contractor shall field verify prior to ordering.
   - Color: Orange
   - Part #: Carlon
     1” BF4X1B-8000
     1-1/4” BG4X1B-5600
     1-1/2” BH4X1B-4500
     2” BJ4X1B-8000

F. Outlet Boxes

1. Outlet boxes (voice, data and audio visual)
   - All boxes shall be 5 in. Square x 2.875 in. Deep Metal Box with Cable Management minimum. As required provide 4-11/16” square by 2-1/8” deep.
   - Volume: 64 in3 (1050 cm3)
   - Side Knockouts: (1) 1"& (1) 1-1/4" each side
   - Listing: C ETL US; for use on Class 2 and Class 3 Remote-Control, Signaling and Power-Limited Circuits only.
   - Provide **varied depth** mud ring as required to allow no more than 1/8” gap between wall materials.
   - Any unused outlet or j-box shall be equipped with a blank cover.
   - Approved Outlet box shall be RANDL Inc. T-55 series

2. Outlet boxes (wall phone, microphone and other devices)
   - All boxes shall be 4-11/16” square by 2-1/8” deep minimum.
   - Provide **varied depth** mud ring as required to allow no more than 1/8” gap between wall materials.
   - Any unused outlet or j-box shall be equipped with a blank cover.
3. Junction boxes
   - All boxes shall be 4-11/16” square by 2-1/8” deep minimum.

- Provide **varied depth** mud ring as required to allow no more than 1/8" gap between wall materials.
- Any unused outlet or j-box shall be equipped with a blank cover.

4. Surface Mount boxes
   - base has rectangular KO to enable extension from existing single-gang flush wall box and 1/2" and 1" trade size concentric KOs.
   - Accepts NEMA Faceplates
   - one-gang - 4 3/4" H x 3" W x 2 3/4" D equal to Wiremold # 2344
   - two-gang - 4 3/4" H x 4 7/8" W x 2 3/4" D equal to Wiremold # 2344-2

G. Floor Boxes

1. Floor boxes provide the interface between power and communication cabling in an on-grade or above-grade concrete floor where power and communication services are required. Boxes shall provide flush or recessed device outlets that will not obstruct the floor area.

2. Provide floor boxes approved for use in concrete floor construction. Boxes shall be approved for above grade (stamped steel) and on grade (cast iron) applications. Floor boxes shall have been examined and tested by Underwriters Laboratories Inc. to meet UL514A and Canadian Standard C22.2 and shall bear the appropriate label. Floor boxes shall conform to the standard set in the California Electrical Code. Multi-compartment box shall have been evaluated by UL to meet the applicable U.S. and Canadian safety standards for scrub water exclusion when used on tile, terrazzo, wood, and carpet covered floors.

3. Boxes shall be available in one-, two-, or three-gang configurations or a single unit with four independent wiring compartments and available in stamped steel and cast iron versions. Boxes shall be rectangular in shape and available in deep and shallow versions. Boxes shall provide pre- and post-pour adjustments. Multiple gang boxes shall also provide a removable barrier between the individual compartments for greater capacity when required.

4. Multi-Compartment Boxes: Floor boxes shall be manufactured in stamped steel or cast-iron. Box shall be available in shallow version for stamped steel or cast-iron types and deep version for stamped steel type only. Box shall have four independent wiring compartments that allow up to 4 duplex receptacles and/or communications services.
   - Boxes shall permit a tunneling feature that will allow internal wiring to various compartments. The box shall provide various size conduit openings.
   - Boxes shall be fully adjustable, providing a maximum of 1-7/8 inch pre-pour adjustment, and a maximum of 3/4 inch post-pour adjustment.
   - Boxes shall provide a series of device mounting plates that will accept both duplex power devices, as well as plates that will accommodate connectivity outlets and modular inserts. Where indicated, provide connectivity outlets and modular inserts by Ortronics or approved equal.
   - Activation covers shall be die-cast aluminum. Cover finish shall be one of the following, as selected:
     a. textured aluminum finish.

b. Powder coat finish, color shall be Black.
c. Powder coat finish, color shall be Brass,

- Activation covers shall be available in flanged or flangeless versions as selected. Covers shall be available with options for tile or carpet inserts, blank covers, or covers with one or two 1 inch liquid tight openings for furniture feed applications as applicable.
- Pre-Approved Floor boxes shall be equal to Wiremold RFB-4 & RFB-9 series boxes.
- Contractor shall provide all required entrance fittings & adapter plates for scope of work depicted.

H. Surface mount raceway "SMR"

1. Non-metallic raceway is an enclosed pathway used for surface distribution of branch circuit electrical wiring, and cabling for voice, data, multi-media, low voltage, and optical fiber. Raceway is typically installed in existing building structures, or after construction is complete. A complete raceway system includes raceway, covers, mounting hardware, various fittings, and outlet boxes installed at specific locations. Specific codes and standards apply to electrical wires and telecommunications cables that are deployed within non-metallic raceway. Codes that are enforced by the local Authority Having Jurisdiction (AHJ) must be observed during construction.
   - Assembly and disassembly of raceway base, cover, and fittings shall require no special tools.
   - Installed fittings shall be designed to overlap the raceway junction to cover exposed or uneven edges.
   - Security caps shall provide enhanced tamper protection by installing over the assembled raceway in desired locations.
   - Raceway shall be designed to accept inline device boxes with either horizontal or vertical faceplate orientations.
   - Device boxes shall have a removable knockout portion to permit raceway entry and exit. Device boxes shall serve as an extension box by removing a single knockout.
   - Device boxes shall be available in standard NEMA single, double, and 3-gang versions. Device box color shall match raceway color.
   - Device boxes shall accommodate various faceplates that accept modular connector inserts or bezels for balanced twisted pair, fiber optic, coaxial, multi-media, and other low voltage cabling connectors.
   - Faceplates for device boxes shall accommodate pre-printed labels for proper electrical identification, or telecommunications port identification according to ANSI/TIA/EIA-606-A.
   - Faceplates shall be available in colors that match the device box and raceway.
   - Category rated communications jacks installed in surface box faceplates shall have provisions for snap-in icons for further identification.

2. 5400 Series
   - The raceway shall be a two-piece design with a base and snap-on covers. The raceway base shall accept both a single cover that spans the entire base or two individual TwinSnap™ covers. Total width shall be 5.25" [133mm] by 1.75" [44.5mm] deep with an approximate thickness of .095" [2.4mm].

The base and cover shall be available in 8' [2.4m] lengths. The raceway shall be available with two (5400TB) or three (5400TBD) wiring channels. VERIFY WITH OWNER BEFORE USING ANY RACEWAY. IT IS ALWAYS PREFERRED TO HAVE CABLING CONCEALED IN THE WALLS.

- The 5400TB Series Base shall have two wiring channels separated by one integral barrier. Each channel must be large enough to accept standard power and communication devices without restricting capacity of the adjacent channel. The 5400TBD Series Base shall have three wiring channels separated by two integral barriers forming 1/2, 1/4, and 1/4 compartments. One channel must be large enough to accept standard power and communication devices without restricting capacity of the other channels. The 5400C Series Cover shall span the entire width of the base concealing all of the wiring channels. The 5400TC Series Cover shall have flanges for snapping onto the base side walls and center barrier. The cover shall span one-half the width of the base, providing independent access to services.
- A complete line of full capacity corner elbows and tee fittings must be available to maintain a controlled 2" [51mm] cable bend radius which meets the specifications for Fiber Optic and UTP/STP cabling and exceeds the TIA / EIA 569-A requirements for communications pathways. They shall be manufactured of a rigid PVC compound. A full complement of fittings must be available including, but not limited to tees, entrance fittings, cover clips, and end caps. They shall be manufactured of a rigid PVC compound. The fittings shall have a matte texture, in ivory or white colors to match the base and cover. They shall overlap the cover and base to hide uneven cuts. All fittings shall be supplied with a base where applicable to eliminate mitering. A transition fitting shall be available to adapt to other Wiremold series raceways.
- Device brackets shall be available for mounting standard devices in-line or offset from the raceway. A device bracket shall provide up to three single-gang openings at one location. Faceplates shall be 5507 Series that match and fit flush in the device plate. They shall be manufactured of rigid PVC compound.
- The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP, STP (150 ohm), fiber optic, coaxial and other cabling types with faceplates and bezels to facilitate mounting. A complete line of preprinted station and port identification labels, snap-in icon buttons, as well as write-on station identification labels shall be available.
- If raceway does not exist and plans show raceway to be installed, verify with owner BEFORE any installation occurs. The Owner prefers all cables to be inside the walls, whenever possible. Verify with Owner on location Contractor believes raceway is required.

l. Cable Tray Systems

Provide cable tray system to route power and communications cable distribution for utility needs. Cable tray system shall consist of cable tray and appropriate fittings for a complete installation.

1. Cable tray is to be utilized in locations only as covered in Article 392 of the California Electric Code, as adopted by the National Fire Protection Association

and as approved by the American National Standards Institute.

2. Trays shall be constructed of 6063 T6 and T5 aluminum alloys and shall utilize center lines to indicate all areas where after field cutting of tray, new holes need to be drilled or screws inserted (Center Spine, Twin Spine, Ladder Style and Wall Mounted Trays).

3. Ladder Tray: Cable tray shall be constructed to form an open and accessible compartment to hold the necessary cables. The tray shall be constructed of two components, (1) two longitudinal support rails (side rails) and (2) the rungs. The rail shall be a single aluminum extrusion with extending flanges that provide rung support. The rungs shall have 7/8 inch cable laying surface and be attached with sheet metal screws to the two side rails on 6 inch, 9 inch or 12 inch centers, creating a cable laying area between the rails.

4. Wall Mounted Cable Tray: Cable tray shall be constructed to form an open and accessible compartment to hold the necessary cables which also enables full viewing of the compartment. The tray shall be wall mounted allowing cable lay-in where applicable.
   - Trays shall be constructed with two components, (1) the main support which is the spine and (2) the rungs. The spine shall be a single aluminum extrusion designed with a lower cavity which has extending wings and provides rung support.
   - Rungs shall have a 1 inch cable laying surface, and be attached on 6 inch, 9 inch or 12 inch centers, and protrude from the spine only on one side. The end of the rungs shall be bent upward to the height of 3 inches, 4 inches or 6 inches as applicable forming a 90 degree angle. This creates a cable laying area between the spine and the vertical portion of the rung. The rung shall be designed with a center screw groove along its length to provide a direct connection for rung mounted accessories. The ends of all rungs shall be fitted with a plastic cap to prevent damage to the cable and injury to the installer.
   - For multi-tier wall mounted trays, the lower rungs shall be mounted through the entire vertical distance of the spine and project down, be bent outward, then up from one side only, forming a 'J' hook shape. These rungs shall be fixed in place with a sheet metal screw through the top of the spine which allows for replacement or expansion of the tray area.
   - Top and bottom rungs shall form two or three tiers of cable tray, one above the other, attached to one single support member or spine.
   - Tray shall not have side rails and shall offer an open view of the cables.

5. A full complement of fittings for the cable tray shall be available including, but not limited to, 45 and 90 degree flat, vertical inside and outside elbows, tee and cross fittings, couplings for joining sections of the tray, hangers, end blanks, field- installed dividers and all other components necessary to make the system perform as intended. The fittings and accessories shall be of a compatible material.

6. Ladder Rack Cable Runway
   - Stringers shall be fabricated from ASTM A513 Steel tubing.
   - Rungs shall be fabricated from 3/8”x1 ½” steel channel welded

- Rungs shall be spaced at 12.0” center to center
- Ladder Rack shall have a powder coat finished.
- Ladder Rack shall be individually boxed
- Ladder rack shall be part of a total system that includes: manufacture bends, wall supports, joining hardware, etc.
- Ladder Rack shall be grounding per the TIA/EIA 607-A.
- Ladder Rack shall be UL listed- File number E60548
- Color: Ladder Rack will be BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Equal to Cooper B-Line Ladder Rack, PN# SB17U12BFB

7. Wire Basket Cable Runway
   - Wire mesh cable tray shall be manufactured from round carbon steel wires that are 5 mm and 6 mm in diameter. Wires shall be welded at intersections to form a 2” x 4” grid pattern. The tray shall be U-shaped with equal height sidewalls.
   - Individual tray sections shall be 10’ long and 4”, 6”, 8”, 12”, 16”, 18”, 20”, or 24” wide. Sidewalls shall be 4” high, as specified below.
   - Wire mesh cable tray shall be zinc electroplated after fabrication, galvanized before fabrication (pre-galvanized) or painted black with powder coat paint, as specified below.
   - Wire mesh cable tray that is 6” wide or wider shall be UL Classified for suitability as an equipment grounding conductor only. Pre-galvanized trays shall be UL Classified in the United States. Painted tray shall be UL Classified in the United States.
   - Ladder Rack shall be grounding per the TIA/EIA 607-A.
   - Color: Zinc Electroplate
   - Quantity: See Drawing for quantity and installation details.
   - Part#: Equal to Chatsworth Products OnTrac
     - Part Number 34821-504, 4” High x 4” Wide x 10’ Long.
     - Part Number 34821-506, 4” High x 6” Wide x 10’ Long.
     - Part Number 34821-508, 4” High x 8” Wide x 10’ Long.
     - Part Number 34821-512, 4” High x 12” Wide x 10’ Long.
     - Part Number 34821-516, 4” High x 16” Wide x 10’ Long.
     - Part Number 34821-518, 4” High x 18” Wide x 10’ Long.
     - Part Number 34821-520, 4” High x 20” Wide x 10’ Long.
     - Part Number 34821-524, 4” High x 24” Wide x 10’ Long.
   - Provide all installation hardware required for installation whether shown on the plans or not. Some of the supports may require design build application and shall be included by the contractor without notice.
     - OnTrac Standard Splice Kit
     - OnTrac Splice Bar
     - OnTrac Splice Washer & Bolt Kit
     - OnTrac Spring Splice Kit
     - OnTrac Clamp Washer
     - OnTrac Carriage Bolt Hardware Kit
     - OnTrac 90° Splice Bar Kit
     - OnTrac Rack-Mount Hook
     - OnTrac Pedestal Clamp Bracket
     - Split Bolt Grounding Clamp o OnTrac Cable Tray Divider o OnTrac Cover
     - OnTrac Cable Tray Bottom Insert
     - OnTrac Cable Tray Liner

- OnTrac Tool-Less Radius Drop
- OnTrac Large Radius Drop
- OnTrac Vertical Radius Bracket o OnTrac Electrical Box Bracket
- o OnTrac Conduit Bracket
- OnTrac Auxiliary Side Bracket
- OnTrac Section Support Bracket
- OnTrac Label Holder
- OnTrac Cable Tray Cutting Tool
- Threaded Rod, 3/8-16
- Threaded Rod Coupling Kit, 3/8-16
- Threaded Rod I-Beam Clamp, 3/8-16
- Hex Nut, 3/8-16
- Split Lock Washer, 3/8”
- Washer, 3/8”
- Hex Lag Screw, 3/8-7 x 2” Long o Hex Lag Screw, 1/4-10 x 2” Long o Split Lock Washer, 1/4”

- Provide all support systems required for installation whether shown on the plans or not. Some of the supports may require design build application and shall be included by the contractor without notice.
  - OnTrac Wire Mesh Cable Tray System Supports
  - OnTrac Ceiling Center Support Bracket
  - OnTrac Ceiling Edge Hanger
  - OnTrac Ceiling Trapeze Support Bracket o OnTrac Wall/Ceiling C-Support Bracket o OnTrac Wall L-Support Bracket
  - OnTrac Wall Triangle Support Bracket
  - OnTrac Wall-Mount Angle
  - OnTrac Under Floor Support
  - OnTrac Under Floor C-Bracket
  - OnTrac Pedestal Clamp Bracket Kit

J. Cabling Support System

1. Telco Backboards
   - Backboards shall be 4’ x 8’ x .75” void free plywood (ACX Plywood with the “A” side turned out).
   - The plywood shall be painted with two coats of white fire retardant paint.
   - Cut full size sheet to required size for application type.

2. J-Hooks
   - Cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; cULus Listed.
   - Cable supports shall have flared edges to prevent damage while installing cables.
   - Cable support system shall provide fasteners that allow them to be mounted to wall, concrete, joist, tee-bar wire, treaded rod, beams and raised floor supports.
   - Fasteners shall have the ability to either be factory or jobsite assembled; rated for indoor use in non-corrosive environments; cULus Listed.
   - Fastener to with one non-continuous cable support, factory or jobsite assembled.
   - Color: NA
   - Quantity: Contractor will provide quantities of j-hooks and hanger accessories in the amount necessary to support all horizontal cabling every 14” – 28”. The load per hook shall not exceed the Owner’s 40% fill ratio.

All hooks shall have a retainer clip installed as part of the hook. Verify with Owner as to what 40% fill is.
- Part#: ERICO CAT425, Cooper B-Line BCH12, BCH21, BCH32, BCH64 and accessories.

3. In-ceiling support brackets
   - Above-ceiling cable termination locations shall be either wall-mounted or suspended from structure above the drop ceiling. Cables or terminations shall not rest on ceiling grid or equipment above ceiling grid.
   - For Wireless Access Points and other above-ceiling-mounted communications devices, cables shall land in an above-ceiling bracket which is affixed to dedicated cable support hardware.
   - Two category-rated jacks may be installed in each above-ceiling bracket. Each above-ceiling bracket will hold a 2-port Surface-Mount Box or 1-U MOS SMB for multimedia applications.
   - For wall-mounted device locations (above or below ceiling), devices needing to be mounted directly to a backbox will utilize the in-wall mounting bracket to secure the jack inside the backbox.
   - One category-rated jack can be installed in each in-wall backbox jack mounting bracket. For devices requiring (2) category-rated jacks, (2) in-wall brackets must be used.
   - Part #:
     Leviton QuickPort In-Ceiling Bracket, rod/wire hanger, 49223-CBC Leviton QuickPort In-Ceiling Bracket, accepts beam and screw mounts, 49223-CB0 Leviton QuickPort In-Wall Bracket, 49223-BA5 (pack of 5)

K. Pull Rope

1. Pulling Ropes (Mule tape)
   - Pull ropes shall be 1/2" flat tape with a minimum tensile strength of 1200 Ibs.
   - Ropes shall be pre-lubricated, woven polyester or aramid fiber tape made from low friction, high abrasion resistant yarns providing a low coefficient of friction. Tape shall be printed with sequential footage markings for accurate measurements.

2. Empty Conduits
   - Pull rope shall be new 1/2” flat tape with a minimum 1200 lb. tensile strength.
   - Every empty conduit shall be equipped with a pull rope secured to the duct plug at each end.

3. Installed with Cables:
   - Pull rope shall be new 1/2” flat tape with a minimum 1200 lb. tensile strength.
   - Contractor is required to install a pull rope into every conduit that they pull cabling in.

2.2 Fire Stop Systems

A. General

1. Sleeves shall be 2”, 3” or 4" EMT or smaller. All cables penetrating walls must be sleeved.

2. Sleeves shall maintain a 40% conduit fill ratio.

3. Sleeves must be supported or attached at walls by apparatuses meant to do so. All sleeves shall be rigidly and properly supported.

4. Sleeves must extend past inaccessible areas.

5. Sleeves must be protected by a U.L. rated system at all firewalls designated on the construction drawings.

6. Fire stopping shall be a material, or combination of materials, to retain the integrity of time-rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases. It shall be used in specific locations as follows:
   - Duct, cables, conduit, piping, and cable tray penetrations through floor slab and through time-rated partitions or fire walls.
   - Openings between floor slab and curtain walls, including inside hollow curtain walls at the floor slab.
   - Penetrations of vertical service shafts.
   - Openings and penetrations in time-rated partitions of fire walls containing fire doors.
   - Locations where specifically shown on the drawings or where specified in other sections of the Standards.

7. Fire stopping materials shall be asbestos free and capable of maintaining an effective barrier against flame, smoke, and gasses in compliance with requirements of ASTM E 814, and UL 1479. Only listed fire stopping material acceptable to State, County, and City codes shall be used.

8. The rating of the fire stops shall in no case be less than the rating of the time rated floor or wall assembly.

9. All Fire stopping Locations (FSL) shall be labeled within 12" of the fire stopping material on each side of the penetrated fire barrier. The format for the Fire stopping Location identifier shall display the Telecom Room floor number, the Fire stopping Location number, and the hour rating of the fire rating system (e.g. 1-FLS001 (2)). Each fire stopping location shall be identified with a fire stopping warning label. The label shall include the manufacturer of the product, the installer and company name, the UL number for the product, the rating of the material, the installation date, and the number and type of cables passing through the opening. The fire stopping warning label can include the fire stopping location identifier, eliminating the need for a separate label. Penetration modifications requiring the repair/re-installation of the fire stopping material require the addition of a new fire stopping warning label. No previous fire

stopping warning labels shall be removed or obscured by new labels. In the event the penetration is completely cleaned of existing fire stopping material, and new material is installed, the previous label shall be removed or obscured completely.

10. Manufacturers; Specified Technologies Inc., 3M & Hilti
    - SSS - intumescent sealant
    - SSP - putty and putty pads
    - SSAMW - mineral wool
    - IC 15WB+ - intumescent sealant
    - CP 25WB+ - intumescent sealant
    - Fire Barrier Moldable Putty+ - putty and putty pads
    - FS-ONE - intumescent sealant
    - CP 618 - putty and putty pads.

B. Single Entry System
- The fire stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.
- Fire stop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.
- All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall use the proper fire stop equipment.
- Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).
- Quantity: See Drawing for quantity and installation details.
- Part#: Equal to STI, PN# SSS100

C. Re-Enterable Fire Stop System
- The re-enterable fire stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.
- No additional fire stopping material shall be required to obtain proper fire stopping.
- The system shall offer full fire resistance whether it is empty or 100% visually filled.
- The system shall be self-contained, and shall automatically adjust to differing cable loads.
- The system shall allow add, moves, and changes without additional materials.
- All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate re-enterable fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall use the proper fire stop equipment.
- Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).
- The system shall be gang-able using wall plates for additional capacity.

- Quantity: See Drawing for quantity and installation details.
- Part #: Equal to STI PN# EZDP33FWS STI PN# EZDP33WR

2.3 Grounding/Bonding Systems

A. Grounding and Bonding Equipment

1. Telecommunications Main Grounding Busbar (TMGB)
   - Telecommunications Main Grounding Busbar (TMGB) shall be constructed of
     .25" (6.4 mm) thick solid copper bar.
   - The buss bar shall be 4" (100 mm) high and 12" (300 mm) long and shall have 18 attachment points (two rows of 9 each) for two-hole grounding lugs.
   - The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD – 607-A and shall accept 15 lugs with 5/8" (15. 8 mm) hole centers and 3 lugs with 1" (25.4 mm) hole centers.
   - The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4" (100 mm) standoff from the wall.
   - The busbar shall be UL Listed as grounding and bonding equipment.
   - Design Make shall be:
   - Chatsworth Products, Inc. (CPI),
   - Telecommunications Main Grounding Busbar: Part Number 40153-012, 12" x 4" (300 mm x 100 mm) Telecommunications Main Grounding Busbar, UL Listed.

2. Telecommunications Grounding Busbar (TGB)
   - Telecommunications Grounding Busbar (TGB) shall be constructed of .25" (6.4 mm) thick solid copper bar.
   - The busbar shall be 2" (50 mm) high and 10" (250 mm) long and shall have 7 attachment points (one row) for two-hole grounding lugs.
   - The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD – 607-A and shall accept 4 lugs with 5/8" (15.8 mm) hole centers and 3 lugs with 1" (25.4 mm) hole centers.
   - The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4" (100 mm) standoff from the wall.
   - The busbar shall be UL Listed as grounding and bonding equipment.
   - Design Make shall be:
   - Chatsworth Products, Inc. (CPI),
   - Telecommunications Grounding Busbar:
     Part Number 13622-010, 10" x 2" (250 mm x 50 mm) Telecommunications Grounding Busbar, UL Listed.

3. Horizontal Rack Busbar
   - Horizontal rack-mount busbar shall be constructed of 3/16" (4.7 mm) thick by 3/4" (19.1 mm) high hard-drawn electrolytic tough pitch 110 alloy copper bar.
   - Bar shall be 19" EIA or 23" rack mounting width (as specified below) for mounting on relay racks or in cabinets.
   - Bar shall have eight 6-32 tapped ground mounting holes on 1" (25.4 mm) intervals and four 0.281" (7.1 mm) holes for the attachment of two-hole grounding lugs.
   - Each bar shall include a copper splice bar of the same material (to transition

between adjoining racks) and two each 12-24 x ¾" copper-plated steel screws and flat washers for attachment to the rack or cabinet.
- Bar shall be UL Listed as grounding and bonding equipment.
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Horizontal Rack Busbar: Part Number 10610-019, Ground Bar for 19" Rack.

4. Two Mounting Hole Ground Terminal Block
   - Ground terminal block shall be made of electroplated tin aluminum extrusion.
   - Ground terminal block shall accept conductors ranging from #14 AWG through 2/0.
   - The conductors shall be held in place by two stainless steel set screws.
   - Ground terminal block shall have two 1/4" (6.4 mm) holes spaced on 5/8" (15.8 mm) centers to allow secure two-bolt attachment to the rack or cabinet.
   - Ground terminal block shall be UL Listed as a wire connector.
   - Design Make shall be:
   - Chatsworth Products, Inc. (CPI),
   - Two Mounting Hole Ground Terminal Block:
   - Part Number 40167-001, Two Mounting Hole Ground Terminal Block, 1 each
   - Compression Lugs
   - Compression lugs shall be manufactured from electroplated tinned copper.
   - Compression lugs shall have two holes spaced on 5/8" (15.8 mm) or 1" (25.4 mm) centers, as stated below, to allow secure two bolt connections to busbars.
   - Compression lugs shall be sized to fit a specific size conductor, sizes #6 to 4/0, as stated below.
   - Compression lugs shall be UL Listed as wire connectors.
   - Design Make shall be:
   - Chatsworth Products, Inc. (CPI),
   - Compression Lugs:
   - Part Number 40162-901, Compression Lug, #6 Awg, 5/8" (15.8 mm) hole spacing, 1 each.
   - Part Number 40162-903, Compression Lug, #6 Awg, 1" (25.4 mm) hole spacing, 1 each.
   - Part Number 40162-904, Compression Lug, #2 Awg, 5/8" (15.8 mm) hole spacing, 1 each.
   - Part Number 40162-907, Compression Lug, #2 Awg, 1" (25.4 mm) hole spacing, 1 each.
   - Part Number 40162-909, Compression Lug, 2/0 Awg, 1" (25. 4 mm) hole spacing, 1 each.
   - Part Number 40162-911, Compression Lug, 4/0 Awg, 1" (25.4 mm) hole spacing, 1 each.

5. Antioxidant Joint Compound
   - Oxide inhibiting joint compound for copper-to-copper, aluminum-to-aluminum or aluminum-to-copper connections.
   - Design Make shall be:
   - Chatsworth Products, Inc. (CPI),
   - Antioxidant Joint Compound:
   - Part Number 40168-101, Antioxidant Joint Compound, Copper-to-Copper

Connections, .5 oz, 1 each.
- Part Number 40168-801, Antioxidant Joint Compound, Copper-to-Copper Connections, 8 oz, 1 each.
- Part Number 40166-101, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, .5 oz, 1 each.
- Part Number 40166-801, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, 8 oz, 1 each.
- Part Number 40168-150, Antioxidant Joint Compound, Copper-to-Copper Connections, .5 oz, 50 each.
- Part Number 40168-812, Antioxidant Joint Compound, Copper-to-Copper Connections, 8 oz, 12 each.
- Part Number 40166-150, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, .5 oz, 50 each.
- Part Number 40166-812, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, 8 oz, 12 each.

6. C-Type, Compression Taps
   - Compression taps shall be manufactured from copper alloy.
   - Compression taps shall be C-shaped connectors that wrap around two conductors forming an irreversible splice around the conductors; installation requires a hydraulic crimping tool
   - Compression taps shall be sized to fit specific size conductors, sizes #2 AWG to 4/0, as stated below.
   - Compression taps shall be UL Listed.
   - Design Make shall be:
   - Chatsworth Products, Inc. (CPI),
   - Compression Taps:
   - Part Number 40163-001, Compression Tap, #6 AWG Solid Run to #6 AWG Solid Tap, 1 each.
   - Part Number 40163-007, Compression Tap, 2/0 Stranded Run to 2/0 Stranded Tap, 1 each.

7. Pipe Clamp With Grounding Connector
   - Pipe clamp shall be made from electroplated tinned bronze. Installation hardware will be stainless steel.
   - Pipe clamp shall be sized to fit up to two conductors ranging in size from #6 to 250 MCM; conductors must be the same size.
   - Pipe clamp installation hardware shall be sized to attach to pipes, sizes 1” to 6” (.75” to 6.63” in diameter), as stated below.
   - Pipe clamp shall be UL Listed as grounding and bonding equipment.
   - Design Make shall be:
   - Chatsworth Products, Inc. (CPI),
   - Pipe Clamps:
   - Part Number 40170-002, Pipe Clamp, for 1” to 1-1/4” pipe, 1 each.
   - Part Number 40170-003, Pipe Clamp, for 1-1/2” to 2” pipe, 1 each.
   - Part Number 40170-004, Pipe Clamp, for 2-1/2” to 3” pipe, 1 each.
   - Part Number 40170-005, Pipe Clamp, for 3-1/2” to 4” pipe, 1 each.
   - Part Number 40170-006, Pipe Clamp, for 5” to 6” pipe, 1 each.

8. Equipment Ground Jumper Kit
   - Kit includes one 24”L insulated ground jumper with a straight two hole compression lug on one end and an L-shaped two hole compression lug on

the other end, two plated installation screws, an abrasive pad and a .5 once tube of antioxidant joint compound.
- Ground conductor is an insulated green/yellow stripe #6 AWG wire
- Lugs are made from electroplated tinned copper and have two mounting holes spaces .5" to .625" apart that accept 1/4" screws.
- Jumper will be made with UL Listed components
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Equipment Ground Jumper Kit:
- Part Number 40159-010, Equipment Ground Jumper Kit, 1 each.

B. Communications raceways, backboards and rack systems

1. The conduit system must be permanently and effectively grounded, in accordance with Title 24 of the California Code of Regulations, California Electric Code #250, and National Electric Code or as required by local AHJ. If in confusion or conflict the most stringent specification shall apply.

2. Provide as a minimum a #1/0awg THHN conductor in conduit from the main building grounding point to a ¼" x 4" x 5.25" telecommunications grounding bus bar(TGB) at every backboard.

3. Provide as a minimum #6awg green THHN conductor from each equipment rack, cable tray or wall mounted equipment to a TGB.

PART 3 – EXECUTION

3.1 General

A. Permits and Licensing

1. Contractor is responsible to procure all necessary permits before the commencement of their work to the city or state agencies as required. It is the contractor's responsibility to provide all documentation to the AHJ.

2. Contractor is responsible to procure all necessary licenses for the city or state they are commencing the work in, before the commencement of their work begins.

3. Contractor to procure all encroachment permits as it pertains to the work described in these documents.

4. No person may access or enter in any way, an underground vault or confined space without the training, staff, and safety equipment defined on the confined space permit. Accessing these spaces without a valid permit or without the required support services will be cause for an order to stop work until all violations are resolved and may result in a fine or suspension of the workers involved.

B. Safety

1. All federal (OSHA), state, and local safety rules, will be enforced at all times during the duration of the project. It is the responsibility of the Contractor to conduct frequent inspections of the job site to ensure compliance.

3.2 Installation

A. INTRA-BUILDING PATHWAYS

A. COMMUNICATION VAULTS

1. Site Access
   - The general contractor shall be responsible for providing adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete units.

2. Installation
   - Precast concrete units shall be installed to the lines and grades shown in the contract documents or otherwise specified.
   - Precast concrete units shall be lifted by suitable lifting devices at points provided by the precast concrete producer.
   - Precast concrete units shall be installed in accordance with applicable industry standards. Upon request, the precast concrete producer shall provide installation instructions.
   - Field modifications to the product shall relieve the precast producer of liability regardless if such modifications result in the failure of the precast concrete unit.

3. Watertightness
   - Where watertightness is a necessary performance characteristic of the precast concrete unit’s end use, watertight joints, pipe-entry connectors and inserts should be used to ensure the integrity of the entire system.

B. CONDUIT

1. All conduit shall be routed parallel or perpendicular to walls.
2. All conduit shall be installed in accordance with NEMA "Standard of Installation" and shall meet applicable local and California building and electrical codes or regulations.
3. Conduit runs shall not exceed 100 feet or contain more than two 90-degree bends without utilizing appropriately sized pull boxes. No conduits may enter a pull box at a 90-degree angle. They are not to be installed into the side of a pull box. All conduits must enter the ends of the pull box.
4. All conduits entering a building from outside shall be plugged with reusable stoppers to eliminate the entrance of water or gases into the entrance room. Building entrance conduits shall slope downward away from the building to reduce the potential of water entering the building. All building penetrations are to be sealed from wall to wall and on the outside and inside of the penetrations.
5. All conduits penetrating a fire or smoke barrier shall be fully sealed between the conduit and the actual penetration following manufacturer's recommendations.
6. Contractor shall label each fire stop location with the manufacturer's identification number of the product used and shall provide the inspector copies of each products system configuration.
7. No communications outlet boxes shall be "daisy-chained." Each communications outlet shall be served by a separate 1-inch (minimum) conduit.
8. In rooms with a drop or false ceiling, communications outlets shall be served by a 1-inch conduit stubbed six inches above the false ceiling, angled toward the cable tray or open access area, and be equipped with a compression fitting and plastic bushing. All stubs shall be marked "Comm".
9. All conduit shall be equipped with an approved water or barrier seal in building access points.
10. All conduits which utilize fabric mesh innerduct, willhave the innerduct installed first, and then the appropriate cables installed within the channels of the innerduct.
11. No communications conduit shall contain more than 180 degrees of bend without the use of a pullbox. Pullboxes must be approved by Engineer of Record to ensure proper sizing and conduit entry placement.
12. In areas where hard lid ceilings are in place, all conduits are to run to accessible location or to cable tray.
13. Provide labels at both ends of conduits to identify location of far end.

C. STATION CABLE SUPPORT SYSTEM

1. All station cable support systems shall be braced for zone four seismic activity.
2. In suspended ceiling and raised floor areas where duct, cable trays, or conduit are not available, station cables shall be bundled with Velcro straps at appropriate distances.
3. Velcro straps shall not be over tightened to the point of deforming or crimping the cable sheath.
4. Velcro straps shall be UL listed, rated for low smoke, and certified for use in a plenum environment.
5. The station cable support system components shall be firmly attached to the existing building structure and installed not more than five feet apart.
6. The station cable support system components shall be installed to provide at

least three (3) inches of clear vertical space between the cables/optics and the ceiling tiles.
7. The station cable support system components shall be spaced to prevent the cables/optics from sagging or buckling.
8. No more than eighteen (18) Category 6 cables shall be supported by a J - hook.
9. No more than thirty (30) Category 6 cables shall be supported by triangular galvanized metal bracket.
10. The station cable support system shall be clearly and neatly labeled per TIA/EIA 606-A, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

D. Raceways

1. All dual channel raceway shall be installed with a complete end-to-end channel for future power service installation.
2. The raceway shall be stubbed above the false ceiling space and capped so that each section of raceway can be connected to a power service in the future without a requirement to add raceway to visible portions of the system. If no false ceiling space is available, the power channel is to be stubbed up and capped next to the point at which the communication services enter the room.

E. Cable Tray

1. The Contractor will be responsible for placement of the cable tray in concert with other trades, allowing sufficient room for the cable installers to gain access to all portions of the tray system. Cable tray location shall be coordinated with open ceiling areas, access panel locations, and feeder conduit positions to provide an accessible cable pathway throughout the facility.
2. All metallic trays must be grounded and may be used as a ground conductor. Provide #2 AWG bare copper equipment grounding conductor through entire length of tray; bond to each component. Trays used as an equipment grounding conductor must be clearly marked.
3. Trays shall be bonded end-to-end.
4. Trays shall enter distribution rooms a minimum or six inches into the room, then utilize a drop out to protect station cables from potential damage from the end of the tray.
5. Cable trays shall be placed a minimum of six (6) inches from any overhead light fixture and twelve (12) inches from any electrical ballast. A minimum of eight (8) inches of clearance above the tray shall be maintained at all times. All bends and T-joints in the tray shall be fully accessible from above (within 1 foot). Trays shall be mounted no higher than twelve (12) feet above the finished floor and shall not extend more than eight (8) feet over a fixed ceiling area.
6. A separate conduit sleeve (minimum of four inches) must be provided as a pathway through any wall or over any obstruction (such as a rated hallway) from the cable tray into any room having a communications outlet.
7. The Contractor shall fire stop around the tray and, after installation of the cables, within the tray using removable pillow-style products following manufacturers' guidelines. Sound deadening material shall be provided and installed after installation of cable.
8. In rooms without a drop ceiling (open to the structure), the cable shall be mounted as high as possible to provide the greatest clearance above the finished

floor, but within the limits in (e) above.

F. Wire Mesh Cable Tray

1. Provide all components of the tray system (tray, supports, splices, fasteners, and accessories) from a single manufacturer.
2. Wire mesh cable tray shall be secured to the structural ceiling, building truss system, wall or floor using manufacturer's recommended supports and appropriate hardware as defined by local code or the authority having jurisdiction (AHJ).
3. When the pathway is overhead, wire mesh cable tray shall be installed with a minimum clearance of 12" (300 mm) above the tray. Leave 12" (300 mm) in between the tray and ceiling/building truss structure. Multiple tiers of wire mesh cable tray shall be installed with a minimum clearance of 12" (300 mm) in between the trays. When located above an acoustical drop ceiling, wire mesh cable tray shall be installed a minimum of 3" (75 mm) above the drop ceiling tiles.
4. When installed under a raised floor, wire mesh cable tray shall be installed with a minimum 3/4" (19 mm) clearance between the top of the tray and the bottom of the floor tiles or floor system stringers, whichever are lower in elevation. Maintain a 3" (75 mm) clearance between trays wherever trays cross over.
5. Wire mesh cable tray shall be supported every 6' (1.8 m) of span or less. Support wire mesh cable tray within 2' (0.6 m) of every splice and intersection. Support intersections on all sides. Support wire mesh cable tray on both sides of every change in elevation/direction. The weight of the load on the cable tray must not exceed the stated limits per span in the manufacturer's published load table. Use additional supports where needed.
6. Secure wire mesh cable tray to each support with a minimum of one fastener. Follow the manufacturers' recommended assembly, splice and intersection-forming practices.
7. Use installation tools and practices recommended by the manufacturer to field fabricate wire mesh cable tray intersections and changes in elevation. Use side-action bolt cutters with an offset head to cut wire mesh cable tray.
8. Wire mesh cable tray shall be bonded to the Telecommunications Grounding Busbar (TGB) using an approved ground lug on the wire basket tray and a minimum #6 grounding wire or as recommended by the AHJ. Follow UL
9. Classified splicing methods recommended by the manufacturer, ground the tray per CEC requirements and verify bonds at splices and intersections between individual cable tray sections. Cable pathway should be electrically continuous through bonding and attached to the TGB.
10. The quantity of cables within the tray will not exceed a whole number value equal to 50% of the interior area of the tray divided by the cross-sectional area of the cable. Cable fill will not exceed the depth of the cable tray's side rail [2" (50 mm), 4" (100 mm) or 6" (150 mm)].
11. The combined weight of cables within the tray will not exceed stated load capacity in manufacturer's specifications.
12. Separate different media type within the tray. Treat each type of media separately when determining cable fill limits.
13. When pathways for other utilities or building services are within 2' (0.6 m) of the wire mesh cable tray, cover the tray after cables are installed.

G. Pull boxes

1. Pull boxes shall be installed in easily accessible locations.
2. Pull boxes installed as part of a horizontal cabling pathway shall be installed immediately above suspended ceilings, where possible.
3. Pull boxes shall not be used for splicing cable.
4. Pull boxes shall be placed in conduit runs that exceed 100 feet or which require more than two 90 degree bends. The pull boxes shall be located in straight sections of conduit and must not be used for a right angle bend. Installation shall allow cable to pass through from one conduit to another in a direct line.
5. Pull boxes must have a length at least 12 times the diameter of the largest conduit.

B. EXISTING OUTLET BOXES, RACEWAYS, AND CONDUITS

A. Existing recessed boxes and concealed station conduits may only be re-used as a pathway for a new outlet per the criteria below:

1. Existing recessed single-gang box with a ¾ inch diameter station conduit: One new voice or data outlet (1 cable maximum).
2. Existing recessed single-gang outlet with a 1 inch diameter station conduit: One new voice/data outlet or one new voice/data/fiber outlet. (3 cables maximum) (Only acceptable in offices and classrooms where wire cannot be fished in existing walls.) For outlets with fiber cable terminations, faceplates must be equipped with a spool to provide for a maintenance loop per manufacturer's specifications.

C. GROUNDING AND BONDING SYSTEMS

A. Grounding and bonding - GENERAL

1. Installation: The Contractor shall provide grounding and bonding in accordance with the requirements of CEC, IEEE 142, TIA/EIA 568, TIA/EIA 607, state and local codes, the campus standards and to requirements specified herein. Codes shall be complied with as a minimum requirement, with these specifications prevailing when they are more stringent.

2. Bonding
   (a) Metallic conduits, wireways, metal enclosures of busways, cable boxes, equipment housings, cable racks and all non-current carrying metallic parts of the installed telecommunications services shall be grounded with #6 AWG copper wire. The metallic conduit system shall be used for equipment and enclosure grounding but not as a system ground conductor.
   (b) All metallic conduit stub-ups shall be grounded, and where multiple stub-ups are made within an equipment enclosure, they shall be equipped with grounding bushings and bonded together and to the enclosure and the enclosure ground bus.
   (c) Each metallic raceway, pipe, duct and other metal object entering the buildings shall be bonded together. The Contractor shall use #6 AWG bare copper conductors.

(d) The Contractor shall bond telecommunications equipment and busbars separately.

B. Signal Reference Grounding and Bonding

1. Each identified telecommunications space within a building shall have a common signal reference ground. The signal reference ground shall conform to the following:
   (a) Within the building, all communication spaces shall be separately bonded to each other and connected to the primary building ground in accordance with the provisions of TIA/EIA 607. The communication ground shall not ground any other equipment or be connected to any potential high voltage source. All racks, frames, drain wires, and all installed communication equipment shall only be grounded to this common reference ground with a minimum size #6 AWG copper wire.
   (b) The Contractor shall provide, as a minimum, a continuous #3/0 AWG green electrical conductor connected to a 1/4" x 4" x 5.25" telecommunications grounding bus bar (TGB) 6" AFF on the plywood backboard of each IDF (or telecommunication space) to terminate chassis and other equipment grounds.
   (c) The ground wires from each individual IDF shall be routed directly to the Building Distribution Frame (BDF), terminated and bonded together via a telecommunications main grounding bus bar (TMGB) of minimum 1/4" x 4" x 12" dimensions. This point of single reference for all closets in a building shall in turn be grounded with a minimum #3/0 AWG ground conductor to the main building ground. If a main building ground is unavailable, the ground wire from the BDF shall be grounded to the nearest electrical panel ground bus bar. The building ground for signal reference shall be the building service entrance ground.

2. Riser/Tie Cable Bonding
   (a) There shall be no bonding between the entry cable and the inside riser or distribution cable.
   (b) All riser and tie cable shields shall be bonded into a single continuous path end-to-end and grounded on each floor in which pairs leave the sheath. Cable shields shall be grounded to the signal reference ground provided in each telecommunication space.

C. Grounding and Bonding Testing and Inspection Procedures

1. As an exception to requirements that may be stated elsewhere in these documents, the Inspector of Record shall be given five (5) working days' notice prior to each test. The Contractor shall provide all test equipment and personnel and shall provide written copies of all test results.
2. Grounding and bonding system conductors and connections shall be inspected for tightness and proper installation.
3. The Contractor shall provide personnel and test equipment for point-to-point resistance tests before connecting equipment. Perform point-to-point tests in each building to determine the resistance between the main grounding system and all BDF/IDF ground bus bars. Investigate and correct point-to-point resistance values that exceed 0.5 ohm. The Contractor shall record resistance

measurements at all test point locations.

D. INFORMATION OUTLETS

A. GENERAL REQUIREMENTS

1. Station outlets shall be mounted securely at work area locations.
2. Station outlets shall be located so that the cable required to reach the desktop equipment is no more than 10 feet long.
3. Station outlets should not be "daisy-chained."
4. Outlets shall be mounted as follows:
   (a) Wall phone: 48 inches above the finished floor.
   (b) Standard voice/data outlet: 15 inches above the finished floor.
   (c) Wall-mounted video outlet: 78 inches above the finished floor.
   (d) Counter top: 6 inches above the counter top.

B. MODULAR FURNITURE TELECOMMUNICATIONS OUTLETS

1. The Contractor shall provide and install all components and labor necessary to completely install, test, and document voice and data telecommunications outlets at each modular furniture workstation location.
2. Category 6 station cable shall be placed from the BDF, through the riser sleeves, through the cable tray system into the conduit, ceiling or floor poles, etc. into the furniture to be served.
3. The Contractor shall coordinate the telecommunications and electrical installation so that the modular furniture is served from the joint signal/power floor monuments or joint power pole in a consistent manner. The Contractor shall provide and install all fittings, flex conduit, adapter plates, and telecommunications cable and components necessary to install Category 6 station cable from the consolidation point box, through the ceiling or floor monument or pole, into the furniture raceway, and to the final user outlet location (including jacks, adapters, and faceplates).
4. The telecommunications installers shall coordinate with the electrical drawings for the number and location of user voice and data outlets.
5. Labels shall be numbered according to a scheme developed in consultation with the owner's representative. Owner to approve label scheme prior to printing.

E. GROUNDING AND BONDING

1. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor.
2. The TBB shall be installed independent of the building's electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA/EIA-607 Telecommunications Bonding and Grounding Standard.
3. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB).
4. The TMGB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop

current potential is minimized between telecommunications equipment and the electrical system to which it is attached.

5. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.
6. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape.
7. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.
8. Wall-Mount Busbars
   - Attach busbars to the wall with appropriate hardware according to the manufacturer's installation instructions.
   - Conductor connections to the TMGB or TGB shall be made with two-hole bolt-on compression lugs sized to fit the busbar and the conductors.
   - Each lug shall be attached with stainless steel hardware after preparing the bond according to manufacturer recommendations and treating the bonding surface on the busbar with antioxidant to help prevent corrosion at the bond.
   - The wall-mount busbar shall be bonded to ground as part of the overall Telecommunications Bonding and Grounding System.
9. Rack-Mount Busbars and Ground Bars
   - When a rack or cabinet supports active equipment or any type of shielded cable or cable termination device requiring a ground connection, add a rack-mount horizontal or vertical busbar or ground bar to the rack or cabinet. The rack-mount busbar or ground bar provides multiple bonding points on the rack for rack and rack-mount equipment.
   - Attach rack-mount busbars and ground bars to racks or cabinets according to the manufacturer's installation instructions.
   - Bond the rack-mount busbar or ground bar to the room's TMGB or TGB with appropriately sized hardware and conductor.
10. Ground Terminal Block
    - Every rack and cabinet shall be bonded to the TMGB or TGB.
    - Minimum bonding connection to racks and cabinets shall be made with a rack-mount two-hole ground terminal block sized to fit the conductor and rack and installed according to manufacturer recommendations.
    - Remove paint between rack/cabinet and terminal block, clean surface and use antioxidant between the rack and the terminal block to help prevent corrosion at the bond.
11. Pedestal Clamp
    - At minimum, bond every sixth raised access floor pedestal with a minimum #6 AWG conductor to the TMGB or TGB using a pedestal clamp sized to fit the pedestal and the conductor and installed according to the manufacturer's recommendations.
    - If pedestal clamps are used to construct a signal reference grid, bond the signal reference grid to the TMGB or TGB and bond each rack and/or cabinet to the signal reference grid using a compression tap or similar non-reversible bonding component sized to fit both conductors.
    - Remove paint between the pedestal and pedestal clamp, clean surface and use antioxidant between the pedestal and the clamp to help prevent corrosion at the bond.

- Remove insulation from conductors where wires attach to the pedestal clamp.

12. Pipe Clamp
    - Bond metal pipes located inside the data center computer room with a minimum #6 AWG conductor to the TMGB or TGB using a pipe clamp sized to fit the pipe and the conductor and installed according to the manufacturer's recommendations.
    - Remove paint between the pipe and pipe clamp, clean surface and use antioxidant between the pipe and the clamp to help prevent corrosion at the bond.
    - Remove insulation from conductors where wires attach to the pipe clamp.
13. Equipment Ground Jumper Kit
    - Bond equipment to a vertical rack-mount busbar or groundbar using ground jumper according to the manufacturer's recommendations.
    - Clean the surface and use antioxidant between the compression lugs on the jumper and the rack-mount busbar or groundbar to help prevent corrosion at the bond.

F. FIRE STOP SYSTEM

1. The fire stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.
2. Fire stop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.
3. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall use the proper fire stop equipment.
4. Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).

3.3 System Closeout and As-built Documentation

A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Owner's Representative/Engineer for approval. One (1) to be a hardcopy and two (2) to be electronic copies. Documentation shall include the items detailed in the sub-sections below.

B. Documentation shall be submitted within ten (10) working days of the completion of each construction phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 calendar days of the completion of each testing phase. At the request of the Owner's Representative/Engineer, the telecommunications contractor shall provide copies of the original test results.

C. The As-Built drawings are to include conduit routes, utility vault/pull box locations, surface mount enclosure locations, PVC to GRC transition points and the approved

labeling identifiers. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD 2008) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.

END OF SECTION

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SECTION 271000 - STRUCTURED CABLING SYSTEM

PART 1 – GENERAL

1.1 Scope of Work

A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing a Structured Cabling Plant.

B. The Cabling System as described in this document is comprised of cabling, infrastructure and termination hardware to provide an approved TIA/EIA Data Networking and Voice Communication Structured Cabling System.

C. Provide all labor, materials, tools and equipment required for the complete installation of work called for on the Construction Drawings and described in the Specifying Documentation.

D. 271000 contractors shall be complete with work including all testing and labeling prior to 272000 contractor work start. Owner requires a minimum of 5 days to review test documents prior to network start up.

1.2 Contractor Qualifications/Quality Assurance

A. Safety and Indemnity
1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 “1.5 A. Safety & Indemnity”.

B. Contractor Qualifications
1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 “1.5 B. Contractor Qualification”.

C. Quality Assurance
1. Contractor shall comply with all requirements as specified in Section 270000 “1.5 Quality Assurance”.

D. Warranty
1. Contractor shall comply with all requirements as specified in Section 270000 “1.8. Acceptance & Warranties”.
2. The bid package shall be accompanied by a warranty commitment binding the awarded contractor and manufacturer to a Lifetime Structured Cabling Warranty with guaranteed performance criteria set forth in this document and/or set forth by the Manufacturer. Contractor must be trained and certified in the installation of the Manufacturer system proposed. Contractor shall submit proof of current certification in the Certified Installer Program as a Premier or Authorized Network Installer in order to install and fully warrant the Cabling System. Copy of current Certificate must be included in Proposal if not already on file with Architect/Consultant/Owner.
3. A Lifetime warranty (or 25yr minimum) for the structured cabling system shall be provided for an end-to-end permanent link model installation which covers the performance of the cable, connecting hardware and the labor cost for the repair or replacement of the link.
4. Links failing test parameters or producing marginal pass results will be retested

or replaced at Contractor expense until link test results passing TIA/EIA Standard parameters for the category rating or better are achieved.

5. Warranty application is to be submitted in advance of the project start, and full test reports shall be delivered to Manufacturer within 15 days of project completion. Lifetime Manufacturer warranty processing is to be completed by Contractor and warranty certificate delivered to owner upon project completion.

1.3 Submittal Documentation

A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule, and Section 270000 “1.6 Submittal Documentation”.

1.4 Equivalent Products

A. All Products Leviton, Berk-Tek, Superior Essex, and Chatsworth form the basis of design for this Specification. Part numbers, where provided, exemplify the feature set expected to be provided for this Structured Cabling Plant.

B. Pre-Approved Equals:
1. None, all alternate materials must be submitted for approval prior to bid.

C. Structured cabling manufacture system warranties shall be Limited Lifetime or 25-year.

D. Contractors wishing to approve a system other than those specified in this document shall do so in accordance with Section 270000 “1.7 Equivalent Products”.

1.5 Typical configurations

A. All room configurations are based on the “Learning Wall” and entry door. All locations shall be installed per plan. Classrooms shall have on average 17 Cat6A cables in each room;
1. Entry door shall have ONE Cat6A cable for IP wall phone (one voice).
2. Four (4) Cat6A cables, with two on each side of the whiteboard (two data, two voice)
3. Student work area shall have eight (8) Cat6A cables (8 data)
4. Ceiling area shall have four (4) Cat6A cables (one for the A/V projector, one for the A/V switcher, and two for wireless access point). A red colored dot is to be placed on the ceiling grid to mark the location of these four cables.
5. Depending on the orientation of the room, two additional Cat6A cables may be added to allow for teacher flexibility.

B. Computer labs shall have 48 Cat6A cables in each room
1. Entry door shall have ONE Cat6A cable for IP wall phone (one voice).
2. Computer labs shall have FORTY Cat6A cables.
3. Standard A/V classroom install is included: A/V Control Panel, two input modules, and either wall or pole mounts.
4. Ceiling area shall have four Cat6A cables (one A/V projector, one A/V switcher, two wireless access point). A red colored dot is to be placed on the ceiling grid to mark the location of these four cables.

5. Three Cat6A for the teacher (phone, computer, and printer).

C. All rooms shall be field verified prior to installation.

PART 2 – PRODUCTS

2.1 Work Area Subsystem

A. The Work Area shall consist of the connectivity equipment used to connect the horizontal cabling subsystem and the equipment in the work area. The connectivity equipment shall include the following options:
- Patch Cords
- Modular Inserts and Jacks
- Faceplates

1. Category 6A Outlet Patch Cords
   - *OWNER PROVIDED*

B. Modular Inserts and Jacks
1. Category 6A Keystone Jack (for Wireless and other uses as specified)
   - Jacks must meet or exceed the Category 6A standard.
   - Jacks shall be 8-position 8-conductor RJ45-style and must have "retention- force technology" or equivalent feature to prevent time damage over the life of the jack regardless of use
   - Jacks shall be 8 position un-keyed
   - Jack shall be rear-terminated industry- standard 110 IDC. Lead-frame jacks shall not be used in this Cable Plant.
   - Jacks shall have a designation indicating Category 6A on the nose which can be plainly seen from the front of the faceplate. Bottom of jack shall have date code.
   - Jacks shall utilize a paired punch down sequence. Cable pair twists shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
   - Jacks shall terminate 22-26 AWG stranded or solid conductors.
   - Jacks shall be compatible with single conductor 110 impact termination tools.
   - Jacks shall have an attached color coded wiring instruction label housed between the IDC termination towers.
   - Jacks shall be manufactured in the USA
   - Jacks shall be compatible with TIA/EIA 606 color code, and have removable high-visibility color labels designating pair locations. Split-colored T568A/B labels are not approved.
   - Jacks shall utilize pair-separation towers for ease of untwisting pairs, and shall employ a snap-on rear termination cover designed for suppression and isolate of cross-talk of neighboring connectors.
   - Jacks will be terminated according to theT568B wiring scheme.
   - Color:
     Data Jacks will be BLUE
     Voice Jacks will be WHITE
     Wireless Jacks will be YELLOW

A/V Jacks will be GRAY
Camera Jacks will be PURPLE

- Quantity: Contractor will provide and install one jack for every outlet cable shown on the drawings.
  Part#:
  Data Jacks will be 6110G-RL6
  Voice Jacks will be 6110g-RW6
  Wireless Jacks will be 6110G- RY6
  A/V Jacks will be 6110G-RG6
  Camera Jacks will be 6110G-RP6

2. Category 6A Keystone Jack (for General-Purpose Data/Voice applications)
   - Jacks must exceed the Category 6 standard, and must be Component-Rated for performance.
   - Jacks shall be 8-position 8-conductor RJ45-style and must have "retention- force technology" or equivalent feature to prevent time damage over the life of the jack regardless of use
   - Jacks shall be 8 position un-keyed
   - Jack shall be rear-terminated industry- standard 110 IDC. Lead-frame jacks shall not be used in this Cable Plant.
   - Jacks shall have a designation indicating Category 6 on the nose which can be plainly seen from the front of the faceplate. Bottom of jack shall have date code.
   - Jacks shall utilize a paired punch down sequence. Cable pair twists shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
   - Jacks shall terminate 22-26 AWG stranded or solid conductors.
   - Jacks shall be compatible with single conductor 110 impact termination tools.
   - Jacks shall have an attached color coded wiring instruction label housed between the IDC termination towers.
   - Jacks shall be manufactured in the USA
   - Jacks shall be compatible with TIA/EIA 606 color code, and have removable high-visibility color labels designating pair locations. Split-colored T568A/B labels are not approved.
   - Jacks shall utilize pair-separation towers for ease of untwisting pairs, and shall employ a snap-on rear termination cover designed for suppression and isolate of cross-talk of neighboring connectors.
   - Jacks will be terminated according to theT568B wiring scheme.
   - Color:
     Data Jacks will be BLUE
     Voice Jacks will be WHITE
     Wireless Jacks will be YELLOW
     A/V Jacks will be GRAY
     Camera Jacks will be PURPLE
   - Quantity: Contractor will provide and install one jack for every outlet cable shown on the drawings.
     Part#:
     Data Jacks will be 6110G-RL6
     Voice Jacks will be 6110G-RW6

Wireless Jacks will be 61110-RY6
A/V Jacks will be 61110-RG6
Camera Jacks will be 61110-RP6

C. Wall Mount and Modular Furniture Faceplates

1. Wall Plates
   - Faceplates shall be UL Listed and CSA Certified
   - Faceplates shall be 2.75" W x 4.5" H (69.8 mm x 114.3 mm)
   - Faceplates shall provide for TIA/EIA 606 compliant station labeling.
   - Faceplates shall have plastic covers over the mounting screws that can be replaced with a clear plastic window over a printable paper insert.
   - Faceplates shall have an industry-standard KEYSTONE opening style, and shall accept any Keystone modular insert.
   - Faceplates shall be made in the U.S.A.
   - Color: Faceplate to be WHITE
   - Quantity: Contractor will provide and install one single gang faceplate for each outlet shown on the drawings.
   - Part#:
     6 Port Face Plate, PN# 42080-6WS 4 Port Face Plate, PN# 42080-4WS 2 Port Face Plate, PN# 42080-2WS
2. Blank Insert
   - Color: Blank Insert to match device place or raceway.
   - Quantity: Contractor will provide and install one insert for every unused port in a faceplate.
     - Part#: 41084-B*B
3. Blank Wall Plates
   - Faceplate shall be constructed from stainless steel.
   - Faceplates shall be UL Listed and CSA Certified
   - Faceplates shall be 2.75" W x 4.5" H (69.8 mm x 114.3 mm) for single gang.
   - Color: Faceplate to be STAINLESS STEEL
   - Quantity: Contractor will provide and install one faceplate for each unused data/voice/video/intercom outlet shown on the drawings.
     - Part#: 84014-40
4. Surface Mount Raceway Insert

   Inserts for Wiremold's 4050, 5450 and 5550 Device Mounting Brackets
   - Insert shall allow for two category 6 jacks to be mounted flush.
   - Insert shall match the color of the Raceway installed.
   - Color: Faceplate to be IVORY
   - Quantity: Contractor will provide and install one 2-port insert for each outlet in the Surface Mount Raceway shown on the drawings.
   - Part#: Equal to Wiremold, PN# 5507-FRJ

2.2 Horizontal Distribution Cabling

The horizontal distribution cabling system is the portion of the telecommunications cabling system that extends from the Work Area (WA) telecommunications outlet/connector to the horizontal cross-connect in the Telecommunications Room (TR).

- Cabling Support System
- Copper Station Cabling
- Copper Cross-Connect Cabling

A. Copper Station Cable

1. Category 6A Unshielded Twisted Pair (UTP) Cable
   - Cable will meet or exceed the proposed requirements of ANSI/TIA 568-C.2 and ISO/IEC 11801 Category 6 Cable Standard for: NEXT and ELFEXT (Pair-To-Pair and Power Sum), Insertion Loss (Attenuation), Return Loss, PSANEXT, and Delay Skew.
   - Cable shall be proven to support 10 Gigabit Ethernet / 10GBASE-T, Gigabit Ethernet / IEEE 802.3an, Gigabit Ethernet / 1000BASE-T / IEEE 802.3ab, ATM up to 155 Mbps, IEEE 802.3af Power Over Ethernet for VoIP, 100 Mbps Fast Ethernet / 100BASE-T / IEEE 802.3, ANSI.X3.263 FDDI TP-PMD, Ethernet / 10BASE-T / IEEE 802.3, 4 & 16 Mbps Token Ring / IEEE 802.5, T1/E1, xDSL, ISDN, 550 MHz Broadband Video and standards under development such as ATM at 622 Mbps, 1.2 and 2.4 Gbps.
   - The cable shall consist of four unshielded twisted pairs of thermoplastic insulated bare copper enclosed in a thermoplastic jacket.
   - All cable shall conform to the requirements for communications circuits defined by the California Electrical Code (Article 800) and the Canadian Building Code. Cable listed to CEC Article 800-51(a) will be used for "Plenum" installations. Cable listed to CEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor.
   - Cable shall have been certified with the UL 1666 Vertical Tray Flame Test.
   - Cable shall be available in a Plenum, Riser and Indoor/Outdoor rated jackets.
   - Contractor will use the indoor/outdoor rated cable for all locations where the cable pathway goes underground and/or run in exterior conduit.
   - Cables shall be made in the U.S.A.
   - The listed Category 6A cables in this specification are manufactured by Berk- Tek
   - Color:
     Data cable jacket will be BLUE
     Data cable for Security Cameras will be PURPLE
   - Quantity: See Drawing for quantity and installation details.
   - Part#:
     For Riser Application:
     Berk-Tek LANmark-10G2, PN# 11084689
     For Plenum Application:
     Berk-Tek LANmark-10G2, PN# 11085339
     For Indoor/Outdoor
     Application: Berk-Tek
     LANmark 10G OSP
2. Category 6 Unshielded Twisted Pair (UTP) Cable
   - Cable will meet or exceed the proposed requirements of ANSI/TIA/EIA 568- C.2, 568-B.2 Addendum #1 and ISO/IEC 11801 Category 6 Cable Standard for: NEXT and ELFEXT (Pair-To-Pair and Power Sum), Insertion Loss (Attenuation), Return Loss, and Delay Skew.
   - Cable shall be proven to support Gigabit Ethernet / 1000BASE-T / IEEE 802.3ab, ATM up to 155 Mbps, IEEE 802.3af Power Over Ethernet for VoIP, 100 Mbps Fast Ethernet / 100BASE-T / IEEE 802.3, ANSI.X3.263 FDDI TP- PMD, Ethernet / 10BASE-T / IEEE 802.3, 4 & 16 Mbps Token

Ring / IEEE 802.5, T1/E1, xDSL, ISDN, 550 MHz Broadband Video and standards under development such as ATM at 622 Mbps, 1.2 and 2.4 Gbps.

- The cable shall consist of four unshielded twisted pairs of thermoplastic insulated bare copper enclosed in a thermoplastic jacket.
- All cable shall conform to the requirements for communications circuits defined by the California Electrical Code (Article 800) and the Canadian Building Code. Cable listed to CEC Article 800-51(a) will be used for "Plenum" installations. Cable listed to CEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor.
- Cable shall have been certified with the UL 1666 Vertical Tray Flame Test.
- Cable shall be available in a Plenum, Riser and Indoor/Outdoor rated jackets.
- Contractor will use the indoor/outdoor rated cable for all locations where the cable pathway goes underground and/or run in exterior conduit.
- Cables shall be made in the U.S.A.
- The listed Category 6 cables in this specification are manufactured by Berk- Tek
- Color:
  Data cable jacket will be BLUE
  Data cable for Security Cameras will be PURPLE
- Quantity: See Drawing for quantity and installation details.
- Part#:
  <u>For Riser Application:</u>
  Superior Essex PN# 77-240-2A or Berk-Tek PN# 10136339
  <u>For Plenum Application:</u>
  Superior Essex PN# 77-240-2B or Berk-Tek PN# 10136226
  <u>For Indoor/Outdoor Application:</u>
  Mohawk CDT PN# M58772 (all cable jackets will be BLACK)

B. Horizontal Copper Cross-Connect Cabling

1. Voice Cross-Connect Cabling
   - Cable shall meet and/or exceed the UL Listed Type CMR and the ANSI/ICEA S-80-576 standard.
   - Cables shall be made in the U.S.A.
   - Core Construction
     - Conductors: Solid-copper conductors, 24 AWG.
     - Insulation: Flame retardant semi-rigid PVC.
     - Core Assembly: Cable core will be made up of 100 pair units consisting of four (4) 25 pair sub-units. Each group individually identifiable by color coded unit binders.
   - Jacket: Gray, flame retardant PVC jacket.
   - Color: Voice cable jacket will be GRAY
   - Quantity: See Drawing for quantity and installation details. The number of 25-pair cable between the MDF and the IDF shall be derived by multiplying the number of pairs required for the cross-connect by 1.25 to the nearest 25-pair increment.
   - Part#:

	Superior Essex Cable:	Berk-Tek:
25 pair =	PN# 18-475-33	10032396
50 pair =	PN# 18-579-33	10032471

100 pair = PN# 18-789-33 10032472

2.3 Backbone Cabling

The backbone cabling system is the portion of the telecommunications cabling system that extends from the Intermediate Distribution Frame (IDF) to the Main Distribution Frame (MDF).

- Fiber Optic Backbone Cabling
- Copper Backbone Cabling

A. Fiber Optic Backbone Cabling

1. Data System Backbone Cabling
   - Cable shall be UL/cUL OFNR/OFN FTA rated and be Flame Resistant in accordance with the UL 1666.
   - Cable shall an OSP.
   - Cable shall be constructed utilizing a loose tube design.
   - Cable will be fully water blocked combining overall water blocking tape and a moisture blocking gel for each individual tube.
   - Cable will maintain the following:
     - Crush Resistance (EIA-455-41) = 2000 N/cm
     - Impact Resistance (EIA-455-25) = 2000 Impacts w/1.6 N-m
     - Min Bend Radius:
       Long Term - No Load = 15x Cable diameter Short Term – Load = 20x Cable diameter
     - Operating Temp. = -40°C to +70°C
     - Storage Temp. = -40°C to +80°C
   - Cable shall be constructed of 50/125µ Laser Optimized rated glass capable of:
     1 Gigabit Ethernet Link at 1000m/600m (@850nm/1300nm) 10 Gigabit Ethernet Link at 300m/300m (@850nm/1300nm)
   - ALL FIBER SHALL BE FUSION SPLICED
   - The Fiber Optic Cable in this specification is manufactured by Berk-Tek
   - Color: Fiber Optic cable jacket will be Black
   - Quantity: See Drawing for quantity and installation details.
   - NOTE: HYBRID CABLES ARE PREFERRED OVER SEPARATE RUNS OF EACH TYPE OF CABLE. PROVIDE JUSTIFICATION IF YOU ARE NOT ABLE TO USE THE HYBRID CABLE.
   - THE CABLES LISTED BELOW ARE ARMORED CABLE. CONTRACTOR IS REPOSNBILE TO VERIFY DIAMETER OF CABLES NEEDED VERSUS AVAILBLE CONDUIT PATHWAY. ARMORED CABLE IS PREFERRED FOR ANY CABLING BETWEEN BULDINGS. IF ARMORED CABLE CANNOT BE USED, CONTRACTOR TO NOTIFY OWNER IN WRITING AT A MIMUMUM OF 30 WORKING DAYS PRIOR TO CABLE INSTALLATION.
   - Field Breakout Kits: Leviton PN# 49887-12S is to be used for all cables more than 6 strands. Six strand cables will use 49887-06S. Provide two kits per buffer tube to be terminated.

     6 Strand Armored Single Mode Fiber (needs two breakout kits)
     Equal to Berk-Tek, PN# OPRK006AB0403

.

12 Strand Armored Single Mode Fiber (needs two breakout kits)
Equal to Berk-Tek, PN# OPRK012AB0403

24 Strand Armored Single Mode Fiber (needs four breakout kits)
Equal to Berk-Tek, PN# OPRK12B024AB0403

36 Strand Armored Single Mode Fiber (needs six breakout kits)
Equal to Berk-Tek, PN# OPRK12B036AB0403

48 Strand Armored Single Mode Fiber (needs eight breakout kits) Equal to Berk-Tek, PN# OPRK12B048AB0403

60 Strand Armored Single Mode Fiber (needs ten breakout kits)
Equal to Berk-Tek, PN# OPRK12B060AB0403

72 Strand Armored Single Mode Fiber (needs twelve breakout kits) Equal to Berk-Tek, PN# OPRK12B072AB0403

6 Strand Armored Multi Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# OPRK006EB3010/25

12 Strand Armored Multi Mode Fiber (needs two breakout kits)
Equal to Berk-Tek, PN# OPRK012EB3010/25

24 Strand Armored Multi Mode Fiber (needs four breakout kits)
Equal to Berk-Tek PN#OPRK12B024EB3010/25

36 Strand Armored Multi Mode Fiber (needs six breakout kits) Equal to Berk-Tek PN#OPRK12B036EB3010/25

48 Strand Armored Multi Mode Fiber (needs eight breakout kits)
Equal to Berk-Tek PN#OPRK12B048EB3010/25

60 Strand Armored Multi Mode Fiber (needs ten breakout kits)
Equal to Berk-Tek PN#OPRK12B060EB3010/25

72 Strand Armored Multi Mode Fiber (needs twelve breakout kits) Equal to Berk-Tek PN#OPRK12B072EB3010/25

Hybrid 6 Armored Strand Multi Mode, 6 Strand Single Mode Fiber (needs 2 breakout kits)
Equal to Berk-Tek, PN# OPRK012-006EB3010/25-006AB0403

Hybrid 12 Armored Strand Multi Mode, 12 Strand Single Mode Fiber (needs 4 breakout kits)
Equal to Berk-Tek, PN# OPRK12B024-012EB3010/25-012AB0403

Hybrid 18 Armored Strand Multi Mode, 18 Strand Single Mode Fiber (needs 6 breakout kits)

Equal to Berk-Tek, PN# OPRK12B036-018EB3010/25-018AB0403

Hybrid 24 Armored Strand Multi Mode, 24 Strand Single Mode Fiber (needs 8 breakout kits)
Equal to Berk-Tek, PN# OPRK12B048-024EB3010/25-024AB0403

Hybrid 36 Armored Strand Multi Mode, 36 Strand Single Mode Fiber (needs 12 breakout kits)
Equal to Berk-Tek, PN# OPRK12B072-036EB3010/25-036AB0403

Hybrid 48 Armored Strand Multi Mode, 48 Strand Single Mode Fiber (needs 16 breakout kits)
Equal to Berk-Tek, PN# OPRK12B096-048EB3010/25-048AB0403

Hybrid 60 Armored Strand Multi Mode, 60 Strand Single Mode Fiber (needs 20 breakout kits)
Equal to Berk-Tek, PN# OPRK12B120-060EB3010/25-060AB0403

Hybrid 72 Armored Strand Multi Mode, 72 Strand Single Mode Fiber (needs 24 breakout kits)
Equal to Berk-Tek, PN# OPRK12B144-072EB3010/25-072AB0403

NON-ARMORED CABLE – NOTIFY OWNER WITH JUSTIFICATION AS TO WHY THE NON-ARMORED CABLE IS RECOMMEND FOR USE BY CONTRACTOR AT LEAST 30 WORKING DAYS PRIOR TO SCHEDULE INSTALLATION.

6 Strand Single Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# OPR006AB0403
.
12 Strand Single Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# OPR012AB0403

24 Strand Single Mode Fiber (needs four breakout kits) Equal to Berk-Tek, PN# OPR12B024AB0403

36 Strand Single Mode Fiber (needs six breakout kits) Equal to Berk-Tek, PN# OPR12B036AB0403

48 Strand Single Mode Fiber (needs eight breakout kits)
Equal to Berk-Tek, PN# OPR12B048AB0403

60 Strand Single Mode Fiber (needs ten breakout kits) Equal to Berk-Tek, PN# OPR12B060AB0403

72 Strand Single Mode Fiber (needs twelve breakout kits)
Equal to Berk-Tek, PN# OPR12B072AB0403

6 Strand Multi Mode Fiber (needs two breakout kits)
Equal to Berk-Tek, PN# OPR006EB3010/25

12 Strand Multi Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# OPR012EB3010/25

24 Strand Multi Mode Fiber (needs four breakout kits) Equal to Berk-Tek PN#OPR12B024EB3010/25

36 Strand Multi Mode Fiber (needs six breakout kits) Equal to Berk-Tek PN#OPR12B036EB3010/25

48 Strand Multi Mode Fiber (needs eight breakout kits) Equal to Berk-Tek PN#OPR12B048EB3010/25

60 Strand Multi Mode Fiber (needs ten breakout kits) Equal to Berk-Tek PN#OPR12B060EB3010/25

72 Strand Multi Mode Fiber (needs twelve breakout kits) Equal to Berk-Tek PN#OPR12B072EB3010/25

Hybrid 6 Strand Multi Mode, 6 Strand Single Mode Fiber (needs 2 breakout kits)
Equal to Berk-Tek, PN# OPR012-006EB3010/25-006AB0707

Hybrid 12 Strand Multi Mode, 12 Strand Single Mode Fiber (needs 4 breakout kits)
Equal to Berk-Tek, PN# OPR024-012EB3010/25-012AB0403

Hybrid 18 Strand Multi Mode, 18 Strand Single Mode Fiber (needs 6 breakout kits)
Equal to Berk-Tek, PN# OPR036-018EB3010/25-018AB0403

Hybrid 24 Strand Multi Mode, 24 Strand Single Mode Fiber (needs 8 breakout kits)
Equal to Berk-Tek, PN# OPR048-024EB3010/25-024AB0403

Hybrid 36 Strand Multi Mode, 36 Strand Single Mode Fiber (needs 12 breakout kits)
Equal to Berk-Tek, PN# OPR12B072-036EB3010/25-036AB0403

Hybrid 48 Strand Multi Mode, 48 Strand Single Mode Fiber (needs 16 breakout kits)
Equal to Berk-Tek, PN# OPR12B096-048EB3010/25-048AB0403

Hybrid 60 Strand Multi Mode, 60 Strand Single Mode Fiber (needs 20 breakout kits)
Equal to Berk-Tek, PN# OPR12B120-060EB3010/25-060AB0403

Hybrid 72 Strand Multi Mode, 72 Strand Single Mode Fiber (needs 24 breakout kits)
Equal to Berk-Tek, PN# OPR12B144-072EB3010/25-072AB0403

B. Copper System Backbone Cabling

1. Voice System Backbone Cabling
   - Cable shall meet or exceed those specified in RUS Bulletin 1753F-208 (REA PE-89)
   - Cables shall be made in the U.S.A.
   - Core Construction
     - Conductors: Solid, annealed copper, 24 AWG unless otherwise noted on design documents.
     - Insulation: Dual insulation consisting of an inner layer of foamed polyolefin skin, colored coded in accordance with industry standards
     - Core Assembly: Cables of 25 pairs and less formed by assembling pairs together in a single group. Cables of more than 25 pairs formed by twisted pairs arranged in groups with each group having a color coded unit binder.
     - Filling Compound: The entire core assembly completely filled with ETPR compound, filling the interstices between the pairs and under the core tape.
     - Core Wrap: Non-hygroscopic dielectric tape applied longitudinally with an overlap.
     - Sheath Construction
     - Aluminum Shield: Corrosion protected plastic coated, corrugated 0.008" aluminum tape.
   - Jacket: Black, linear low-density polyethylene.
   - Color: Voice cable jacket will be BLACK
   - Quantity: See Drawing for quantity and installation details. The number of 25-pair cable between the MDF and the IDF shall be derived by multiplying the number of pairs serving the individual telephone handsets by 1.25 to the nearest 25-pair increment.
   - Part#: Equal to Superior Essex
     Cable: 25 pair = PN# 09-097-02
     50 pair = PN# 09-100-02
     100 pair = PN# 09-104-02
     200 pair = PN# 09-108-02

2.4 Telecommunication Room

The Telecommunication Room (TR) includes those products that terminate horizontal and backbone cabling subsystems and connect then to the network equipment.

- Patch Cords
- Horizontal Cabling Termination Equipment
- Backbone Cabling Termination Equipment
- Cabinets, Racks, and Enclosures
- Cable Support System

A. Patch Cords

1. Copper Patch Cords

1.1 Category 6 and Category 6A Data/Voice TR Patch Cords
- *OWNER PROVIDED*

1.2 Data to Voice TR Patch Cords
- *OWNER PROVIDED*

2. Fiber Patch Cords
   2.1 Fiber Optic TR Multimode Patch Cords
   - *OWNER PROVIDED*

   2.2 Fiber Optic TR Singlemode Patch Cords
   - *OWNER PROVIDED*

B. Horizontal Cable Termination Equipment
1. Copper Termination Equipment
   1.1 Data Category 6 and 6A Patch Panels
   - Panels shall be made of black 16-gauge steel in 24 port configurations.
   - Panels shall have optional rear cable support bar for strain relief. Cable support bar shall attach to the rear of the patch panel itself without the use of additional fasteners or screws.
   - Panels shall have write-on blocks and port numbers are silk-screened in white.
   - Panels shall provide wiring identification & color code and maintain an in-line, paired punch down sequence that does not require the splitting of conductors from individual cable pairs.
   - The panel shall accept all QuickPort modules and feature white write-on front labels.
   - Panels shall be ANSI/TIA/EIA-568-C.1, C.2 and ISO/IEC 11801 category 6 compliant.
   - Panels shall be UL LISTED 1863 and CSA certified.
   - Panels shall be made by an ISO 9002 Certified Manufacturer.
   - Panels shall be made in the U.S.A.
   - Color: Patch Panel shall be BLACK
   - Quantity: See Drawing for quantity and installation details. The number of patch panels to be supplied shall be derived by multiplying the number of data/voice cables being terminated at the individual TR by 1.25 and providing additional panels in the nearest 24 port increment.
   - Part#:

     24-port Category 6 patch panel, angled recessed, 4W256-H24

     INSTALLATION NOTE: When installing the 24-port patch panel, install two together and provide 1U of rack space for equipment installation then two panels, 1U of space, etc. VERIFY WITH OWNER RACK/CABINET LAYOUT PRIOR TO INSTALLATION.

   1.2 Voice Termination Block (Intercom Backbone and Intercom Devices)
   - Pair Capacity 50
   - Blocks shall be wall mounted.
   - Terminates 22 - 26 AWG (0.81 - 0.41mm) solid insulated cable or 18 - 19 AWG (1.02 - 0.91mm) solid stripped cable
   - Blocks shall have stand-off legs included for all locations; S89 series stand- off bracket
   - Made from High impact flame retardant thermoplastic
   - Height: 254mm (10 in.), width: 86.4mm (3.4 in.), depth: 30.5mm (1.2 in.)
   - Part#: Leviton or equal
     Termination block, 40066-
     M50 Mounting bracket,

40089-00D

C. Backbone Cable Termination Equipment

1. Connectors
   1.1 Fiber Optic Connectors
   - *Anaerobic & Mechanical terminations will not be accepted.*

   1.2 Fusion-Fiber Pigtail Fusion Splice Module
   - Integrated module adapter bulkhead for 12 or 24 fibers with self-contained splice holders
   - Individual compartments provide slack storage and bend radius guides for respective backbone cable, 900µm tight buffer pigtails, and fusion spliced fibers
   - 12-fiber color-coded 900µm tight buffer pigtails 1.5m length are pre-loaded in module per specific configuration
   - Modular design allows for ease of maintenance of individual spliced fiber and allows for scaling up without impacting existing fibers
   - Included accessory kit consists of heat shrink style splice sleeves, tie wraps, and mesh sleeve
   - Installs in Leviton's Opt-X rack mount (Ultra, 1000i, and 500i) and wall mount fiber enclosures
   - Zirconia ceramic ferrules and sleeves used
   - 12-fiber splice module configurations will utilize duplex LC adapters
   - 24-fiber splice module configurations will utilize quad LC adapters
   - ALL FIBER SHALL BE FUSION SPLICED
   - Quantity: See Drawing for quantity and installation details.
   - Part #: Leviton or equal
   - 12-strand Singlemode, SPLCS-12L
   - 24-strand Singlemode, SPLCS-24L
   - 12-strand Singlemode Fusion Splice pigtail kit, UPPLC-KIT

2. Fiber Termination Panels
   2.1 IDF Rack Mount Fiber Panel
   - Fiber panels shall be constructed of durable polycarbonate plastic and black powder-coated 16-gauge steel
   - Panel shall have a sliding tray which removes completely from enclosure to facilitate field terminations and splicing
   - Sliding tray with front and rear stop shall glide forward and backward providing accessibility to front and rear of bulkhead after installation
   - Panel shall have a 17" depth for high-density fiber termination and/or splicing
   - Front saddles shall pivot for improved patch cord routing and organization
   - Removable transparent hinged doors and slide-away covers shall allow for easy access during install and visibility of interior after install
   - Panel shall employ patch cord bend radius guides to minimize macro bending
   - Stackable and adjustable fiber rings simplify cable management
   - Panel shall be no more than 1 rack unit in height and shall hold up to 3 adapter plates.
   - Panel shall be Made in the U.S.A

- ALL FIBER SHALL BE FUSION SPLICED
- COLOR: black with translucent blue cover panels
- Quantity: See Drawing for quantity and installation details.
- Part#: Leviton Opt-X SDZ 2000i no exceptions
  1U - 5R1UH-S03

2.2 IDF Wall Mount Fiber Enlosure

- Panels shall be constructed of cold rolled 16 gauge steel with a black powder paint finish and provide for fully enclosed fiber termination.
- Panel shall have a door design. One door shall be lockable for the "technician side" that secures the incoming and outgoing fiber cables. The second door shall accessible to provide fiber patching as needed.
- Panels shall accept four adapter panels for 24 port configurations.
- Panels shall have a splice tray mounting stud incorporated into the base for mounting of mechanical or fusion splice trays. Panel shall have cable management anchor points and come with cable anchors allowing for the maintenance of the incoming cable with the proper minimum bend radius.
- Panels shall have cable entrance ports on the top and bottom with removable plastic dust covers.
- ALL FIBER SHALL BE FUSION SPLICED
- Color: Fiber Panel will be BLACK
- Quantity: See Drawing for quantity and installation details.
- Part: 5W320-00N

2.3 MDF Rack Mount Fiber Panel

- Fiber panels shall be constructed of durable polycarbonate plastic and black powder-coated 16-gauge steel
- Panel shall have a sliding tray which removes completely from enclosure to facilitate field terminations and splicing
- Sliding tray with front and rear stop shall glide forward and backward providing accessibility to front and rear of bulkhead after installation
- Panel shall have a 17" depth for high-density fiber termination and/or splicing
- Front saddles shall pivot for improved patch cord routing and organization
- Removable transparent hinged doors and slide-away covers shall allow for easy access during install and visibility of interior after install
- Panel shall employ patch cord bend radius guides to minimize macro bending
- Stackable and adjustable fiber rings simplify cable management
- Panel shall be 2 or 4 rack units in height and shall hold up to 6 or 12 adapter plates, respectively
- Panel shall be Made in the United States
- ALL FIBER SHALL BE FUSION SPLICED
- COLOR: black with translucent blue cover panels
- Quantity: See Drawing for quantity and installation details.
- Part#: Leviton Opt-X SDX 2000i no exceptions
  2U - 5R2UH-S06
  4U - 5R4UH-S12

2.4 Premise Splice Enclosures – Portable Classroom Distribution

- Modular wall-mount enclosures used to directly splice outside plant or intra- building cables
- Four fusion/mechanical splice trays; 4" Standard Splice Tray, 4" x 11.75" x 0.25" # T4LHS-P06
- Constructed of cold-rolled steel
- ALL FIBER SHALL BE FUSION SPLICED
- CPS-24, Customer Premise Splice Enclosure, empty (2 tray capacity)
- Part#: CPS24-STD

2.5 Fiber Optic Adapter Plates

- The Fiber adapter plate shall precision molded and compatible with all approved panels and enclosures (rack- or wall-mount).
- The adapter plate shall be offered in LC style in 12 or 24 fiber configurations per plate.
- The adapter plate shall be compliant to TIA-568-C.3 (for performance) and respective TIA-604-X (for intermateability) standards.
- Adapter plates shall use zirconia ceramic sleeves and be offered in standard fiber type colors pursuant to TIA-568-C.3 standards.
- The adapter and plate shall be integrated using precision-molded injection manufacturing methods, to eliminate “rattle” and loose fit.
- Adapter plates shall be made in the United States of America.
- Meets TIA-604-10B (LC) for connector intermateability
- ALL FIBER SHALL BE FUSION SPLICED
- COLOR: Aqua for Multimode, Blue for Singlemode, Black for blank plates
- Part #:
  6-port Duplex LC MM Adapter Panel, 5F100-
  2QL 6-port Duplex LC SM Adapter Panel,
  5F100-2LL Blank Adapter Panel, 5F100-PLT

2.6 Fiber Optic OSP Splice Enclosures

- Used to directly splice outside plant or intra-building cables.
- Accommodates various splice tray designs, Maximum Capacity: 96 single fibers using 5" x 7" and 4" x 7" trays
- Enclosure mode from 16-gauge steel, Hinges shall be Stainless steel
- Two-year limited product warranty.
- Durable powder-coat finish COLOR: Beige
- Size 16" x 15" x 3.4"
- ALL FIBER SHALL BE FUSION SPLICED
- Part #: Leviton CPS Customer Premise Splice Enclosure, Single Door, 24 Fiber Trays # CPS24-STD
  Injection Molded Mini Splice Tray, Heat Shrink style (accepts standard sleeves), up to 12 fiber splicing # T5PLS-12F
  Splice Tray Mounting Hardware Kit # SPLMT-HKT
  Splice Sleeve, 40 mm # FSSSD-040
  Cable clamp kit # CPCSR-001 & CPCSR-002
  Grounding kit # CPGRD-KIT
  Key Locking kit # CPLOK-KIT

3. Copper Termination Panels

3.1 OSP Protection Panels (Intercom Backbone Headend)

- 16 AWG Powder Coated Steel Construction
- Equipped with an Internal 26 AWG Fuse Link
- External Ground Connectors Accept 6 - 14 AWG Wire
- Industry Standard 5 Pin Design
- Exceeds UL497 Primary Protection Standards
- Stackable with Connection Grommets Included
- 66 Block Accepts 22 - 26 AWG Wire/18 - 19 AWG Stripped Solid Copper Wire
- Color: NA
- Quantity: See Drawing for quantity and installation details.
  Part#: Circa Enterprise inc.
  25 pair block, PN# 1890ECT1-25
  50 pair block, PN# 1890ECT1-50
  100 pair block, PN# 1890ECT1-100

3.2 OSP Protection Fuses

- 240VDC (RUS Approved)
- Nanosecond response time
- External failsafe mechanism that permanently carbon arrestors grounds the module under sustained high current conditions
- Integrated Test Points
- UL & cUL listed
- Designed to meet or exceed Telcordia standards
- ISO 9002 Certified Manufacturer
- Color: RED
- Quantity: See Drawing for quantity and installation details.
  Part#: Circa Enterprise inc. 4B1SF-240
  **Provide 100% fuse density for all installed Protection Panels.*

3.3 Voice Termination Block (Intercom Backbone building/TC and Intercom Devices)

- Pair Capacity 50
- Blocks shall be wall mounted.
- Terminates 22 - 26 AWG (0.81 - 0.41mm) solid insulated cable or 18 - 19 AWG (1.02 - 0.91mm) solid stripped cable
- Blocks shall have stand-off legs included for all locations; S89 series stand- off bracket
- Made from High impact flame retardant thermoplastic
- Height: 254mm (10 in.), width: 86.4mm (3.4 in.), depth: 30.5mm (1.2 in.)
- Part#:
  Leviton 66-Style Termination block, 40066-M50 Leviton 66-Style Mounting bracket, 40089-00D

D. Cabinets, Racks, and Enclosures

Contractor will provide the following 'HC' Enclosures and components based on the number of cables to that will be terminated:

1. Cabinets:
   - Wall-mounted cabinets shall be manufactured from steel sheet.
   - Each cabinet will have a rear panel that attaches to the wall, a hinged

cabinet body that swings open from the rear panel providing easy access to the rear of equipment and a locking front door.

- The rear panel will provide cable access with pre-punched knockouts, up to 3", for conduit along the top and bottom edges of the panel. There will also be cutouts in the back of the rear panel so that cables can enter the panel through the wall. The rear panel will provide attachment points for accessory equipment mounting brackets and cable tie points within the panel (cabinet).
- The cabinet body will include a single pair of vertical 19" EIA equipment mounting rails. The mounting rails will be EIA-310-D compliant with the Universal hole pattern. Mounting holes will have #12-24 threads.
- Mounting rails will be adjustable in depth so that they can be positioned at any point within the cabinet body. The design of all cabinets will allow an additional pair of mounting rails (for a total of two pairs of mounting rails per cabinet) to be added to the cabinet.
- The wall-mount cabinet shall provide a hinge design that attaches the cabinet body and the rear panel and allow the rear panel to be removed during installation. The hinge design will allow the cabinet body to open at least 90°. The hasp used to secure the rear panel and the cabinet body together will assist in drawing the components together during the locking action.
- The cabinet body will include vents that are designed to accept fan kits.
- The front door will be hinged and locking. The front door and rear panel will be keyed alike. The front door will have rounded edges and corners. The cabinet body will allow the front door to be attached so that it will swing open from the right or left. The cabinet manufacture shall provide an option for a solid or a tinted plexi-glass window front door. The plexi-glass in doors shall be bronze acrylic (not clear) with a UL flammability classification of 94HB or better.
- Finish shall be epoxy-polyester hybrid powder coat (paint).
- The cabinet shall have the option of being delivered fully assembled. All cabinets will include installation hardware (hex lag screws) for wood studs and 50 each #12-24 equipment mounting screws.
- Load bearing capacity for cabinets that wall-mount will be a minimum of 200 pounds per cabinet.
- Cabinets that are wall-mount only will be certified and UL Listed to standard UL 60950 under category NWIN.
- CONTRACTOR TO INSTALL PROFESSIONALY SO OWNER PROVIDED EQUIPMENT FITS IN THE RACK. VERIFY RAILS ARE PROPERLY ALIGNED SO ALL EQUIPMENT FITS (including UPS, Network equipment, cables, cords, power strip, etc.) AND DOORS CLOSE. VERIFY SPACING BETWEEN PANELS IS ADEQUATE FOR EQUIPMENT INSTALLATION. VERIFY WITH OWNER CABINET LAYOUT FOR PATCH PANELS, ETC BEFORE INSTALLATION.
- Color: Wall Mount Cabinet will be BLACK
- Quantity: See Drawing for size, quantity and installation details.
- Part#:
  Wall Mount Cabinet
  18U Cabinet equal to Chatsworth Products, PN# 11900-
  736 26U Cabinet equal to Chatsworth Products, PN#

11900-748
**Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 12787-5xx.*
Wall/Floor Mount Cabinet
33U Cabinet equal to Chatsworth Products, PN# 13495-
760 40U Cabinet equal to Chatsworth Products, PN#
13495-772
**Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 13276-7xx.*
Fan Kit/Filter Kit
Equal to Chatsworth Products Fan Kit, PN# 12804-701
Equal to Chatsworth Products Filter Kit, PN# 12805-701

Grounding Kit
Equal to Chatsworth Products, PN# 10610-
019 Power Strip with Surge Suppression
Leviton 5500-192

2. Floor Mount 2-post Racks
   - Each rack shall have two L-shaped top angles, two L-shaped base angles and two C-shaped equipment-mounting channels. The rack shall assemble with nut and bolt hardware. The base angles shall be pre-punched for attachment to the floor.
   - Equipment mounting channels shall be 3" (76 mm) deep and punched on the front and rear flange with the EIA-310-D Universal hole pattern, 1-3/4" (44.45 mm) rack-mount spaces (U), to provide 45U, 52U or 58U for equipment. Each mounting space (U) shall be marked and numbered on the mounting channel.
   - When assembled with top and bottom angles, equipment-mounting channels shall be spaced to allow attachment of 19" EIA rack-mount equipment. Equipment attachment points shall be threaded with 12-24 roll-formed threads. The rack shall include assembly and equipment-mounting hardware. Racks shall include 50 each combination pan head, pilot point mounting screws.
   - The assembled rack shall measure 7' (2.1 m)/84" (2133 mm) high, 8' (2.4 m)/96" (2438 mm) high or 9' (2.7 m)/108" (2743 mm) high; 20.3" (515.9 mm) wide and 15" (381.0 mm) deep. The sides (webs) of the equipment-mounting channels shall be punched to allow attachment of vertical cable managers along the sides of the rack or for rack-to-rack baying.
   - Assembly hardware shall electrically bond the top angles, side channels and base angles together when assembled, and there shall be a masked ground attachment point with 1/4-20 threaded studs spaced 5/8" apart on the inside of the side channel to attach a ground lug allowing easy attachment to the Telecommunications Ground.
   - The rack shall be rated for 1,000 lb (453.6 kg) of equipment.
   - Certifications: Communications Circuit Accessory, DUXR and DUXR7 category, file number 140851
   - Material: Steel and aluminum extrusion
   - Construction: Bolted assembly, Ships unassembled
   - VERIFY RACK LAYOUT WITH OWNER PRIOR TO INSTALLATION.
   - Color: BLACK

- Quantity: See Drawing for quantity and installation details.
- Part#: Chatsworth Products Inc.
  Floor Mount 2-Post
  Rack CPI# 55053-703
  Vertical Wire Managers
  Equal to Leviton, PN# 8980L-VFR
  Power Strip with Surge Suppression
  Leviton 5500-192

3. Floor Mount 4-post Racks
   - Four-post frame with threaded mounting holes used to support 19" wide rack- mount communications equipment and shelves
   - For indoor use only, in environmentally controlled areas; may not be used
   - outdoors, in industrial or harsh environments, or in plenum spaces
   - Includes: (1) top pan, (1) bottom pan, (4) mounting channels, (2) base angles, (2) top angles
   - Assembly hardware; (100) #12-24 equipment mounting screws
   - Equipment Support: Front and rear pairs of 3" deep C-shaped equipment mounting channels, Fixed in place, 29" apart front-to-rear, 19" wide, EIA-310- D compliant hole pattern
   - 1-3/4" high rack-mount units (RMU); RMU spaces are marked and numbered on the channels
   - Universal hole pattern, 5/8"-5/8"-1/2" vertical hole spacing
   - Threaded #12-24 equipment mounting holes, Includes 100 each #12-24 equipment mounting screws
   - Load capacity: 2000 lb of equipment
   - Material:; Aluminum extrusion, Aluminum sheet
   - Construction: Bolted assembly, Ships unassembled
   - VERIFY WITH OWNER RACK LAYOUT PRIOR TO INSTALLATION.
   - Color: BLACK
   - Quantity: See Drawing for quantity and installation details.
   - Part#: Chatsworth Products Inc.
     Floor Mount 4-Post Open Frame
     Rack CPI# 15053-703
     Grounding
     Kit 10610-
     019
     Power Strip with Surge Suppression
     Leviton 5500-192

4. Floor Mount Cabinets
   - Four-post frame with threaded mounting holes used to support 19" wide rack- mount communications equipment and shelves
   - For indoor use only, in environmentally controlled areas; may not be used
   - outdoors, in industrial or harsh environments, or in plenum spaces
   - Includes: (1) top pan, (1) bottom pan, (4) mounting channels, (2) base angles, (2) top angles
   - Assembly hardware; (100) #12-24 equipment mounting screws
   - Equipment Support: Front and rear pairs of 3" deep C-shaped equipment mounting channels, Fixed in place, 29" apart front-to-rear, 19" wide, EIA-310- D compliant hole pattern
   - 1-3/4" high rack-mount units (RMU); RMU spaces are marked and

numbered on the channels
- Universal hole pattern, 5/8”-5/8”-1/2” vertical hole spacing
- Threaded #12-24 equipment mounting holes, Includes 100 each #12-24 equipment mounting screws
- Load capacity: 2000 lb of equipment
- Material:; Aluminum extrusion, Aluminum sheet
- Construction: Bolted assembly, Ships unassembled
- VERIFY WITH OWNER CABINET LAYOUT PRIOR TO INSTALLATION.
- Color: BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Chatsworth Products Inc.
  Floor Mount Cabinet
  CPI# M1050-741
  Grounding
  Kit 10610-
  019
  Power Strip with Surge Suppression
  Leviton 5500-192

5. Outdoor Wireless Access Point Enclosure
   - Non-glass-filled polyester material, UV resistance; Overlapping tongue-and-groove raised cover and gasket provide secure Type 4X seal
   - Removable snap-hinge cover allows for easy access to cover and body for modifications
   - Molded layout grid on inside of body and solid covers assists with component mounting
   - Molded-in embosses for rear panel mounting
   - Internal rail system and adjustable panel blocks allow
   - UL 508A Listed, NEMA/EEMAC Type 4
   - Material: Non-glass-filled polyester
   - Color: Light-Gray
   - Quantity: See Drawing for quantity and installation details.
   - Part#: Pentair
   - Polypro Wifi, PN# D16148WF

E. Cable Support System
1. Ladder Rack Cable Runway
   - Stringers shall be fabricated from 16ga .375” x 1.5” Cold Rolled Steel tubing.
   - Rungs shall be fabricated from 16ga .5” x 1.0” Cold Rolled Steel tubing
   - Rungs shall be spaced at 9.0” center to center
   - A straight length of ladder shall be capable of supporting 45 pounds per foot when a 10’ length is tested according to NEMA VE-1.
   - Ladder Rack shall have a powder coat finished.
   - Ladder Rack shall be available in standard 6ft. and 10ft. lengths.
   - Ladder rack shall be a part of a total system that includes: manufacture bends, wall supports, joining hardware, etc.
   - Ladder Rack shall be grounding per the TIA/EIA 607-A.
   - Color: Ladder Rack will be BLACK
   - Quantity: See Drawing for quantity and installation details.
   - Part#: Equal to Chatsworth Products Cable Raceway, PN# 11252-71X

PART 3 – BACKBONE SLACK LOOPS

- Storage rings may be used to store coiled slack loops on backboard.
- Part #:
  Fiber storage rings, Indoor fiber: 48900-IFR Fiber storage rings,
  Outdoor fiber: 48900-OFR

PART 4 – EXECUTION

4.1 Installation

A. Work Area Outlets Installation

- No more than 12” of cable shall be stored in an outlet box, modular furniture raceway, or insulated walls.
- Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
- The cable jacket shall be maintained to within 12.7mm (½ inch) of the termination point.
- All UTP cables shall have no more than 6.4mm (1/4 inch) of pair *untwisted* at the termination point.
- Data jacks, unless otherwise noted in drawings, shall be located in the top position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the left-most position(s).
- Voice jacks, unless otherwise noted in drawings, shall occupy the next position(s) below the data on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the position left of the data jack.
- Video jacks, unless otherwise noted in drawings, shall occupy the bottom position(s) on the faceplate. Video jacks in horizontally oriented faceplates shall occupy the position left of the data/voice jack.
- All faceplates installed shall be level.
- All outlets will be labeled according to the approved labeling scheme.
- Each faceplate shall be machine labeled. The labeling shall be placed on the faceplate so that the individual jack can be clearly identified by its associated label.
- Cables shall be identified by a self-adhesive label in accordance with the Identification and Labeling section of this specification and ANSI/TIA/EIA-606. The cable label shall be applied to the cable no further than 6” behind termination module, behind the faceplate on a section of cable that can be accessed by removing the cover plate.

B. Horizontal Distribution Cable Installation

- Cable shall be installed in accordance with manufacturer’s recommendations and best industry practices.
- Nylon or plastic locking cable ties, e.g. "Zip-Ties", shall not be used on this project.
- Contractor will provide at least a three foot “service loop” for all station

cables. The service loop will be coiled and secured using Velcro in the accessible ceiling at the conduit stub to the work area outlet box.

- Tie Wraps will not be allowed for supporting, bundling and/or dressing of any station cables on this project.
- Contractor will provide at least a three foot “service loop” for all station cables. The service loop will be coiled and secured using Velcro in the accessible ceiling at the conduit stub to the work area outlet box.
- A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in all “common” conduit runs. “Common” Conduit Runs are those that house more than one cable or set of cables that do not specifically feed a Work Station Outlet. Examples of “Common” Conduit Runs are: floor/ceiling penetrations, stub-throughs, distribution conduits, all conduits between J- boxes, etc.
- Cable raceways shall not be filled greater than the Owner’s 40% fill ratio. Contact Owner as needed to understand the Owner’s fill ratio requirement.
- Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
- The cable’s minimum bend radius and maximum pulling tension shall not be exceeded.
- Pulling tension on 4-pair UTP cables shall not exceed 25-lb for a four-pair UTP cable.
- The Cable Support System shall be installed in such a way that will allow for future cables to be added and to provide sufficient protection of all cable.
- For all installs where station cables are not installed in a continuous conduit run the following guidelines will apply. The Contractor will be responsible to reinstall all cables and pathways that do not meet with the following at no additional cost to the Owner:
    - J-hooks shall be installed to support all station cables every 14” – 28” inches.
    - All pathways shall be run at right angles. No diagonal pathways will be allowed unless otherwise noted on the drawings.
        - Horizontal cables shall be bundled in groups of no more than 25 cables per Caddy’s CAT21 J-hook, no more than 40 cables per Caddy’s CAT32 J-hook, and no more than 64 cables per Caddy’s CAT64 J-hook.
    - A separate J-hook is used for each group of cable. Specifically, CAT6A cable, fiber cable, and fire alarm are to have their own J-hook.
    - At no point shall cable(s) rest on acoustic ceiling grids, acoustic panels, or lighting fixtures.
    - All cables will be installed so that there is a minimum of 3” of clearance above all ceiling grid and tiles.
    - All cables will be installed so that there is a minimum of 12” of clearance above all florescent lighting.
    - All cables will be installed so that there is a minimum of 6” of clearance from all fire alarm and electrical system conduits.
    - Cables shall not be attached to the ceiling grid or lighting fixture wires. The contractor will provide their own carriers wires to support their horizontal cabling.
    - All cables shall be installed above fire-sprinkler systems and plumbing system fixtures and devises. Cables shall not be attached

to or supported by these fixtures and/or their ancillary equipment or hardware.
- The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
- Contractor is responsible for sealing around all cables that penetrate fire rated barriers.
- Wireless and overhead cables shall be secured by an in-ceiling mounting bracket affixed to its dedicated ceiling wire or mounted to building structure.

- Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

C. Horizontal Cross-Connect Installation

- Cables shall be cleaned, dressed, and terminated in accordance with the recommendations made in the TIA/EIA-568-A standard, manufacturer's recommendations and best industry practices. Contractor to verify standard network equipment can be installed without any interference from the cables. Equipment typically is installed directly above and/or below the panel.
- The cable jacket shall be maintained to within 12.7mm (½ inch) of the termination point.
- All UTP cables shall have no more than 6.4mm 1/4 inch) of pair *untwist* at the termination point.
- Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
- All cables shall be neatly bundled in groups of 24 and dressed continuously from the entrance point of the Telecommunications Room to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame. Contractor will use Velcro strip to bundle cables together. The use of Tie –Wraps is not permitted.
- Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

D. Backbone Cable Installation

- Backbone cables shall be installed separately from horizontal distribution cables.
- Each individual cable is to be labeled. See details sheets for labeling examples. Cable type, installation date, and from/to are required. Each cable to be labeled at any accessible point, including, but not limited to, pull boxes, Christy boxes, junction boxes, and any pass through location.
- Where possible the backbone and horizontal cables shall be installed in separate conduits.
- Where possible backbone cables of the same type shall be combined in conduit runs to maximize conduit fill ratios.

- Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.
- Pulling tension on Backbone cables shall not exceed the manufacture's limitations.
- The minimum bend radius for all Backbone cables is 16 times the cable diameter or the manufactures specification, whichever is greater.
- Cable slack shall be provided in every pull box, junction box, cabinet, entry facility, telecom room and termination enclosure.

  * 25 feet of slack per cable shall be mounted on a service ring inside the enclosure.

  * All cable shall be installed such that all cable is above the bottom of the enclosure. All cable shall be suspended on cable support hooks around the perimeter of the enclosure. Cable Support Hooks equal to Hubbell Power Systems PN# C2031124 and C2031133 (part numbers dependent on size of enclosure, sample part numbers only, not to be used in all circumstances).

  * Entry & telecom rooms & cabinets: Minimum 25' feet coiled in re-closeable storage ring.

  * If 25' is not possible, contact the owner and discuss an agreeable amount of slack, followed up with an confirming RFI.

  * Minimum of 25' of slack in each vault and a minimum of 15' of slack in any other type of box (pull box, Christy box, pass through space, etc).
- All OSP cables may not penetrate more than 50ft into the buildings before be terminated or splices to cable with a fire resistant jacket, unless the jacket is indoor/outdoor rated.
- A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
- All backbone cables shall be securely fastened to the sidewall of the TR on each floor.
- Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
- Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
- Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

E. Backbone Cross-Connect Installation

- Cables shall be cleaned, dressed, and terminated in accordance with the recommendations made in the TIA/EIA-568-C document, manufacturer's recommendations and best industry practices.
- Bend radius of the cable in the termination area shall not exceed 16 times the outside diameter of the cable.
- All cables shall be neatly bundled and dressed continuously from the entrance point of the Telecommunications Room to their respective panels or blocks.
- Contractor will provide a minimum of a 3 foot "service loop" for each backbone cable before terminating to allow future rearrangement. Cables will be coiled and secured above the ceiling where possible or to the Telco

Backboard where entrance point is from the floor.

- Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18" from the finished floor.
- Contractor shall provide a machine label 1ft. to 2ft. from the entrance point of the TR and 6in. to 12in. from the termination point on each backbone cable. Cable shall be easily identified and fully legible without removing the bundle support ties.

F. Cabinets, Racks, Enclosures and Ladder Rack Installation

- Wall Mount Racks/Cabinets shall be securely attached to the Telco Backboard using minimum 5/16" hardware or as required by local codes. Mounting rails shall be adjusted to the proper depth to allow for the closing of doors when populated with network electronics. Coordinate with Owner for final depth required.
- Floor Mount Racks/Cabinets shall be securely attached to the concrete floor using minimum 3/8" drop-in anchor hardware or as required by local codes.
- All Floor Mount Racks/Cabinets will be either; secured on one side to the wall or attached to the closest wall with ladder rack.
- All Racks/Cabinets shall be braced to meet Zone 4 seismic requirements.
- Contractor will maintain a minimum of 36 inches of clearance from the front of the all rack/cabinets and all other obstructions.
- Floor Mount Racks/Cabinets shall be installed to allow for a minimum of 36" from rear and all other obstructions.
- All racks shall be grounded to the telecommunications ground bus bar.
- Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.
- The plywood bottom edge shall be mounted vertically no less than 12" above the finished floor.
- Contractor will provide all cutouts for the Electrical Contractors expansion rings and electric receptacles as shown on the drawings.
- Ladder Rack must be securely attached to walls, backboards, and racks/cabinets to comply with all Zone 4 seismic requirements.
- Ladder rack shall be installed so that there is a minimum of 8" of unobstructed clearance above rack.
- Ladder Rack shall be installed so that there is a minimum of 12" of clearance from all: florescent lighting, electrical conduits/circuits, and fire alarm conduits/devices.

4.2 Identification and Labeling

A. The labeling scheme for CAT6A cable is as follows for classrooms (verify with Owner prior to printing the labels):

When entering the room (if the room has multiple doors, the door designated as the primary entry door), label numbering shall start a one (1) and then increment as data drops are added going around the room, then any drops in the ceiling, and then any drops in the floor. For each room, numbering starts over at one (1). Each jack color starts at one (1) and increments for each additional jack of the same color. Label designations are based on jack color:

Blue = D# White = V# Yellow = W# Gray = A# Purple = C#

Patch Panel Label Format: RM# - _____

The first part of the label shall be the room number the data drop is located in, RM is part of the label, followed by the room number or room designation. The last part of the label shall be the type, as stated above based on jack color, then followed by the drop number. For example, RM3-D10 is room 3, data drop 10. RM3-V2 would be room 3, voice data drop 2.

The label format in the room: RM# - -

The first part of the label shall be RM, followed by the room number/ designation the cabinet/rack is located in.

The second part of the label shall be the patch panel the cable is terminated on. The top most panel is A and continues down with B, C, etc… If multiple panels span more than one rack/cabinet, when standing in front of the rack/cabinets, the top left panel shall be A.

The last part of the label uses the label based on jack color, as stated above, and the drop number. Example, RM3-A-D10: Indicates the other end of the cable is in the cabinet/rack in room 3, terminated on panel A, and the last portion, ie D10 in this example, was the tenth data drop in this room. The last portion, D10 in this example, would match the patch panel label, RM3-D10.

Label scheme for non-classroom buildings follows the above scheme, but the label number starts at 1 (one) for each type (D, V, W, A, C) and increments throughout the building and does not reset for each room/office. Start at one and do not repeat the number anywhere in the building (for each type).

B. The approved system will comply with the TIA/EIA -606-A Class 2 designations and include at a minimum, identifiers for all major components of the system: telecommunication rooms, grounding bus bars, racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure.

C. All label printing will be machine generated or hand-held printers using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

D. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.

E. All fiber cable labels are to include the type, count, from and to on each label. Any point the fiber is accessible shall be labeled. At a minimum, that would include the starting point, any Christy boxes, cabinets/racks, any rooms the cable passes through, and the ending point. Service loops provided and labeled at each location, a minimum

of 25’ in each vault and 15’ minimum in a Christy box/any other box or pass through space.

F. Labels are to be verified by Owner prior to printing. Labels are to include building/room designations used by the site. Do NOT use building/room designations from the plans unless approved by Owner in writing.

G. Fiber optic cable lables are to verified by Owner prior to printing and include:

CABLE TYPE
FROM TO
DATE INSTALLED

For example:
Single Mode – 36 Count
MDF IDF in Room XX
INSTALLED: JULY 2017

4.3 Testing and Acceptance

A. General

1. The Owner reserves the right to be present during any & all types of tests being performed.
2. Contractor will notify the Owner/Owner’s Representative 24 hours before commencement of testing.
3. Upon receipt of the test documentation, the Customer reserves the right to have the contractor perform a 10% witnessed “spot testing” of the cabling system to validate test results provided in the test document, at no additional cost. If a significant amount of cables are marginal and/or fail during the “spot test” Contractor will retest the entire cable plant at no additional cost.
4. Contractors shall provide proof of test equipment calibration prior to testing.
5. Test equipment shall have been factory calibrated within six months of project testing dates.
6. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of TIA/EIA-568-C, TSB-67 and TSB-95. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
7. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the Manufacturer’s Warranty guidelines and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.
8. Test results are required to be sent to Owner in PDF format and in FLW format. IF there are an unusual amount of cables that passed marginal, as indicated by the tester, Contractor to re-terminate all cables and re-test.

B. Copper Cable Testing

1. Twisted Pair Cable

- All twisted-pair copper cable links (including backbone cables) shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below.
- Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
- Cables that are passed by the tester but marked as marginally passed, typically indicated by an asterisk (*), may be required to be re-terminated and re-tested by Owner if there are an unusually high percentage of cables that were marginally passed by the tester. Unusually high is determined by Owner.
- Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-A Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

2. Category 6 Performance

- Follow the Standards requirements established in:
  - ANSI/TIA/EIA-568-C.0
    Wire Map Length Attenuation
    NEXT (Near end crosstalk)
  - ANSI/TIA/EIA-568-C.2 Return Loss
    ELFEXT Loss Propagation Delay Delay skew
    PSNEXT (Power sum near-end crosstalk loss) PSELFEXT (Power sum equal level far-end crosstalk loss)
- A Level III or better test unit is required to verify category 6 performances and must be updated to include the requirements of TSB-95 and Amendment 5. Testers will be equal to or better than Fluke Network's Versiv DSX CableAnalyzer.
- All testers shall have been recalibrated within 6 months of use on this project. Contractor will be asked to provide proof of recalibration.
- Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA/EIA Standard, and the result shown as pass/fail. The approved Level Three tester shall provide a printed document for each test that is also available in a downloadable file using an application from the test equipment manufacturer. The printed test results shall include a print out of all tests performed, and the individual test results for each

cable. A PDF of the test results and the Fluke FLW File are required to be sent to Owner for review.

3. Category 6A Performance

- Shall met all test parameters as stated above for Category 6, with the addition of PSANEXT, PSAACR, and PSAACR-F:

C. Fiber Optic Cable Testing

1. Backbone Fiber

- Each fiber strand shall be tested for attenuation with an Optical Power Meter and light source and with an Optical Time Domain Reflectometer (OTDR) for actual length and splice/connector loss. Cable length shall be verified using sheath markings. The guidelines and procedures established for Tier 1 testing in TIA/TSB-140 shall apply.
- All fiber optic cables shall be tested from the site's MDF to each fiber terminals located in the IDF. The results of OTDR testing to define the length of each riser cable shall be documented. The Contractor shall conduct a power meter (loss) test of each fiber optic station and riser cable at both wavelengths, 850/1300nm for MM and 1310/1550nm for SM, A to B, B to A, and OSPL (OSPL is defined as La + Lb). No individual station or riser fiber link segment (including connectors) shall measure more than 2.0 dB loss. Tests shall be conducted using ANSI/EIA/TIA/EIA-526-14A, Method B. Test results evaluation for the panel to panel (backbone) shall be based on the values set forth in ANSI/TIA/EIA-568-C.2.The Contractor shall provide an electronic printout for each strand tested with the Power Meter and the OTDR.
- Where concatenated links are installed to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. After the link performance test has been successfully completed, each link shall be concatenated and tested. The test method shall be the same used for the test described above. The evaluation criteria shall be established between the Owner and the Contractor prior to the start of the test.
- All installed cables must meet or exceed the defined standards for performance. The Contractor shall take all steps necessary to repair or replace any optic not meeting the standard.
- Fiber optic riser and station cable test results shall be provided in electronic format to the Owner. PDF and Fluke FLV files are to be sent to Owner.

4.4 System Closeout and As-built Documentation

A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Owner's Representative/Engineer for approval. One (1) to be a hardcopy and two (2) to be electronic copies. Documentation shall include the items detailed in the sub-sections below.

B. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings.

Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 calendar days of the completion of each testing phase. At the request of the Owner's Representative/Engineer, the telecommunications contractor shall provide copies of the original test results.

C. The Owner's Representative/Engineer will request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

D. Test Results documentation shall be provided in two media, as listed above, one (1) hardcopy and one (1) on USB within three weeks after the completion of the project. The documentation shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, a bi-annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

E. Printouts generated for each cable by the wire test instrument shall be submitted as part of the documentation package.

F. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

G. The As-Built drawings are to include cable routes, outlet locations and the approved labeling identifiers. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.

H. Contractor will provide one laminated 11"x17" drawing at each IDF that includes the building layout for that IDF, along with the outlet locations and all of the approved labeling. The as-built/current layout is to be provided.

I. Test results are to be submitted to the manufacturer and a copy of the warranty certification is to be provided to the owner.

END OF SECTION

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SECTION 27 17 04 - INTEGRATED ELECTRONIC COMMUNICATIONS AND CLOCK NETWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general provisions of the Contract Documents apply to this Section.

1.2 SUMMARY

A. This section includes a fully operational extension of the existing Rauland PA system.

1.3 DEFINITION OF TERMS

A. Installer(s): Shall refer to the person, persons, or company who or which actually contracts to perform the work specified herein.

1.4 SUBMITTALS

A. Product data for each component.

B. Shop Drawings: Prior to proceeding with the work: Provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, location of each field connection, and a complete schedule of all equipment and materials with associated manufacturer's cuts sheets which are to be used.

   a. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance. Include a single-line diagram showing cabling interconnection of components and levels throughout system and impedances.
   b. Artwork drawings and lists indicating proposed nameplate nomenclature and arrangements for control panels and plug panels prior to fabrication reflecting equipment used.
   c. Each drawing shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project, Systems Contractor's name in the title block.
   d. Details and descriptions of any other aspect of the system, which must differ from the contract documents due to field conditions or equipment, furnished.

C. FCC Approval: The system shall be approved for direct interconnection to the telephone utility under Part 68 of FCC rules and regulations. Systems, which are not FCC approved or utilize an intermediary device for connection, will not be considered. Provide the FCC registration number of the system being proposed as part of the submittal process.

D. Product Certificates: Signed by manufacturers certifying that products furnished comply with specified requirements.

E. Installer Certificates: Signed by manufacturers certifying that Installers comply with specified requirements.

F. Manufacturer Certificates: Signed by manufacturers certifying that they comply with specified requirements.

G. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Include record of final matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

H. Maintenance Data: For equipment to be included in maintenance manuals specified in Division 1.
   a. Record of Owners equipment-programming option decisions.
   b. All instructions necessary for proper operation and manufacturer's instructions.
   c. "Proof of Performance" information.
   d. Manufacturer's maintenance information.
   e. Copies of non-proprietary computer programs and system set up disks documenting all programmable features of the installed system.

I. Record Drawings: Prior to final acceptance, provide three (3) complete sets of drawings indicating all cable numbers and construction details in accordance with the actual system installation. Revise all shop drawings to represent actual installation conditions. These Record Drawings will be used during "Final Acceptance Testing".

J. System Training: Submit the following information describing the training programs and system trainers as outlined in paragraph 1.6 of this specification and in accordance with Division 1 specifications.
   a. Include with the submittal a preliminary staff development training program in outline form for review and approval by the owner's representative.
   b. Include with the submittal a current copy of the trainer's certification from the manufacturer that certifies and identifies the trainer(s) who are eligible to provide training and support for the project.
   c. Include with the submittal a current copy of trainer's needs assessment form which will be reviewed with the owner's designated representative for the system's preliminary system programming and configuration.
   d. Include with the submittal copies of all documentation used to identify for the owner those participants attending and completing the training programs.

K. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required **five-year** warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced Installer who is an authorized representative of equipment manufacturer for both installation and maintenance of equipment required for this Section. Provide the following within thirty (30) days after notification to proceed:
   1. Provide a list of installations that the Installer has specifically installed for verification by the Owner. Random installations from other vendors and/or Installers shall not be accepted. The Installer, not its employees, must meet these qualifications.
   2. The Installer shall be bondable.
   3. The Installer shall demonstrate to the satisfaction of the Owner or his representative that he has:
      a. Adequate plant and equipment to pursue the work properly and expeditiously.
      b. Adequate staff and technical experience to implement the work.
      c. Suitable financial status to meet the obligations of the work.
      d. Technically capable and factory trained service personnel at a local service facility to provide routine and emergency service for all products used in this project.

B. Any Contractor, who intends to bid on this work and does not meet the requirements of the "Quality Assurance" paragraph(s), shall employ the services of an "Installer" who does meet the requirements and who shall provide the equipment, make all connections and continuously supervise the installation. A subcontractor so employed as the "Installer" must be acceptable to the Architect/Engineer. The "Installer" shall be identified within thirty (30) days of notification to proceed for acceptance by the Architect/Engineer.

C. Because the life expectancy of this type of communications structure normally exceeds 10 years, the owner expects continuity from the service provider. If the installing/servicing company has not been an authorized provider of the manufacturers product for it least 10 years, the following is required:

D. Each major component of equipment shall have the manufacturers name, address and model number on a plate securely affixed in a conspicuous place. NEMA code ratings, UL Label, or other data that is die-stamped into the surface of the equipment shall be easily visible.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction.

F. Comply with CEC

G. Comply with NEMA Standard SB-40 for Emergency Communications in K-12 schools.

H. Comply with UL 60950.

1.6 IN-SERVICE TRAINING

A. The contractor shall provide and implement a complete and comprehensive staff training program for all administrators, facility staff members, and teachers. This mandatory training program will provide school staff a complete understanding of how to utilize and properly operate all functions.

B. The training program shall be implemented by a staff member/trainer employed by the contractor. The trainer must be factory certified to provide training on their product.

C. All staff development training is to be coordinated through the owner's designated representative. As training sessions are completed, the trainer will provide the school's administrative staff and school district's staff a document listing all of the staff and faculty members who attended, received, and completed the training program.

1.7 WARRANTY

A. Provide a **manufacturer's five-year warranty** of the school communications network equipment against defects in material and workmanship. This warranty will cover all electronic system components. Additional warranties cover clocks, speakers, and call in switches. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost (equipment only); a one year warranty shall be provided for labor.

B. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required five-year warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary. The standard five-year warranty is an important element in establishing a standard in quality. Manufacturers who circumvent the five-year warranty by offering special "extended warranties" that are not part of their normal published warranty will not be accepted.

C. Contractor shall respond, excluding weekends and holidays, within 24 hours to any warranty service calls. If equipment cannot be repaired within 24 hours of service visit, the contractor shall provide "loaner" equipment to the facility at no charge.

D. Make available a service contract offering continuing factory authorized service of the system after the initial warranty period.

1.8 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide the following system:
   1. Telecenter manufactured by Rauland

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. The platform shall utilize state of the art Technology for Call-in Notification, School Safety Paging and Evacuation tones, Atomic Time Synchronization, Class Change Tones utilizing multiple, programmable schedules for each zone, Two-way hands-free Internal

Communications and Paging, and Program Distribution. The system shall be easy to learn and operate. All standard programming shall be web-based and user friendly to allow the system administrator the ability to easily program system features.

B. Provide complete and satisfactorily operating district/school communications and district/school safety as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with published product information. Coordinate the features of all materials and equipment so they form an integrated system, with components and interconnections matched for optimum performance of specified functions.

C. Each Classroom shall be provided with a Clock/Speaker to match existing at site.

D. Wireless Clock System
   1. Provide complete and satisfactorily operating NTP Synchronized Wireless Clock System with analog and/or digital secondary clocks as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated.
   2.

E. Interior Ceiling Speakers
   1. Provide Ceiling Speaker Assembly consisting of 8 Ohm, 8" speaker mounted in a 2 foot by 2 foot, or 2 foot by 1 foot, lay-in baffle, with an integrated back box that covers the full area of the baffle.

F. Wall Mounted Horns
   1. Provide double re-entrant type horn loudspeakers with integral driver. The horn loudspeaker shall be impervious to weather and vandalism. Horn shall be constructed of heavy-duty ABS plastic. Horn loudspeaker drivers shall be rated at 15 watts with a frequency response of 480 Hz to 14 KHz. Sensitivity shall be 106 dB 1 watt, 1 meter. Transformer assembly shall be dual voltage multi-tap type suitable for 25 or 70-volt installations. Dispersion pattern shall be 180 degrees conical. The horn loudspeaker shall be constructed of treated heavy gauge aluminum, with all exposed parts potted and a sealed driver. Wiring terminal shall be fully enclosed. The speaker flange and mounting surface shall have a cork-rubber gasket. The horn loudspeakers finish shall be gray baked on enamel.
   2. The recessed back box shall be of heavy gauge cold-rolled steel, spot welded for stability with a rust-retardant gray primer finish. Acoustically treat the interior to eliminate mechanical resonance. The back box shall be 10-3/4"x10-3/4"x6" deep.
   3. The baffle shall be vandal proof, the faceplate constructed of 14-gauge carbon steel with a minimum tensile strength of 55,000 PSI. A lattice grid sub-plate shall deny access to the horn but be acoustically transparent for sound projection. Provide tamper proof, stainless steel mounting hardware. The baffle shall a mar/scratch baked epoxy rust inhibitive finish.
      1)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the School Communications and School Safety Network.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install system in accordance with CEC and other applicable codes. Install equipment in accordance with manufacturer's written instructions.

B. Furnish and install all material, devices, components and equipment for a complete operational system.

C. Impedance and Level Matching: Carefully match input and output impedance’s and signal levels at signal interfaces. Provide matching networks where required.

D. Control Circuit Wiring: Install control circuits in accordance with CEC and as indicated. Provide number of conductors as recommended by system manufacturer to provide control functions indicated or specified.

E. All housings are to be located as indicated.

F. The contractor shall provide necessary transient protection on the AC power feed, all copper station lines leaving or entering the building, and all central office trunks. All protection shall be as recommended by the equipment supplier and referenced to earth ground.

G. Wiring within Enclosures: Provide adequate length of conductors. Bundle, lace, and train the conductors to terminal points with no excess. Provide and use lacing bars.

H. Provide physical isolation from speaker-microphone, telephone, line-level wiring, and power wiring. Run in separate raceways, or where exposed or in same enclosure, provide 12 inch minimum separation between conductors to speaker-microphones, telephone wiring and adjacent parallel power. Provide physical separation as recommended by equipment manufacturer for other system conductors.

I. Identification of Conductors and Cables: Use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams.

J. Weatherproofing: Provide weatherproof enclosures for items to be mounted outdoors or exposed to weather.

3.3 GROUNDING

A. Provide equipment grounding connections for Integrated Electronic Communications Network systems as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.

B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

C. Provide all necessary transient protection on the AC power feed and on all copper station lines leaving or entering the building. Note in system drawings, the type and location of these protection devices as well as all wiring information.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a duly factory authorized service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.

B. Inspection: Make observations to verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Provide a list of final tap settings of paging speaker line matching transformers.

C. Testing: Rectify deficiencies indicated by tests and completely re-test 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.

3.5 FINAL ACCEPTANCE TESTING

A. The Final Acceptance Testing shall be provided to the Owner or the Owners designated representative only. Final acceptance testing to any other trade or service provider for the project will not comply with the requirements of this section.

B. The contractor will provide a Final Acceptance Test record document signed by both the contractor and the Owner or designated Owner’s Representative establishing the “In Warranty” date. The warranty period will not commence until the Final Acceptance Test is completed.

C. Be prepared to verify the performance of any portion of the installation by demonstration, listening and viewing test, and instrumented measurements. Make additional adjustments within the scope of work and which are deemed necessary by the Owner because of the acceptance test.

3.6 COMMISSIONING

A. The contractor shall train the Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. This training will be in accordance with the training. In addition to the Training Materials provided, the contractor will also furnish Operators Manuals and Users Guides at the time of this training.

B. Schedule training with Owner through the owners representative, with at least seven days advance notice.

3.7 OCCUPANCY ADJUSTMENTS

A. The contractor shall provide Occupancy Adjustments in accordance with Section 1.6 of these specifications. A response scenario amenable to both the owner and the contractor will be established and followed for the first year of service.

3.8 CLEANING AND PROTECTION

A. Prior to final acceptance, the contractor shall vacuum and clean all system components and protect them from damage and deterioration. All blank spaces in equipment cabinets will be covered with blank panels. Top and side panels, and all cabinet doors will be installed. All general areas within and around all equipment rack/cabinets in the facility will be swept, vacuumed, and cleaned up. No cabinets will be left unlocked and all cabinet keys will be turned over to the owner or designated owner’s representative.

END OF SECTION

SECTION 28 31 00 – FIRE DETECTION AND ALARM

PART 1 – GENERAL

1.1 RELATED SECTIONS

A. Section 26 05 00 – Common Work Results for Electrical

B. Section 27 10 00 – Structured Cabling

1.2 REFERENCES

A. Electrical Industries Association (EIA):
   1. EIA-232-D – Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
   2. TIA-485-A – Electrical Characteristics of Generators and Receivers for Use in Balanced Multipoint Systems

B. California Code of Regulations
   1. Title 24, Part 3 – California Electrical Code (CEC)

C. National Fire Protection Association (NFPA):
   1. NFPA 12 – Standard on Carbon Dioxide Extinguishing Systems.
   2. NFPA 13 – Installation of Sprinkler Systems.
   3. NFPA 15 – Standard for Water Spray Fixed Systems for Fire Protection.
   4. NFPA 16 – Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.
   5. NFPA 16A – Standard for the Installation of Closed Head Foam-Water Sprinkler Systems.
   6. NFPA 72 – National Fire Alarm Code.
   7. NFPA 90A – Standard for the Installation of Air Conditioning and Ventilating Systems.
   8. NFPA 101 – Life Safety Code.
   9. NFPA 750 – Standard on Water Mist Fire Protection Systems.
   10. NFPA 5000 – Building Construction and Safety Code.

D. Underwriters Laboratories (UL):
   1. UL 268 – Standard for Smoke Detectors for Fire Alarm Signaling Systems.
   2. UL 864 – Standard for Control Units and Accessories for Fire Alarm Systems.
   3. UL 1971 – Standard for Signaling Devices for the Hearing Impaired.

1.3 SCOPE OF WORK

A. Furnish all labor, equipment, and materials for, and comply with the performance requirements of the Fire Alarm System indicated in the drawings and specified herein.

B. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required to accomplish work indicated

or specified in this or other sections, it shall be the responsibility of the Contractor to provide all materials and equipment which is usually furnished with such systems in order to complete the installation, whether or not specifically mentioned herein.

1.4 SYSTEM DESCRIPTION

A. A new intelligent reporting, Style 7 networked, fully peer-to-peer, microprocessor-controlled fire detection and notification system shall be installed in accordance with the specifications and as indicated on the Drawings.

B. Basic Performance:
1. Network Communications Circuit Serving Network Nodes: Connected using approved fiber optic cable between nodes in Class A configuration (NFPA Style 7).
2. Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Class B.
3. Initiation Device Circuits (IDC) Serving Non-addressable Devices Connected to Addressable Monitor Modules: Wired Class B.
4. Notification Appliance Circuits (NAC) Serving Strobes and Horns: Wired Class B.
5. Alarm Signals Arriving at Control Panel: Not lost following primary power failure until alarm signal is processed and recorded.
6. Network Node Communications:
   a. Communicated between panels on fiber optic cables.
   b. To enhance system survivability, ability to operate on loss of Command Center, short or open of entire riser at Command Center shall be demonstrated at time of system acceptance testing.
   c. Systems that are not capable of providing true Style 7 riser performance shall not be acceptable.
7. Signaling Line Circuits (SLC):
   a. Reside in remote panels with associated audio zones.
   b. SLC modules shall operate in peer-to-peer fashion with all other panels in system.
   c. On loss of Command Center, each remaining panel shall continue to communicate with remainder of system, including all SLC and control functions Systems that provide a “Degraded” mode of operation upon loss of Command Center or short in riser shall not be acceptable.
   d. Limit the number of devices to 80% of the maximum allowed of each type on SLC circuits.
8. Notification Appliance Circuits (NAC), and Control Equipment:
   a. Arranged such that loss of any 1 NAC circuit will not cause loss of any other NAC circuit in system.
   b. Electrically supervised for open and short circuit conditions.
   c. If short circuit exists on NAC circuit, it shall not be possible to activate that circuit.
   d. Voltage drop is not to exceed 10% at the furthest point on any NAC circuit.
9. Standby Power:
   a. Provide a minimum of 20% spare battery capacity above calculated requirements.

C. Sequence of Operations:

1. General Alarm: Upon alarm activation of any area smoke detector, duct smoke detector, heat detector, manual pull station, or sprinkler water flow switch, the following functions shall automatically occur:
   a. The internal audible device shall sound at the control panel or command center.
   b. The LCD Display shall indicate all applicable information associated with the alarm condition including zone, device type, device location and time/date.
   c. All system activity/events shall be documented on the system printer.
   d. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.
   e. The following notification signals and actions shall occur simultaneously:
      i. A signal shall be sounded on fire floors (zones). The signal shall be a Temporal 3 tone.
      ii. Activate visual strobes on the fire floors (zones). The visual strobe shall stop operating when the "Alarm Silence" is pressed.
      iii. Transmit signal to the building automation system (if applicable) and/or shutdown all HVAC units serving the floor of alarm.
      iv. Transmit signal to the central station with point identification.
      v. Activate automatic smoke control sequences (if applicable).
      vi. All stairwell/exit doors shall unlock throughout the building.
      vii. All self-closing fire/smoke doors held open shall be released.
      viii. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
2. Elevator Lobby / Equipment Room Detectors: Upon alarm activation of any elevator lobby smoke detector or equipment room detector the following functions shall automatically occur:
   a. Perform general alarm sequence above.
   b. Elevator Lobby smoke detectors shall recall the elevators to primary floor
   c. Elevator Lobby smoke detectors located on the primary recall floor shall recall the elevator the alternate floor.
   d. Equipment room smoke detectors shall recall the elevator to the primary floor.
   e. Activation of the Equipment room heat detector shall initiate the shunt trip in the associated elevator equipment room.
3. Supervisory Operation: Upon supervisory activation of any sprinkler valve supervisory switch, fire pump off-normal, clean agent fire suppression system trouble, the following functions shall automatically occur:
   a. The internal audible device shall sound at the control panel or command center.
   b. The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date.
   c. All system activity/events shall be documented on the system printer.
   d. Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
   e. Transmit signal to the central station with point identification.
4. Trouble Operation: Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:
   a. The internal audible device shall sound at the control panel or command center.
   b. The LCD keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.

c. All system activity/events shall be documented on the system printer.
d. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
e. Transmit signal to the central station with point identification.

5. Monitor Operation: Upon activation of any device connected to a monitor circuit (fire pump/emergency generator status), the following functions shall automatically occur:
a. The LCD display shall indicate all applicable information associated with the status condition including; zone, device type, device location and time/date.
b. All system activity/events shall be documented on the system printer.
c. Any remote or local annunciator LCD/LED's associated with the status zone shall be illuminated.

D. Fire Alarm System Functionality:
1. Provide complete, electrically supervised distributed, networked analog/addressable fire alarm and control system, with analog initiating devices.
2. Fire Alarm System:
a. Incorporate E3 Series multiprocessor-based control panels, with Intelligent Loop Interface (ILI-MB-E3), and RPT-E3 repeater modules communicating over peer-to-peer token ring network with capacity of up to 64 nodes.
3. Each ILI-MB-E3 Node: Incorporate 2 Signaling Line Circuits (SLC), with capacity to support up to 159 analog addressable detectors and 159 addressable modules per SLC.
4. All data transmits over single pair of wires or fiber optic cable.
5. Each Network Node: Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
6. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
7. Network:
a. Based on peer-to-peer token ring technology operating at 625 K baud, using Style 7 configuration.
b. Capability of using twisted-pair wiring, pair of fiber optic cable strands up to 200 microns, or both, to maximize flexibility in system configuration.
8. Each Network Node:
a. Capability of being programmed off-line using Windows-based software utilized by fire alarm system manufacturer. Capability of being downloaded by connecting laptop computer into any other node in system. Systems that require system software to be downloaded to each transponder at each transponder location shall not be acceptable.
b. Capability of being grouped with any number of additional nodes to produce a “Region”, allowing that group of nodes to act as 1, while retaining peer-to-peer functionality. Systems utilizing “Master/Slave” configurations shall not be acceptable.
c. Capability of annunciating all events within its “Region” or annunciating all events from entire network, on front panel LCD without additional equipment.
9. Each SLC Network Node: Capability of having integral DACT (digital alarm communicator transmitter) that can report events in either its region, or entire network to single central station monitoring account.

10. Each Control Panel: Capability of storing its entire program, and allow installer to activate only devices that are installed during construction, without further downloading of system.
12. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.

1.5 SUBMITTALS

A. Comply with Section 01 33 00 – Submittal Procedures.

B. Include sufficient information, clearly presented, to determine compliance with the specifications and the Drawings. Insufficiently detailed submittals shall be rejected.

C. Equipment Submittals:
1. Cover Page: Indicate the following:
   a. Project name and address.
   b. Engineered systems distributor's name and other contact information.
   c. Installing contractor's name and other contact information.
   d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
2. Table of Contents: Lists each section of equipment submittal.
3. Scope of Work Narrative: Detail indented scope of work.
4. Sequence of Operations: Use matrix or written text format, detailing activation of each type of device and associated resulting activation of the following:
   a. Control panel.
   b. Annunciator panels.
   c. Notification appliances.
   d. Building fire safety functions, including elevator recall, elevator power shutdown, door lock release, door holder release, HVAC unit shutdown, smoke evacuation system activation, and stair pressurization fan activation.
5. Bill of Material: Indicate for each component of system the following:
   a. Quantity.
   b. Model number.
   c. Description.
6. SLC Circuit Schedule: Detail address and associated description of each addressable device. Clearly provide information that indicates number of both active and spare addresses.
7. Battery Calculations: Show load of each of, and total of, components of system along with standby and alarm times that calculations are based on. Show calculated spare capacity and size of intended battery.

D. Shop Drawings:
1. Cover Page: Indicate the following:
   a. Project name and address.
   b. Engineered systems distributor's name and other contact information.
   c. Installing contractor's name and other contact information.
   d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.

2. Floor Plans:
   a. Provide separate floor plan for each floor.
   b. If a floor plan must be split using match lines to fit on the page, provide match lines and match line references that refer to sheet number that shows area on opposite side of match line.
   c. Prepare using CAD program capable of producing AutoCAD compliant DXF (Drawings Exchange Format) files.
   d. Prepare to scale no smaller than 1/8 inch = 1'-0", unless otherwise required by the Architect or Engineer.
   e. Show equipment and device locations.
   f. Show wiring information in point-to-point format.
   g. Show conduit routing, if required by the AHJ.
3. Title Block: Provide on each sheet and include, at a minimum, the following:
   a. Project name.
   b. Project address.
   c. Sheet name.
   d. Sheet number.
   e. Scale of drawing.
   f. Date of drawing.
   g. Revision dates, if applicable.
4. Control Panel: Provide sheet that details exterior and interior views of control panel and clearly shows associated wiring information.
5. Annunciator Panels: Provide sheet that details exterior and interior views of annunciator panels and clearly shows associated wiring information.

E. Certification: Submit with equipment submittals and shop drawings, letter of certification from major equipment manufacturer, indicating proposed engineered system distributor is an authorized representative of major equipment manufacturer.

F. Project Record Drawings:
1. Submit complete project record drawings within 14 calendar days after acceptance test.
2. Project record drawings shall be similar to shop drawings, but revised to reflect changes made during construction.

G. Operation and Maintenance Manuals:
1. Submit complete operation and maintenance manuals within 14 calendar days after acceptance test.
2. Operation and maintenance manuals shall be similar to equipment submittals, but revised to reflect changes made during construction.
3. Include factory's standard installation and operating instructions.

1.6 APPROVAL

A. All Fire Alarm System components are required to be listed with the California State Fire Marshal (CSFM).

B. Installation of the Fire Alarm System shall not commence until all approvals are granted by the California State Fire Marshal (CSFM), Division of the State Architect (DSA), and any other Authorities Having Jurisdiction (AHJ).

C. Installation of the system shall not commence until all shop drawings and submittals are approved by the School District, Architect of Record, and Engineer of Record.

1.7 QUALITY ASSURANCE

A. Codes and Standards:
   1. NFPA: System shall comply with all applicable NFPA codes and standards:
   2. ADA: System shall conform to American with Disabilities Act (ADA).

B. To ensure reliability and complete compatibility, all items of fire alarm system, including control panels, power supplies, initiating devices, and notification appliances, shall be listed by Underwriters Laboratories Inc. (UL) and shall bear the “UL” label.

C. Fire Alarm Control Panel Equipment: UL-listed under UL 864 Ninth Edition.

D. Equipment, Programming, and Installation Supervision:
   1. The contractor is required to hold a C-10 license and any other certifications required by the Authority Having Jurisdiction.
   2. The contractor is required to be an approved engineered systems distributor of Gamewell-FCI for equipment, programming, and installation supervision.
   3. Proof of factory training shall be delivered within 14 calendar days of award of the Contract.

E. Software Modifications:
   1. Provide services of Gamewell-FCI factory-trained and authorized technician to perform system software modifications, upgrades, or changes.
   2. Provide use of all hardware, software, programming tools, and documentation necessary to modify fire alarm system software on-site.
   3. Modification includes addition and deletion of devices, circuits, zones, and changes to system operation and custom label changes for devices or zones.
   4. System structure and software shall place no limit on type or extent of software modifications on-site.
   5. Modification of software shall not require power-down of system or loss of system fire protection while modifications are being made.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer’s instructions.

C. Handling: Protect materials from damage during handling and installation.

1.9 COORDINATION

A. Coordinate the Work of this section with the Work of other sections, including sprinkler systems, elevators, HVAC systems, and security/door locking systems, as applicable.

1.10 WARRANTY

A. Warranty Period for System Equipment: 1 year from date of final acceptance.

B. Trouble Calls: The contractor shall guarantee on-site service for the Fire Alarm System within 24 hours of the receipt of a trouble call.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Gamewell-FCI, Honeywell Fire Systems
12 Clintonville Road, Northford, Connecticut 06472. Phone (203) 484-7161. Fax (203) 484-7118. Website: www.gamewell-fci.com

B. System Sensor
3825 Ohio Avenue, St. Charles, Illinois 60174.
Phone (630) 377-6580. Fax (630) 377-6495. Website: www.systemsensor.com

2.2 DISTRIBUTED NETWORKED FIRE ALARM SYSTEM

A. Distributed Networked Fire Alarm System: Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System.

2.3 CONTROL PANEL HARDWARE

A. Intelligent Control Panel: Supply user interface, including LCD or touch-screen 1/4 VGA display Intelligent Loop Interface Modules (ILI-MB-E3), manual switching, Control Panel shall consist of the following units and components:
1. System Cabinet (B-, C-, or D-Size Cabinet) with associated inner door.
2. Power Supply Module (PM-9) with batteries.
3. 80-Character LCD Display (LCD-E3).
4. Intelligent Loop Main Board Interface (ILI-MB-E3).
5. Intelligent Loop Supplemental Interface (ILI-S-E3).
6. FocalPoint Gateway (FPT-GATE-E3).
7. Optional DACT (DACT-E3).
8. Optional Network Repeater (RPT-E3).
9. Optional 1/4 VGA touch-screen display (NGA).
10. Optional Auxiliary Switch Module (ASM-16).

B. System Cabinet:
   1. Surface or semi-flush mounted with texture finish.
   2. Consist of back box, inner door, and door.
   3. Available in at least 3 sizes to best fit project configuration.
   4. Houses 1 or more PM-9 Power Supply Modules, 1 or more ILI-MB-E3 or ILI-S-E3 assemblies, and other optional modules as specified.
   5. Construction: Dead-front steel construction with inner door to conceal internal circuitry and wiring.
   6. Wiring: Terminated on removable terminal blocks to allow field servicing of modules without disrupting system wiring.

C. Power Supply Module (PM-9): Use latest technologies to provide power to the Control Panel and incorporate the following features:
   1. Power-saving switching technology using no step-down transformers.
   2. 9-amp continuous-rated output to supply up to all power necessary under normal and emergency conditions.
   3. Integral battery charger with capacity to charge up to 55 amp-hour batteries while under full load.

D. Batteries:

   1. Sufficient capacity to provide power for entire system upon loss of normal AC power for a period of 24 hours with 15 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72, Local Systems.

E. LCD Display Module (LCD-E3):
   1. LCD Display: 80-character RS-485 based textual annunciator with capability of being mounted locally or remotely. Provides audible and visual annunciation of all alarms and trouble signals. Provide dedicated LEDs for:
      a. AC Power On: Green.
      b. Alarm: Red.
      c. Supervisory: Yellow.
      d. System Trouble: Yellow.
      e. Power Fault: Yellow.
      f. Ground Fault: Yellow.
      g. System Silenced: Yellow.
   2. 80-Character Alphanumeric Display: Provide status of all analog/addressable sensors, monitor and control modules. Display shall be liquid crystal type (LCD), clearly visible in dark and under all light conditions.
   3. Panel shall contain 4 functional keys:
      a. Alarm Acknowledge.
      b. Trouble Acknowledge.
      c. Signal Silence.
      d. System Reset/Lamp Test.
   4. Panel shall contain 3 configuration buttons:
      a. Menu/Back.

b. Back Space/Edit.
c. OK/Enter.

5. Panel shall have 12-key telephone-style keypad to permit selection of functions.

F. Intelligent Loop Interface (ILI-MB-E3): System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. Intelligent Loop Interface shall be capable of mounting in stand-alone enclosure as specified.

1. Field Programmable: System shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on network.
2. RS-232C Serial Output: Supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall be standard ASCII code operating from 1,200 to 115,200 baud rate.
3. RS-485 Serial Output: Each ILI-MB-E3 shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. Each ILI-MB-E3's RS-485 bus shall support up to 16 ASM-16 auxiliary switch modules, 6 LCD-E3 main annunciators, and 5 LCD-7100 annunciators.
4. Peer-to-Peer Panel Configuration: All Loop Interface Modules shall incorporate own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any loop driver becomes disabled, each remaining loop driver shall continue to communicate with remainder of network and maintain normal operation.
5. Control-by-Event (CBE) Program: ILI-MB-E3 shall be capable of programming using Boolean logic including AND, OR, NOT, and TIMING functions to provide complete programming flexibility.
6. Alarm Verification: Smoke detector alarm verification shall be standard option while allowing other devices such as manual stations and sprinkler flow to create immediate alarm. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
7. Alarm Signals: All alarm signals shall be automatically latched or "locked in" at control panel until operated device is returned to normal and control panel is manually reset. When used for sprinkler flow, "SIGNAL SILENCE" switch may be bypassed, if required by AHJ.
8. Electrically Supervised:
   a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of fault shall activate system trouble circuitry, but shall not interfere with proper operation of other circuits.
   b. Yellow "SYSTEM TROUBLE" LEDs shall light and system audible sounder shall steadily sound when trouble is detected in system. Failure of power, open or short circuits on SLC or NAC circuits, disarrangement in system wiring, failure of microprocessor or any identification module, or system ground faults shall activate this trouble circuit. Trouble signal shall be acknowledged by operating "TROUBLE ACKNOWLEDGE" switch. This shall silence sounder. If subsequent trouble conditions occur, trouble circuitry shall resound. During alarm, all trouble signals shall be suppressed with exception of lighting yellow "SYSTEM TROUBLE" LEDs.

9. Drift Compensation – Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to effects of component aging or environment, including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while ignoring factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display units that requires maintenance.
10. Analog Smoke Sensor Test: System software shall automatically test each analog smoke sensor a minimum of 3 times daily. Test shall be recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of sensor shall activate system trouble circuitry, display "Test Failed" indication, and identify individual device that failed.
11. Off-Premises Connection:
    a. Fire Alarm System: Connect via Digital Alarm Communicator Transmitter (DACT) and telephone lines to central station or remote station. Panel shall contain disconnect switch to allow testing of system without notifying fire department.
12. Central Station Option: Fire alarm control panel shall provide Digital Alarm Communicator Transmitter (DACT) for signaling to central station. DACT shall contain "Dialer-Runaway" feature preventing unnecessary transmissions as result of intermittent faults in system and shall be Carrier Access Code (CAC) compliant, accepting up to 20-digit central station telephone numbers. Fire department shall be consulted as to authorized central station companies serving municipality. Fire alarm system shall transmit both alarm and trouble signals, with alarm having priority over trouble signal. Contractor shall be responsible for all installation charges and Owner will be responsible for line lease charges.
13. Network Annunciator Option: Each ILI-MB-E3 and associated display shall provide option of being configured as network annunciator. Options for annunciation shall default as regional annunciator with capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities.
14. Redundant History Log: Each ILI-MB-E3 shall contain full 4100 event history log supporting local and network functions. If a main processor or network node is lost the entire log shall be accessible at any other Loop Interface board. This shall be demonstrated by removing power from Command Center followed by extraction of history log from any loop driver location, including Command Center or Transponder.
15. LEDs Indicator and Outputs: Each ILI-MB-E3 Loop Interface shall incorporate as a minimum the following diagnostic LED indicators:
    a. Power: Green.
    b. Alarm: Red.
    c. Supervisory: Yellow.
    d. General Trouble: Yellow.
    e. Ground Fault: Yellow.
    f. Transmit: Green.
    g. Receive: Green.
16. Auxiliary Power Outputs: Each ILI-MB-E3 Loop Interface shall provide the following supply outputs:
    a. 24 VDC non-resettable, 1 amp. maximum, power limited.
    b. 24 VDC resettable, 1 amp. maximum, power limited.

17. Microprocessor: Loop interface shall incorporate 32-bit RISC processor. Isolated "watchdog" circuit shall monitor microprocessor and upon failure shall activate system trouble circuits on display. Microprocessor shall access system program for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall support Boolean logic including AND, OR, NOT, TIME DELAY functions for maximum flexibility.
18. Auto Programming: System shall provide for all SLC devices on any SLC loop to be pre-programmed into system. Upon activation of auto programming, only devices that are present shall activate. This allows for system to be commissioned in phases without need of additional downloads.
19. Environmental Drift Compensation: System shall provide for setting Environmental Drift Compensation by device. When detector accumulates dust in chamber and reaches unacceptable level but yet still below allowed limit, control panel shall indicate maintenance alert warning. When detector accumulates dust in chamber above allowed limit, control panel shall indicate maintenance urgent warning.
20. NON-FIRE Alarm Module Reporting: Non-reporting type ID shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display message at panel LDC. Activation of NON-FIRE point shall activate control by event logic, but shall not cause indication on control panel.
21. 1-Man Walk Test:
    a. System shall provide both basic and advanced walk test for testing entire fire alarm system. Basic walk test shall allow single operator to run audible tests on panel. All logic equation automation shall be suspended during test and while annunciators can be enabled for test, all shall default to disabled state. During advanced walk test, field-supplied output point programming shall react to input stimuli, such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch input. Advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device, and wiring operation/verification.
    b. Test feature is intended to provide for certain random spot testing of system and is not intended to comply with requirements of testing fire alarm systems in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only 1 person.
22. Signaling Line Circuits: Each ILI-MB-E3 module shall provide communication with analog/addressable (initiation/control) devices via 2 signaling line circuits. Each signaling line circuit shall be capable of being wired Class B, Style 4 or Class A, Style 6. Circuits shall be capable of operating in NFPA Style 7 configuration when equipped with isolator modules between each module type device and isolator sensor bases. Each circuit shall communicate with a maximum of 159 analog sensors and 159 addressable monitor/control devices. Unique 40-character identifier shall be available for each device. Devices shall be of the Velocity series with capability to poll 10 devices at a time with a maximum polling time of 2 seconds when both SLCs are fully loaded.
23. Notification Appliance Circuits: 2 independent NAC circuits shall be provided on ILI-MB, polarized and rated at 2 amperes DC per circuit, individually over current protected and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class B, Style Y or Class A, Style Z.

24. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system alarm occurs.
25. Supervisory Dry Contacts: Provide supervisory dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system supervisory condition occurs.
26. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.

H. Auxiliary Switch Module (ASM-16):
1. Each ASM-16 has 16 programmable push-button switches.
2. Each push-button switch has 3 associated status LEDs (red, yellow, and green), configurable to indicate any combination of functions.
3. Flexible switch configurations to allow auxiliary functions.
4. An insertable label to identify function of each switch and LEDs combination.
5. Provide capability to communicate with up to 16 ASM-16 modules locally, or up to 3,000 feet from the Control Panel

I. Network Repeater Module RPT-E3:
1. Intelligent Network Interface shall provide interconnection and protection of remote Control Panels. Repeater shall regenerate and condition token passing, 625 K baud signal between units. Repeater shall be available in wire, fiber, or wire/fiber configurations as determined by field conditions.
2. Fiber configurations shall use “ST”-type connectors and be able to operate with up to 200-micron multi-mode fiber, but optimize for 62.5/125. Interface shall have jumper to allow selection of ground detection of wiring when used in wire mode. Interface shall have integral LEDs to display current status of board.

J. Network Graphic Annunciator (NGA): Networked, 1/4 VGA, touch-screen annunciator with the following characteristics:
1. Custom Graphics: Panel shall permit uploading of custom bit-mapped graphic to display screen. Graphic shall display when all systems are normal.
2. Intuitive Functions: In alarm or trouble condition, annunciator shall display only information pertaining to event, including control switches.
   a. Trouble Condition: Display shall indicate cause of trouble. Only controls available to operator shall be Acknowledge and Reset functions.
   b. Alarm Condition: Display shall indicate cause of alarm. Only controls available to operator shall be Acknowledge, Silence, and Reset functions.

2.4 PRINTERS

A. Printers: Automatic type, printing code, time, date, location, category, and condition.
1. Provide hard-copy printout of all changes in status of system and time-stamp such printouts with current time-of-day and date.
2. Standard carriage with 80 characters per line.
3. Use standard pin-feed paper.
4. Enclose in separate enclosure suitable for placement on desktop or table.
5. Communicate with control using interface complying with EIA-232-D.
6. Power: 120 VAC at 60 Hz.

2.5 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT (HPF24)

A. Supplemental Notification Appliance Circuit (HPF24) shall be either Model HPF24S6 or HPF24S8, as indicated on drawings, offering up to 6.0 amps (4.0 amps continuous) or 8.0 amps (6.0 amps continuous), respectively, of regulated 24-volt power. HPF24 shall include the following features:
   1. Integral Charger: Charge up to 18.0 amp-hour batteries and support 60-hour standby.
   2. 2 Input Triggers. Input trigger shall be Notification Appliance Circuit (from fire alarm control panel) or relay.
   3. Surface-mount back box.
   4. Ability to delay AC fail delay in accordance with applicable NFPA requirements.
   5. Power limited circuitry in accordance with applicable UL standards.
   6. Operates as sync follower or a sync generator

2.6 SYSTEM PERIPHERALS

A. Addressable Devices – General:
   1. Provide address-setting means using rotary-decimal switches.
   2. Use simple to install and maintain decade-type (numbered 0 to 15) address switches by using standard screwdriver to rotate 2 dials on device to set address. Devices which use binary address set via dipswitch packages, handheld device programmer, or other special tools for setting device address shall not be acceptable.
   3. Detectors: Analog and addressable. Connect to fire alarm control panel's Signaling Line Circuits.
   4. Addressable Thermal and Smoke Detectors: Provide 2 status LEDs. Both LEDs shall flash under normal conditions, indicating detector is operational and in regular communication with control panel, and both LEDs shall be placed into steady illumination by control panel, indicating alarm condition has been detected. If required, flashing mode operation of detector LEDs can be programmed off via fire control panel program.
   5. Fire Alarm Control Panel: Permit detector sensitivity adjustment through field programming of system. Sensitivity can be automatically adjusted by panel on time-of-day basis.
   6. Using software, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. Detectors shall be listed by UL as meeting calibrated sensitivity test requirements of NFPA 72, Chapter 7.
   7. Detectors shall be ceiling-mounted and shall include separate twist-lock base with tamper-proof feature.
   8. Following bases and auxiliary functions shall be available:
      a. Standard base with remote LED output.
      b. Sounder base rated at 85 dBA minimum.
      c. Form-C relay base rated 30 VDC, 2.0 A.
      d. Isolator base.
   9. Detectors shall provide test means whereby they will simulate alarm condition and report that condition to control panel. Such test shall be initiated at detector itself by activating magnetic switch or initiated remotely on command from control panel.

10. Detectors shall store internal identifying type code that control panel shall use to identify type of device (PHOTO, THERMAL).

B. Addressable Manual Stations (MS-7AF):
1. Manual Fire Alarm Stations: Non-code, non-break glass type, equipped with key lock so they may be tested without operating handle.
2. Operated Station: Visually apparent, as operated, at a minimum distance of 100 feet (30.5 m) from front or side.
3. Stations shall be designed so after actual activation, they cannot be restored to normal except by key reset.
4. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on cover. The word FIRE shall appear on front of stations in raised letters, 1.75 inches (44 mm) or larger.
5. Addressable manual stations shall, on command from control panel, send data to panel representing state of manual switch and addressable communication module status.

C. Intelligent Thermal Detectors (ATD-L2F, ATD-HL2F): Intelligent addressable devices rated at 135 degrees F (58 degrees C) and 190 degrees F (73 degrees C), respectively. Connect via 2 wires to fire alarm control panel signaling line circuit.

D. Intelligent Photoelectric Smoke Detectors (ASD-PL2F): Use photoelectric (light-scattering) principal to measure smoke density and shall, on command from control panel, send data to panel representing analog level of smoke density.

E. Intelligent Duct Smoke Detectors (ADPF):
1. In-Duct Smoke Detector Housing: Use on-board intelligent photoelectric detector, which provides continuous analog monitoring and alarm verification from panel.
2. When sufficient smoke is sensed, alarm signal is initiated, and appropriate action taken to shut down or change over air handling systems to help prevent rapid distribution of toxic smoke and fire gases throughout areas served by duct system.
3. Duct Smoke Detectors Mounted Above Ceiling or Otherwise Obstructed from Normal View: Provide with remote alarm indicator.
4. Each Detector: Install in either supply side or return side duct in accordance with local mechanical code.

F. Addressable Dry Contact Monitor Modules (AMM-2F):
1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
2. Mount in standard deep electrical box.
3. IDC Zone: Suitable for Style B operation.

G. Addressable Dry Contact Monitor Modules (AMM-4F):
1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
2. Mount in 4-inch (102-mm) square, 2-1/8-inch (54-mm) deep electrical box.
3. IDC Zone: Suitable for Style D or Style B operation.

4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

H. Addressable Dry Contact Monitor Modules (AMM-2IF):
1. Provide to connect 2 supervised IDC zones of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
2. Mount in 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box.
3. IDC Zones: Suitable for Style B operation.
4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

I. Addressable Dry Contact Monitor Modules (MMI-10F):
1. Provide to connect 10 supervised Style B IDC zones or 5 supervised Style D IDC zones of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

J. 2-Wire Detector Monitor Modules (AMM-4SF):
1. Provided to connect 1 supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
2. Mount in 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to optional surface-mounted back box.
3. IDC Zone: Wired for Class A or B (Style D or Style B) operation.
4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

K. 2-Wire Detector Monitor Modules (MMI-6SF):
1. Provided to connect 6 supervised Class B IDC zones of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

L. Addressable Control Modules (AOM-2SF):
1. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
3. Control Module NAC: Wire for Style Z or Style Y (Class A/B) with up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
4. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.

M. Addressable Control Modules (MMO-6SF):
1. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
4. Control module NAC: Wire for Style Z or Style Y (Class A/B) with up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
5. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.

N. Addressable Relay Modules (AOM-2RF):
1. Available for HVAC control and other building functions. Relay shall have 2 Form C sets of contacts that operate in tandem and are rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.

O. Addressable Relay Modules (MMO-6RF):
1. Available for HVAC control and other building functions. Relay shall be Form C and rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

P. Isolator Modules (M500X):
1. Provide to automatically isolate wire-to-wire short circuits on SLC Class A or Class B branch. Isolator module shall limit number of modules or detectors that may be rendered inoperative by short-circuit fault on SLC loop segment or branch. At least 1 isolator module shall be provided for each floor or protected zone of building. No more than 25 devices shall be connected to 1 isolator module.
2. If wire-to-wire short occurs, isolator module shall automatically open-circuit (disconnect) SLC. When short-circuit condition is corrected, isolator module shall automatically reconnect isolated section.
3. Does not require address-setting, and its operations shall be totally automatic. Not necessary to replace or reset isolator module after normal operation.
4. Mount in standard 4-inch (101.6-mm) deep electrical box or in surface-mounted back box.
5. Single LED: Flash to indicate isolator is operational and illuminate steadily to indicate short-circuit condition has been detected and isolated.

Q. Addressable Projected Beam Detectors (ABD-2F):
1. Single-ended, reflective design.
2. Six user-selectable sensitivity levels.
3. Operates in range from 16 feet to 328 feet.
4. Temperature Range of Device: Minus 22 degrees F to 131 degrees F.
5. Beam Detector: Automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses.
6. UL LIsted.
7. Ability to be tested using calibrated test filters or magnet-activated remote test station.

R. Sprinkler Waterflow Switches (provided and installed by the sprinkler contractor):
1. Integral, mechanical, non-coded, non-accumulative retard type.
2. Alarm transmission delay time conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30 to 45 seconds.
3. Single manufacturer and series.
4. Where possible, locate waterflow switches a minimum of 1 foot from fitting which changes direction of flow and a minimum of 3 feet from valve.
5. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.

S. Sprinkler and Standpipe Valve Supervisory Switches (provided and installed by the sprinkler contractor):
1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with supervisory switch. Standpipe hose valves, test valves, and drain valves shall not be equipped with supervisory switches.
2. PIV (Post Indicator Valve) or Main Gate Valves: Equip with supervisory switch.
3. Mount not to interfere with normal operation of valve and adjust to operate within 2 revolutions toward closed position of valve control, or when stem has moved no more than one-fifth of distance from normal position.
4. Contain in weatherproof aluminum housing, which shall provide 3/4-inch (19-mm) conduit entrance and incorporate necessary facilities for attachment to valves.
5. Switch Housing Finish: Red baked enamel.
6. Entire Installed Assembly: Tamper proof and arranged to cause switch operation if housing cover is removed or if unit is removed from mounting.
7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

T. Graphic Annunciator (Uses ANU-48 Serial Driver Board):
1. Communicate to fire alarm control panel via EIA-485 (multi-drop) 2-wire communications loop. Up to 16 annunciator drivers, each configured up to 48 points, shall be connected per ILI-MB-E3.
3. ANU-48: Provide interface to approved UL-listed graphic-style annunciator and provide each of the features specified.

U. Remote LCD Display Annunciator:

1. Furnish and install as indicated on the Drawings a remote serial annunciator, Model LCD-7100. Annunciator shall provide 80-character display, which shall duplicate all information on basic system display, including any network nodes its host panel is annunciating, with exception of menus. Contain the following function keys:
   a. Alarm Acknowledge.
   b. Trouble Acknowledge.
   c. Signal Silence.
   d. System Reset/Lamp Test.
   e. System Drill Test.
2. Key Lock: Enable switches only when placed in "ON" position, with exception of Trouble Acknowledge, which is used to silence local trouble audible sounder. Annunciator shall contain the following LEDs:
   a. Alarm.
   b. Supervisory.
   c. System Trouble.
   d. Power Fault.
   e. System Silenced.
3. Mount on standard 3-gang surface or flush electrical box.
4. Each ILI-MB-E3: Accommodate up to 5 remote LCD-7100 annunciators which shall be located up to 3,000 feet from control panel.

V. Speakers:
1. Operate on 24 VDC or with field-selectable outputs.
2. Refer to Drawings.

W. Strobes:
1. Compliance: ADA and UL 1971.
2. Maximum Pulse Duration: 0.2 second.
3. Strobe Intensity: UL 1971.
4. Flash Rate: UL 1971.
5. Strobe Candela Rating: Determine by positioning selector switch on back of device.

X. Speaker/Strobes:
1. Operate on 24 VDC
2. Refer to drawings

2.7 WIRING

A. Conduit:
1. EMT: Allied Tube & Conduit "Fire Alarm Red" steel EMT conduit, or equivalent.
2. Others: Where fire alarm raceway is not buried underground, it shall be painted red.

B. Cables & Conductors:
1. Optical Fiber Cable: As per Data Specification.
2. Signaling Line Circuit Cable:
   a. OSP: West Penn #AQ225 (Black Jacket)

b. ISP: West Penn #D980 (Red Jacket)
3. Notification Appliance Circuit Cable:
a. OSP: West Penn #AQ227 (Black Jacket)
b. ISP: West Penn #974 (Red Jacket)
3. Voice Evacuation Speaker Cable: Refer to drawings

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas and surfaces to receive fire alarm system.
1. Notify Architect of conditions that would adversely affect installation or subsequent use.
2. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

A. Install fire alarm system in accordance with NFPA 72, CEC, state and local codes, manufacturer's instructions, and as indicated on the Drawings.

B. Smoke detectors shall neither be installed within 36 inches of any HVAC supply or return air grille, to include air handling light fixtures, nor within 12 inches of any wall.

C. Smoke detectors shall not be installed before system programming and test period. If construction is ongoing during this period, take measures to protect smoke detectors from contamination and physical damage.

D. Wall mounted notification appliances shall be installed not lower than 80 inches and not higher than 96 inches, above finished floor. Devices shall be not be mounted within 6 inches of the ceiling.

E. All fire alarm devices shall be accessible for periodic maintenance. Should a device location indicated in the Contract Documents not meet this requirement, it shall be the responsibility of the Contractor to bring it, in writing, to the attention of the Engineer.

F. Flush-mount fire detection and alarm system devices, control panels, and remote annunciators in finished areas. Flush-mount or surface-mount fire detection and alarm system devices, control panels, and remote annunciators in unfinished areas.

G. Ensure manual stations are suitable for surface mounting or semi-flush mounting as indicated on the Drawings. Install stations at 48 inches above finished floor, measured to operating handle.

H. End of Line Resistors shall be furnished as required by the manufacturer. Devices containing end-of-line resistors shall be appropriately labeled so as not to require removal to identify the EOL device.

I. Addressable modules shall be mounted within 36 inches of the monitored or controlled point of termination. This shall include, but is not necessarily limited to, fan shutdown, elevator recall, shunt trip, sprinkler status points, or door release. Label all addressable modules as "FIRE ALARM SYSTEM" and to their function, e.g., "FAN F-1 SHUTDOWN".

J. Conduit/Raceways, Junction Boxes:
1. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems maybe installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.
2. The fire alarm system cabling / wiring shall be installed in RED color conduit, minimum size 3/4". In upgrade projects, existing fire alarm system conduit may be reused, if serviceable. Paint existing conduits red to match new.
2. All junction box covers shall be painted red.
2. Minimum conduit size shall be 3/4" trade size.
3. Conceal conduit, junction boxes, and conduit supports and hangers in finished areas. Conceal or expose conduit, junction boxes, and conduit supports and hangers in unfinished areas. Concealed installation is preferred wherever possible.

K. Cables & Conductors:
1. Cables & conductors shall be labeled at both ends as to their origin and destination; e.g. "FACP - i1-1" indicates the origin as the FACP and the destination as initiation device "i1-1". Utilize Panduit labels (or equivalent), size MP-150c through MP-350, as required by the amount of information on the label.
2. Splices in wiring are permitted only at terminal cabinets, or locations specifically approved by the Engineer. Do not splice in conduit, pull boxes, inaccessible locations, etc.

L. Terminal Cabinets:
1. Wiring shall be neatly bundled, fanned, tagged, and laced. Leave minimum three inches fan space between terminal block connection and vertical wiring. Incoming wiring shall terminate on the left, outgoing on the right.
2. Wire terminations at devices and terminal strips shall be "spade" type terminal connections, Sta-Kon, or equivalent.
3. Terminal barrier strips shall be Cinch 142 series (or equivalent) with minimum six points. Leave minimum two space separation between types of system cables. Provide minimum four spare termination points.

M. Coordinate the required space in the Data equipment frames with this and other network based systems. Provide racks with sufficient space to accommodate all systems.

3.3 SYSTEM UPGRADES

A. When upgrading an existing system, the existing fire alarm shall be tested in the presence of an assigned representative of Central Unified School District prior to any work being started by a contractor. Upon completion of testing, it shall be the contractor’s responsibility to note any

discrepancy with the existing system. It will be contractor's responsibility to provide and complete a working system, minus any discrepancies noted.

B. When upgrading an existing system, all end of line resistors shall be changed out to meet the manufacturer's specifications for each fire panel. Install the latest software updates on existing equipment to be reused.

C. When specifications call for the removal of existing equipment, that equipment shall be returned to the District.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide service of competent, factory-trained technician authorized by manufacturer to technically supervise and participate during pre-testing and acceptance testing of system.

B. Testing:
All testing shall comply with all applicable requirements listed in NFPA 72, Chapter 14.
1. Conduct complete visual inspection of control panel connections and test wiring for short circuits, ground faults, continuity, and insulation before energizing cables and wires.
2. Close each sprinkler system control valve and verify proper supervisory alarm at Control Panel.
3. Verify activation of flow switches.
4. Open initiating device circuits and verify that trouble signal actuates.
5. Open signaling line circuits and verify that trouble signal actuates.
6. Open and short notification appliance circuits and verify that trouble signal actuates.
7. Ground initiating device circuits and verify response of trouble signals.
8. Ground signaling line circuits and verify response of trouble signals.
9. Ground notification appliance circuits and verify response of trouble signals.
10. Check installation, supervision, and operation of intelligent smoke detectors.
11. Introduce on system each of the alarm conditions that system is required to detect. Verify proper receipt and proper processing of signal at Control Panel and correct activation of control points.
12. Consult manufacturer's manual to determine proper testing procedures when system is equipped with optional features. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality, and similar.

C. Acceptance Testing:
1. The contractor's job foreman and an assistant, in the presence of a representative of the manufacturer, an assigned representative of the School District, and the assigned inspector of the AHJ, shall perform a test of the system. All attending personnel shall be given reasonable notice so as to make themselves available for the test.
2. Operate every installed device to verify proper operation and correct annunciation at the control panel.
2. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.

3. Completely disconnect main Control Panel from rest of network. Activate initiating device. All control outputs supported by transponder SLC circuits shall operate under project programming mode. Default or degrade mode programming shall not be acceptable.
4. Complete any additional testing required by the AHJ.
5. When testing has been completed to satisfaction of both Contractor's job foreman, representatives of the manufacturer and Owner, and the inspector of the AHJ, a notarized letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to the Owner and fire department.
6. Leave fire alarm system in proper working order and, without additional expense to Owner, replace defective materials and equipment provided within 1 year (365 days) from date of final acceptance by the owner.

3.5 DEMONSTRATION

A. Provide instruction as required for operating fire alarm system.

B. Provide hands-on demonstrations of operation of fire alarm system components and functions.

END OF SECTION

SECTION 311100 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Provide all material, labor, equipment and services necessary to completely clear and demolish all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

B. RELATED SECTIONS:

1. Contract General Conditions and Division 1, General Requirements
2. Section 31 20 00 – Earthwork: Excavation, Filling, and Grading
3. Section 31 22 22 – Soil Materials
4. Section 31 23 33 – Trench Excavation and Backfill

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. In accordance with Specification Section GENERAL REQUIREMENTS, and the following:

a. Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board [CARB] and the Environmental Protection Agency [EPA].

B. Meetings:

1. Minimum agenda shall be to discuss coordination of upcoming work, review the work progress, discuss field observations, identification of any potential problems which may impede planned progress; corrective measures to regain projected schedule; and maintenance of quality and work standards.
2. Meetings shall include Pre-Clearing and Demolition Meetings.
3. Participants (or designated representative of) invited to attend each of the above meetings shall be as follows:

a. Contractor
b. Owner
c. Architect
d. Testing Laboratory
e. Local Governing Authorities as applicable
f. Utility Representatives as applicable
g. Owner's Inspector
h. Clearing and Demolition Subcontractor
i. Other subcontractors, as appropriate (including any accessory subcontractors)

1.4 PROJECT CONDITIONS OR SITE CONDITIONS

A. Dust Control

1. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.
2. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
3. No construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan, if one is required.
4. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.
5. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The costs for any such fines or fees shall be included in the lump sum price bid for work under this contract and no additional payment will be made therefor.

B. Existing Conditions:

1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives, walks or occupied facilities.

a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and Authorities having jurisdiction.
b. Provide alternate routes around closed or obstructed traffic ways if required by Authorities having jurisdiction.

3. Locate and identify utilities.

    a. Call a Local Utility Locator Service (USA – "Underground Service Alert" – [800] 227-2600) for the task of locating any applicable utilities in the area where the Project is located.

4. Carefully remove items indicated to be salvaged and store on Owner's premises at the Owner's direction.

PART 2 - PRODUCTS

(NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:

1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

1. Protect and maintain all benchmarks and survey control points from disturbance during clearing and demolition operations.
2. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties.
3. Furnish and install temporary protection/barrier fencing surrounding the limits of demolition.
4. Protect trees, plant growth, and features not specifically designated for removal. Locate and clearly flag trees and vegetation to remain or to be relocated.
5. Protect existing improvements designated to remain from damage during construction.

    a. Restore damaged improvements to their original condition, as acceptable to the Owner.

3.2 CONSTRUCTION

A. Vegetation, Shrub, Topsoil, Weed Removal:

1. Remove weeds and rooted topsoil to a minimum depth of 2 to 4 inches, or until all organics in excess of 3 percent by volume are removed, and temporarily stockpile as needed for re-use in finished grading of landscape areas. Remove excess material from the site.

2. Where existing vegetation is to be replaced by new materials, remove contaminated or excess soil from the site and legally dispose of off-site.

B. Existing Site Improvements Removal:

1. Remove existing above and below grade improvements as necessary to facilitate new construction.

a. Remove concrete slabs, sidewalk, curbs, mow strips, gutters, and fence post footings.

1) Neatly saw-cut length of existing pavement to remain before removing existing pavement unless existing full-depth joints coincide with line of demolition. Saw-cut faces vertically.

b. Remove indicated utility improvements within the limits of construction.

1) Excavate for and disconnect utilities designated to be removed. Seal or cap off underground.
2) Coordinate removal and/or relocation of utilities with the appropriate utility agencies.

c. Where existing underground utilities, irrigation pipes, wells, leach fields, or underground tanks are encountered, they must be removed or moved to a point at least 5 feet horizontally outside the proposed building and 3 feet horizontally outside the concrete flatwork or pavement construction areas. All resultant cavities must be backfilled with engineered fill.

C. Existing Utilities to Remain or be Relocated:

1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

a. Notify Architect and the Owner not less than seven (7) days in advance of proposed utility interruptions.
b. Arrange to shut off indicated utilities with utility companies and Owner.

D. Disposal:

1. Legally dispose of all debris (surplus soil materials, unsuitable topsoil, obstructions, demolished materials, waste materials, trash, etc.) resulting from clearing, grubbing, demolition and from construction. Disposal of all materials shall be at a location secured by the Contractor off of the Owner’s property.

END OF SECTION

SECTION 312000 - EARTHWORK: EXCAVATION, FILLING AND GRADING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Excavating soil and other material for surface improvements.
2. Placing fill.
3. Compaction of existing ground and fill.
4. Preparation of subgrade for other improvements.
5. Grading of soil.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1, General Requirements
2. Section 31 11 00 – Site Clearing
3. Section 31 22 22 – Soil Materials
4. Section 31 23 33 – Trench Excavation and Backfill

1.3 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18-inch (457 mm) Drop.

B. A Geotechnical Engineering Investigation Report has been prepared for the project by Krazan & Associates, Inc.; KA Project No. 012-25194, dated October 2, 2025. A copy of the report is available (for reference only) at the cost of reproduction. Contact Krazan & Associates, Inc. if a copy of the report is desired.

1.4 DEFINITIONS

A. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.5 SUBMITTALS

A. Product Data:

1. Information indicating the source of all import material, the fill material type and where it is to be used, and approval of the District's Inspector of Record for incorporation of import material into the Work.

B. Material Test Reports:

1. Classification of Soils.
2. Compaction Characteristics of Soils.
3. Density and Unit Weight of Soils in Place.
4. Imported fill shall be tested and approved by the Owner’s Geotechnical Engineer prior to import to the site, including testing for compliance with Department of Toxic Substances Control (DTSC) guidelines. Said testing and certification documents shall be paid for by the Owner.

C. Project Closeout: In accordance with Specification Section PROJECT CLOSEOUT.

1. Drawings indicating the extent and depth of all engineered fill, and overexcavation and recompaction. This information shall be a part of the Project “As-Built” and Project “Record” Documents in accordance with the Specification Section PROJECT DOCUMENTS.

1.6 QUALITY ASSURANCE

A. Installer:

1. Qualifications:

a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.

B. Regulatory Requirements:

1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:

a.	CARB	Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB].
b.	CM	City of Merced, Codes and Ordinances
c.	EPA	Environmental Protection Agency.

d. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.

e. DTSC Comply with all recommendations of the California Department of Toxic Substance Control (DTSC) regarding soil testing for potential contaminants.

C. Certificates:

1. Installer's certification that all Earthwork installation meets or exceeds the requirements of this specification.
2. Contractor's certification (on Contractor's letterhead paper) that the Earthwork materials and installation meets or exceeds the requirements of this specification.

D. Meetings:

1. Pre-Installation: Schedule prior to the start of work.

a. Coordinate the work with other work being performed.
b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.

a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.

a. Inspect and identify any problems which may impede issuance of warranties or guaranties.
b. Maintain installed work until the Notice of Substantial Completion has been filed.

1.7 COORDINATION

A. Coordinate work with Owner's personnel.

B. Provide required notification to the Owner and Geotechnical Engineer or the Engineer of Record so that a representative from the Owner's Geotechnical Engineering consultant can be present for all excavation, filling and grading operations to test and observe earthwork construction.

C. Verify that the location of existing utilities has been indicated at work site by utility authorities, by Owner, and as specified on the Plans.

1.8 EXISTING CONDITIONS

A. Existing Conditions:

1. Examine the site and verify conditions with the Drawings and Specifications. Contractor shall familiarize himself with existing site conditions and any changes that have occurred at the site since the preparation of the contract documents and shall be responsible to account for any such changes in the price bid for this work.
2. Thoroughly investigate and verify conditions under which the Work is to be performed.
3. Locate and identify utilities:

    a. Call a Local Utility Locator Service (USA - “Underground Service Alert” – [800] 227-2600) for the task of locating any applicable off-site and on-site utilities in the area where the Project is located.

4. No allowance for Extra Work will be granted resulting from negligence or failure to meet requirements of this Section.

B. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete flatwork, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunk line utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. Under similar circumstance, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

D. Determine exact location of existing buried utilities by:

1. Marking on ground or pavement surface the alignment and extent of the facilities and the probable location of existing utilities using construction plans and existing surface features.
2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations and notify Owner of said request concurrently.
3. Confirm exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.

E. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner’s personnel.

F. Provide Field Engineering to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under this Contract, submit detailed information to the Engineer for review and direction.

G. Maintain all existing utility mains and service lines in constant service during construction of the Work.

H. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work, and coordinate the timing of any such disruptions in advance with the District.

I. Existing soils are considered to have a moderate expansion potential.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.

1. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.
2. All land clearing, demolition, grubbing, scraping, excavation, land leveling, grading, and cut and fill activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by pre-soaking.
3. When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions or at least six inches of freeboard space from the top of the container shall be maintained.
4. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.
5. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/ suppressant.

    a. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.
    b. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. If required, Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
    c. If a dust control plan is required, no construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan.
    d. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.

e. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The costs for any such fines or fees shall be included in the lump sum price bid for work under this contract and no additional payment will be made therefore

B. Burning: No burning will be allowed on-site.

C. Rain: Work under this section shall not be started or maintained under threat of rain, unless the work is not affected by the rain.

D. Do not place fill during weather conditions which will alter moisture content of fill materials sufficiently to make compaction to the specified densities difficult or impossible.

E. When reference is made to SWPPP (Storm Water Pollution Prevention Plan), if any within this Project Manual, then comply with all environmental protection requirements included therein.

F. In accordance with EPA, CARB and CM.

G. Protection:

1. Protect cut and fill areas to prevent water running into excavation. Maintain areas free of water. Remove seeping water immediately by pumps. Provide dewatering as necessary.
2. Protect cut slopes from erosion due to precipitation and other sources of runoff.
3. Protect utilities to remain within the construction area and special construction. If utility lines are uncovered (water, electric, sewer, etc.) not shown on the drawings during excavation of site, notify the Architect promptly for its review and action.
4. Do not permit access to undeveloped portions of the site, nor to areas that are outside of the limits of grading.

H. Before being brought onto the site, all import soil must be sampled, tested and approved by Owner's Geotechnical Engineer. All import material must comply with DTSC recommendations and guidelines for environmentally clean soil suitable for school construction. Import testing will be provided and paid for by the Owner.

1.10 PROJECT RECORD DOCUMENTS

A. Submit under provisions of GENERAL CONDITIONS and DIVISION 1, GENERAL REQUIREMENTS.

B. Accurately record actual locations of utilities encountered including depth and horizontal location, as measured from permanent site features.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill in Turf or Other Planting Areas: Type S2 or S3 per Division 31 Specification Section SOIL MATERIALS.

B. Fill in Non-planting Areas: Type S1, S2 or S4 per Division 31 Specification Section SOIL MATERIALS.

C. Imported material: Type S3, S4 or S5 per Division 31 Specification Section SOIL MATERIALS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

3.2 PREPARATION

A. Layout of Work:

1. Contractor shall be responsible for all lines and grades. Layout shall be provided by a California registered Land Surveyor or Civil Engineer, at Contractor's expense.
2. Check all benchmarks, monuments and property lines and verify locations.
3. Locate and maintain all grade stakes.
4. Monuments moved or displaced during grading operation are to be replaced by a California Registered Civil Engineer or Surveyor, at Contractor’s expense.

B. Locate, identify, and protect existing above and below grade utilities from damage.

C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

D. Protect existing structures, fences, curbs, sidewalks, paving and other improvements to remain from damage from excavation equipment and vehicular traffic.

E. Employ equipment and methods appropriate to the work site.

F. Protect excavated areas from drainage inflow and provide for drainage of all excavated areas.

G. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.3 SITE STRIPPING:

A. Reference is made to Division 31 Specification Section SITE CLEARING.

B. Within the areas of planned surface improvements and structures, the near surface soils containing vegetation, roots, organics, or other objectionable material must be stripped and removed from the site. Upon approval of the Geotechnical Engineer, suitable materials stripped from the site may stockpiled and incorporated into the finish fill for planting areas.

C. All areas to receive surface improvements shall be stripped to remove turf, shrubs, trees and other vegetation, along with associated root systems, concrete, wood, metal, rubbish and other unsuitable debris, and any loose, saturated or unconsolidated soil material. Minimum stripping depth is expected to be 2 to 4 inches, or until all organics in excess of 3 percent by volume are removed. Stripping shall continue to the depth required to expose acceptable basement soils that are free from deleterious which are not suitable for Engineered Fill, as required by the Geotechnical Engineer.

3.4 EXCAVATION

A. Following clearing and stripping operations, excavate planned construction areas as specified in this Section.

B. Prior to backfilling, the bottom of the excavation shall be proof-rolled and observed by the geotechnical engineer of record Inc. to verify stability.

C. Provide additional excavation as required to conform to the lines, grades and cross-sections shown on the plans.

D. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw. Remove all roots ¼” in diameter and greater.

E. Remove excess soil not to be used as fill in the Work from the site. Unless requested by Owner to be deposited at a site designated by Owner on the property, obtain a disposal site and legally dispose of said excess material, all at no additional cost to the Owner.

F. Areas disturbed by demolition must be excavated to expose undisturbed soils.

G. Excavated soils free of deleterious substances (organic matter, demolition debris, tree roots, fragments larger than 4-inches, etc.) and with less than 3% organic content by volume, may be returned to the excavations as Engineered Fill. Clayey soils with an expansion index greater than 20 shall not be used in the upper 18 inches of soil supporting slabs-on-grade and exterior flatwork.

H. Approximately 1 to 1-1/2 feet of fill material was encountered at the site. The fill material predominantly consisted of silty sand. The thickness and extent of fill material was determined by limited testing borings and visual observation. Thicker fill may be present at the site. Verification of the extent of fill shall be determined during the site grading. The fill soils that have not been properly compacted and certified shall be excavated and recompacted. Prior to backfilling, the bottom of the excavation shall be observed by the geotechnical engineer of record to verify no additional removal is required.

3.5 FILLING AND COMPACTING

A. Once clearing, stripping, fill removal or certification, and demolition operations are complete, scarify/excavate the surface to receive fill material, exterior flatwork, and pavement to a minimum depth of 12-inches, worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method 1557. The zone of subgrade scarification shall extend a minimum of 2 feet beyond these improvements.

B. The upper 18” of soil within the limits of slab-on-grade and exterior flatwork areas shall consist of non-expansive Engineered Fill or lime-treated Engineered Fill.

C. Place and compact soil to finish subgrade of improvements to be placed thereon, or to finished surface grade where no improvements are to be placed thereon.

D. All fill required shall be placed as Engineered Fill.

E. The Contractor shall be solely responsible for securing an acceptable source of import material as required to grade the site. Reference is made to 31 20 00 1.9.H

F. On-site soils are suitable for re-use as Engineered Fill, providing they are cleansed of excessive organics (less than 3 percent by weight, ASTM D2974), debris, and fragments larger than four (4) inches in maximum dimension and meet the requirements of soil Type S4, Division 31 Specification Section SOIL MATERIALS.

G. Engineered Fill shall be moisture conditioned to a minimum of 2% above optimum moisture, placed in uncompacted layers not exceeding six (6) inches in thickness, and compacted as specified, based on ASTM Test Method D1557.
   1. Non-vegetative surface improvement areas (site concrete) - To a minimum of 90% of maximum dry density (relative compaction).
   2. Non-vegetative surface improvement areas (pavement improvements) - To a minimum of 95% of maximum dry density (relative compaction)
   3. Vegetative surface improvement areas (turf and planters) - Below top twelve (12) inches - to a minimum of 90% of maximum dry density (relative compaction). Top twelve (12) inches - 85% of maximum dry density (relative compaction).

H. Clayey soils with an expansion index greater than 20 shall not be used in the upper 18 inches of soil supporting slabs-on-grade and exterior flatwork areas.

I. Maintain optimum moisture content of fill materials to attain required compaction density.

J. Additional lifts shall not be placed if the previous lift did not meet the required dry density (relative compaction), or if soil conditions are not stable.

K. Conform fill to the lines, grades and cross-sections shown on the plans.

L. Fill materials to conform to Division 31 Specification Section SOIL MATERIALS.

M. Provide, at no additional cost to Owner, imported soil material conforming to the requirements of Division 31 Specification Section SOIL MATERIALS, as needed to attain finished grades of Work.

N. Utilize equipment which will not disturb or damage existing utilities and other improvements.

3.6 PREPARATION OF SUBGRADE FOR SURFACE IMPROVEMENTS

A. Where concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvements, or a layer of said surface improvements, are to be constructed on the soil surface, prepare the subgrade for said improvements in accordance with this section.

B. Scarify the soil as specified and remove and dispose of (off the project site) all rocks, hardpan chunks or otherwise unsuitable material over 4-inches in size.

C. Thoroughly moisture condition and compact as described above.

D. Prior to commencing construction of surface improvements, pass a test roller of size and weight as approved by the Owner over the subgrade to establish the extent of soft or spongy areas requiring repairs.

E. Conform finished subgrade surface to the lines, grades and cross-sections shown on the plans.

3.7 FINE GRADING

A. Fine grade all finished surfaces to the lines, grades and cross-sections shown on the plans, and to blend to hard surface improvements.

B. Rake and smooth all finished surfaces not to receive hard surface improvements.

C. Use suitable stockpiled or imported topsoil for the top 12-inches of areas to receive landscape improvements.

D. Import topsoil meeting the requirements of Division 31 Specification Section SOIL MATERIALS, as required to complete finish grading.

E. Topsoil may not be used in areas requiring Engineered Fill.

3.8 TOLERANCES

A. Top surface of Subgrade for Non-Vegetative Surface Improvements or Layers thereof: Plus or minus 0.02 foot from planned elevation.

B. Top surface of Subgrade for Vegetative Surface Improvements or for Bare Ground - Plus or minus 0.05 foot of planned elevation, or as required for finish surface to match adjacent improvements or ground.

3.9 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of GENERAL CONDITIONS and/or DIVISION 1, GENERAL REQUIREMENTS.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest.

D. All retesting required as a result of failure of initial test will be performed by Owner's testing agency, at the expense of the Contractor.

3.10 PROTECTION

A. Protect graded areas from traffic, freezing, erosion, and all other sources of damage. Keep free of debris and trash.

B. Repair and re-establish grades to specified tolerances where completed or partially completed work becomes eroded, rutted, settled, or where it is damaged by subsequent construction operations or weather.

C. Where settlement occurs prior to acceptance of the work, remove and replace surface improvements, excavate, replace, and re-compact in accordance with these specifications, and restore the surface improvements.

3.11 CLEANING

A. Remove all surplus or unsatisfactory soil material, trash, and debris, and legally dispose of off of the Owner's property.

END OF SECTION

SECTION 312222 - SOIL MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Imported, excavated, and re-used materials.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1, General Requirements.
2. Section 31 20 00 - Earthwork: Excavation, Filling and Grading
3. Section 31 23 33 - Trench Excavation and Backfill

1.3 SUBMITTALS

A. Samples: Submit, in air-tight containers, 10 lb. sample of Type S3, S4 and S5 fill to inspector.

B. Soil Analysis: Submit for Type S3, S4 and S5 soils to be imported.

C. Materials Source: Submit location of imported materials source. Provide materials from same source throughout the work. Change of source requires approval.

D. For imported soil, obtain Geotechnical Engineer and District approval prior to importing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Soil Type S1: Excavated and reused material, graded; free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.

B. Soil Type S2: Excavated and reused material, graded; free of roots, lumps greater than one inch, rocks larger than 1/2 inch, debris, weeds and foreign matter.

C. Soil Type S3: Imported topsoil, friable loam; reasonably free of roots, rocks larger than ½ inch, debris, weeds, and foreign matter.

D. Soil Type S4: Imported borrow, suitable for purposes intended, meeting the following characteristics:

1. Maximum Particle Size: 4”
2. Percent Passing #4 Sieve: 65-100
3. Percent Passing #200 Sieve: 20-45
4. Expansion Index: <15
5. Plasticity Index: <10
6. R-Value (in paved areas): >50
7. Low Corrosion Potential:

    a. Soluble Sulfates: <1,500 mg/Kg
    b. Soluble Chlorides: <300 mg/Kg
    c. Soil Resistivity: >5,000 ohm-cm

E. Soil Type S5: Imported sand. Natural river or bank sand (sand equivalent greater than 30), washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

2.2 SOURCE QUALITY CONTROL

A. Inspection of imported soil will be performed by the Geotechnical Engineer, at source of import and prior to being delivered to the site.

PART 3 - EXECUTION

3.1 STOCKPILING

A. Stockpile excavated or imported material onsite at location designated by project inspector.

B. Stockpile excavated or imported material in sufficient quantities to meet project schedule and requirements.

3.2 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

B. Dispose of excess material off-site.

END OF SECTION

SECTION 31 23 33 - TRENCH EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. A Geotechnical Engineering Investigation Report has been prepared for the project by Krazan & Associates, Inc.; KA Project No. 012-25194, dated October 2, 2025. A copy of the report is available (for reference only) at the cost of reproduction. Contact Krazan & Associates, Inc. if a copy of the report is desired.

1.2 SUMMARY

A. This Section includes the following:

1. Provide all material, labor, equipment, and services necessary to excavate trenches, holes, and pits. Provide suitable bedding and backfill material and achieve compaction, as specified herein.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1, General Requirements
2. Section 31 11 00 - Site Clearing
3. Section 31 20 00 - Earthwork: Excavation, Filling and Grading
4. Section 31 22 22 - Soil Materials
5. Section 33 40 00 - Storm Drainage

1.3 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.4 DEFINITIONS

A. Utility: Any buried or above ground pipe, conduit, cable, associate devices or appurtenances, or substructure pertaining hereto.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Installer:

a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.

B. Regulatory Requirements:

1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:

a.	CARB	Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board [CARB].
b.	CM	City of Merced, Codes and Ordinances
c.	EPA	Environmental Protection Agency.
d.	CAL/OSHA	Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground excavations.

C. Certificates:

1. Installer’s certification that all trench backfill installation meets or exceeds the requirements of this specification.
2. Contractor’s certification (on Contractor’s letterhead paper) that the trench backfill materials and installation meets or exceeds the requirements of this specification.

D. Meetings:

1. Pre-Installation: Schedule prior to the start of work.

a. Coordinate the work with other work being performed.
b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.

2. Progress: Scheduled by the Contractor during the performance of the work.

a. Review for proper installation of work progress.
b. Identify any installation problems and acceptable corrective measures.
c. Identify any measures to maintain or regain project schedule if necessary.

3. Completion: Scheduled by the Contractor upon proper completion of the work.

a. Inspect and identify any problems which may impede issuance of warranties or guaranties.

4. Maintain installed work until the Notice of Substantial Completion has been filed.

1.6 COORDINATION

A. Coordinate work with Owner's personnel.

B. Verify that the location of existing utilities have been indicated at work site by utility authorities.

1.7 EXISTING UTILITIES

A. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete work, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

B. Under circumstance similar to 31 23 33/1.7A, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. Determine exact location of existing buried utilities by:

1. Marking on ground or pavement surface the alignment and extent of the proposed facilities and the probable location of existing utilities using construction plans and existing surface features.
2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations, and notify Owner of said request concurrently.
3. Locate exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.

D. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner's personnel.

E. Provide Field Engineering per Contract General Conditions and Division 1 to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under the Contract, submit detailed information to the Owner's Inspector and Engineer for review and direction.

F. Maintain all existing utility mains and service lines in constant service during construction of the Work.

G. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work.

PART 2 - PRODUCTS

2.1 FILL MATERIALS

A. Fill Type S1, S2, S4 and S5, as specified in Division 31 Specification Section SOIL MATERIALS.

2.2 WARNING TAPE

A. 6” wide warning tape shall be installed over all of the pipelines as shown on the details.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

B. Protect existing structures, fences, sidewalks, curbs, and other improvements from excavation equipment and vehicular traffic.

C. Maintain and protect above and below grade utilities which are to remain.

D. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.2 EXCAVATION

A. Excavate soil required to locate existing utilities and install the work.

B. Use hand methods of excavation to locate existing utilities, and to excavate trenches, pits and holes in congested areas.

C. Employ equipment and methods appropriate to the work site. Small mechanical excavators may be used only in areas where there is sufficient space so as not to damage adjacent improvements, and where the locations of all existing utilities have been determined by hand methods of excavating.

D. Cut trenches just wide enough to enable installation and proper bedding and backfill, and to allow inspection.

E. Except as specifically allowed in writing by the Engineer, open or backfilled trenches parallel with a footing shall not be below a plane having a downward slope of 1 unit vertical to 2 units horizontal (50 percent slope) from a line 9 inches (229 mm) above the bottom edge of the footing and not closer than 18 inches (457 mm) from the face of such footing.

F. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose material.

G. Excavate trenches, pits or holes bottoming in hardpan to a minimum of 6 inches below the grade for the bottom of the pipe and any couplings. No additional payment will be made for such over-excavation and refill.

H. In all trenches or excavation sites where a firm foundation is not encountered, such as soft, spongy, or otherwise unsuitable material, remove the material to a minimum of 12 inches, or to a depth determined by the Engineer, below the bottom of the proposed pipe or structure, and backfill the space with Type S2 or S5 material containing sufficient moisture to allow compaction to 90% maximum dry density (relative compaction). Soil Type S2 shall meet requirements of Type S5. No additional payment will be made for such additional excavation or backfill.

I. Excavate trenches to provide the design grade of the facility, or as directed by the Engineer.

J. Stockpile excavated material to be returned to trench adjacent thereto in location which will not be detrimental to existing improvements, or pedestrian or vehicular traffic. Remove from site all unsuitable or excess material not to be used.

K. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw.

L. Remove excess soil not used as backfill from the work site. Obtain a disposal site off of the Owner’s property and legally dispose of said excess material, all at no additional cost to the Owner.

M. If water is encountered during excavations, provide all dewatering measures necessary to construct improvements shown.

N. Contractor shall make all provisions necessary, including but not limited to, shoring or sloping back trench walls as required to address sandy soils. The cost of these provisions shall be included in the lump sum amount bid for this work and no separate payment will be made therefore.

3.3 PROTECTION OF EXCAVATIONS

A. Provide all shoring and bracing as required and those codified in local, state and federal safety regulations.

B. Prevent water, caving or sloughing ground from entering excavations.

C. Maintain excavations free of water.

3.4 BACKFILLING

A. Provide type S2 or S5 pipe bedding as required by Plans and compact to 90% maximum dry density (relative compaction). Soil Type S2 shall meet requirements of Type S5.

B. After installation of pipes and appurtenances and placement of pipe bedding material, backfill trenches and excavations to finished grade, or subgrade in areas to receive surface improvements

C. Backfill trenches to a minimum of 12 inches above the pipe and any couplings with Type S2 or S5 material, containing sufficient moisture to allow compaction to 90% maximum dry density (relative compaction). Soil Type S2 shall meet requirements of Type S5.

D. Backfill trenches above pipe bedding material and to within 24 inches of finish subgrade with Type S1, S2, S4, or S5 soils, except that that top 12 inches shall be type S2, S3, S4 or S5 soils.

E. Employ a placement method that does not disturb or damage existing or proposed pipes or other Utilities or Improvements.

F. Place and compact all soil backfill in continuous layers not exceeding 6 inches in loose uncompacted thickness, moisture condition to at least 3% above optimum moisture content.

G. Maintain optimum moisture content of fill materials to attain required compaction.

H. Backfill final 12-inch thickness to finish subgrade in areas to receive concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvement, with Type S2, S4, or S5 soils.

I. Backfill final 12-inch thickness to finish subgrade in areas to receive sod, other vegetation, or bare soil, with Type S2 or S3 soils.

J. Compact backfill below the top 12-inches to 90% maximum dry density (relative compaction).

K. In areas to receive buildings, structures, or concrete flatwork, compact the top 12-inches to 90% maximum dry density (relative compaction).

L. In areas to receive asphalt concrete pavement or concrete pavement subject to vehicular traffic, compact the top 12-inches to 90% maximum dry density (relative compaction).

M. In planting areas, compact the top 12-inches to 85% maximum dry density (relative compaction).

3.5 TOLERANCES

A. Top Surface of Backfill under Paved or Concrete Areas: Plus or minus 0.02 feet from required elevations.

B. Top Surface of General Backfilling: As required for finish surface to match adjacent improvements or ground.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of General Conditions and/or Division 1.

B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, recompact, and retest. Retests required due to failure of initial tests shall be paid for by the Contractor.

3.7 PROGRESS AND PROSECUTION

A. Backfill any excavation opened in any day on that same day.

END OF SECTION

SECTION 32 11 26 - AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Provide all material, labor, equipment and services necessary to install aggregate base surfacing as indicated by the Contract Documents.

1.3 RELATED SECTIONS

A. Contract General Conditions and Division 1, General Requirements
B. Section 31 20 00 – Earthwork: Excavation, Filling, and Grading
C. Section 31 23 33 – Trench Excavation and Backfill
D. Section 32 12 16 – Soil Sterilization
E. Section 32 12 17 – Asphalt Paving
F. Section 32 13 13 – Site Concrete Improvements

1.4 REFERENCES

A. SSCDOT - Standard Specifications, Department of Transportation, State of California (Caltrans), latest edition, except for references to method of payment, and references to any state furnished materials

1.5 QUALITY ASSURANCE

A. Provide and install in accordance with SSCDOT.

1.6 SUBMITTALS

A. Submit data sheets from supplier to document compliance with SSCDOT requirements.

B. Certificates of compliance for material.

C. Load tags for delivered material.

1.7 COORDINATION

A. Coordinate with other work, including subgrade preparation and soil sterilization.

B. Coordinate installation schedule with Owner's use of the premises and with other contractors working at the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate Base: Unless specified otherwise on Plans, Class 2, 3/4 Inch Maximum per Section 26 of SSCDOT.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify quantities required.

B. Verify that subgrade has been placed and compacted per Contract Documents

C. Verify gradients and elevations of subgrade are correct.

3.2 INSTALLATION OF AGGREGATE BASE COURSE

A. Install in conformance with SSCDOT Section 26, Aggregate Bases.

B. Thickness - As shown on construction drawings.

C. Spreading and Compacting - In accordance with Section 26, SSCDOT. Base course shall be moisture conditioned to a minimum of 2% above optimum moisture, placed in uncompacted layers not exceeding six (6) inches in thickness, and compacted as specified, based on ASTM Test Method D1557. The relative compaction of each layer of compacted base material shall be not less than 95 percent.

D. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities, true to grade and cross-section.

E. Lines and grades for the installation of aggregate base shall be set by a California licensed Land Surveyor or Civil Engineer, at Contractor's expense.

3.3 TOLERANCES

A. Compacted thickness of aggregate base: Not less than the thickness specified on the Plans.

B. Finished Surface: Within 0.02 foot of planned grade per Section 26, SSCDOT. No more than 50% of the finish surface shall be above or below the specified grade for aggregate base.

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by the Owner’s inspector, under provisions of Division 01.

3.5 PROTECTION

A. Immediately after placement and compaction, protect surface from mechanical injury.

B. Protect completed surface until surfacing layers are in place.

END OF SECTION

SECTION 321216 - SOIL STERILIZATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work specified in this section.

1.2 SECTION INCLUDES

A. This Section includes the following:

1. Furnish and install soil sterilant under concrete and asphalt concrete paving.

1.3 RELATED SECTIONS

A. All Division 01 Specification Sections
B. Section 31 20 00 – Earthwork: Excavation, Filling, and Grading
C. Section 31 23 33 – Trench Excavation and Backfill
D. Section 32 11 26 – Aggregate Base Course
E. Section 32 12 17 – Asphalt Paving

1.4 STANDARDS

A. In accordance with the following:

CCR-T21	California Code of Regulations, Title 21 Public Works.
CBC	California Building Code, California Code of Regulations, Title 24, Part 2, CCR-T24.
USDA	United States Department of Agriculture.
EPA	Environmental Protection Agency.
CM	City of Merced

1.5 QUALITY ASSURANCE

A. Provide licensed operator to apply soil sterilant.

B. All products shall comply with the current EPA laws at time of application. Should the products listed become unavailable because of changes in the law, submit substitute products for review by the Owner.

1.6 SUBMITTALS

A. Certificates of application.

B. Certificates of compliance for material.

1.7 COORDINATION

A. Coordinate with other work, including subgrade preparation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Soil Sterilant: Bayer Oust XP, weed and grass preventer, or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that site is ready for application.

3.2 PREPARATION

A. Identify installation locations.

B. Employ equipment and methods appropriate to the work site.

3.3 APPLICATION

A. Thoroughly water soak surface to be treated. Avoid excessive water runoff.

B. Apply sterilant solution over surface to receive pavement or surfacing prior to the start of pavement or surfacing installation.

C. Apply in spray form, at rate as allowable by State of California and the manufacturer's recommended application rate.

D. Take all precautions to limit soil sterilant solution to areas immediately under proposed pavement or surfacing. Use shields as necessary, and do not apply under windy conditions.

3.4 FIELD QUALITY CONTROL

A. Field inspection will be performed under Specification Section QUALITY REQUIREMENTS.

END OF SECTION

SECTION 32 12 17 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Provide all material, labor, equipment, and services necessary to completely install all pavement materials, accessories, and other related items as required by the Contract Documents.

B. Related Sections

1. Contract General Conditions and Division 1, General Requirements.
2. Section 31 22 00 - Earthwork: Excavation, Filling, and Grading
3. Section 31 23 33 - Trench Excavation and Backfill.
4. Section 32 11 26 - Aggregate Base Course
5. Section 32 12 16 - Soil Sterilization

1.3 REFERENCES

A. SSCDOT - Standard Specifications, Department of Transportation, State of California (Caltrans), latest edition, except for references to method of payment, and references to any state furnished materials.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with SSCDOT.

B. Mixing Plant: Conform to SSCDOT.

C. Installation Criteria: Asphalt concrete shall show no evidence of cracking, uneven settlement, improper drainage, or untoward junctions with adjoining or existing surfaces. Work displaying such conditions shall be corrected under the Contractor’s guarantee of all work.

1.5 SUBMITTALS

A. Hot mixed asphalt mix design.

B. Certificates of compliance for material.

C. Load tags for delivered material.

1.6 COORDINATION

A. Coordinate with other work, including subgrade preparation, aggregate base placement and soil sterilization.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt-concrete when atmosphere temperature is less than 50 degrees F, or surface is wet or frozen.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Paint Binder: In accordance with SSCDOT Section 94, Asphaltic Emulsions.

B. Asphalt-Concrete: Type A in accordance with Section 39, SSCDOT, ½ inch or ¾ inch maximum aggregate (medium) as indicated on the Plans. The asphaltic concrete shall be compacted to an average relative compaction of 97 percent, with no single test value being below a relative compaction of 95 percent based on a 50 blow Marshall maximum density. Use asphalt binder performance grade PG 64-10.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify quantities required. New asphalt-concrete paving is required at all locations shown on the plans, and where existing asphalt-concrete paving to remain is removed or damaged by the Project excavation or related work.

B. Verify that subgrade or base material has been compacted to required relative compaction and is dry.

C. Verify gradients and elevations of base are correct.

D. Verify that subgrade or base material has been sterilized per Section 32 12 16 SOIL STERILIZATION.

3.2 AGGREGATE BASE

A. Where shown on the construction plans, place and compact aggregate base course per Section 32 11 26 AGGREGATE BASE COURSE.

B. Where shown on the construction plans, place asphalt on compacted earth subgrade per Section 31 20 00 EARTHWORK: EXCAVATION, FILLING AND GRADING and Section 31 23 00 TRENCH EXCAVATION AND BACKFILL.

C. A soil sterilant shall be applied over the entire area which is to be paved in accordance with Section 31 12 16 SOIL STERILIZATION

3.3 PREPARATION – PAINT BINDER

A. Apply paint binder to existing asphalt-concrete or concrete surfaces which will be in contact with asphalt-concrete surfacing.

B. Rate of application for all surfaces against which asphalt concrete is to be placed shall be no less than 0.02 and no more than 0.05 gallons per square yard. All vertical concrete surfaces which will be in contact with asphalt concrete surfacing and all areas now in place which will be covered with new surfacing materials and feathering operations shall be coated with a paint binder applied at the rate of 0.05 gallons per square yard.

3.4 INSTALLATION OF ASPHALTIC-CONCRETE

A. Install in conformance with SSCDOT Section 39, Asphalt-Concrete.

B. Thickness - As shown on construction plans. Where thickness exceeds 3 inches, place in no less than 2 layers with top layer no thicker than one inch. Asphaltic concrete shall be laid to the thickness designated on the Plans. The plan thickness is to be considered as a minimum thickness. The Contractor shall lay the asphaltic concrete to a depth required to insure that, after compaction, the in place compacted thickness is equal to or greater than the specified plan thickness.

C. The Contractor shall provide to the Engineer the truck delivery weight tags for the asphaltic concrete material. The quantity delivered shall be equal to or greater than the calculated in place quantity based on the specified thickness and area to be paved as designated on the construction plans and based on a unit density of the asphaltic concrete of 141 pounds per cubic feet.

D. Asphalt type: PG 64-10

E. Compaction Equipment - In accordance with Section 39, SSCDOT. At small difficult areas, equipment may be altered as approved by Engineer.

F. The completed surface shall be thoroughly compacted, free from ruts, depressions, and irregularities and to be true to grade and cross-section.

3.5 TOLERANCES –GENERAL

A. Finished Surface: within 0.02 foot of planned grade.

B. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.

C. Scheduled Compacted Thickness: Not less than specified.

3.6 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01.

B. Pavement shall comply with the following:
   1. Water shall not be able to accumulate at any point and the surface shall be free to drain to drainage inlets or gutters.
   2. The paving contractor shall water flood the surface with the use of a water truck. If, after 30 minutes on a 70 degree F day, “bird baths” are evident in a depth more than 0.01 foot, the paving contractor and the Owner’s representative will determine the best method of correction.
   3. A 10 foot straightedge shall be used to check for high spots and ridges. High spots and ridges out of compliance shall be reduced by a remedy determined by the paving contractor and the Owner’s representative.

C. Should a section of the work be not acceptable on the basis of inadequate compaction and/or the mixture becomes loose and broken, mixed with dirt, out of tolerance, or in any other way defective, it shall be repaired or removed and replaced with fresh mixture and immediately compacted to conform to the surrounding area to the satisfaction of the Owner.

3.7 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury.

B. Protect sealed surface until it is cured.

END OF SECTION

SECTION 32 13 13 - SITE CONCRETE IMPROVEMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This Section includes the following:
   1. All material, labor, equipment and services necessary to completely install exterior Portland cement flatwork, cast-in-place concrete, and architectural flatwork concrete, accessories and other related items, slabs, ramps and sidewalks and walkways, curb and gutter, mowstrips, and other miscellaneous concrete items of the form and dimensions shown on the plans and necessary to complete the project, and in accordance with the requirements of the Standard Specifications as modified and supplemented by these Special Provisions

B. RELATED SECTIONS

   1. Contract General Conditions and Division 1, General Requirements
   2. Section 31 20 00 - Earthwork: Excavation, Filling, and Grading
   3. Section 32 11 26 - Aggregate Base Course
   4. Section 32 13 15 - Concrete Reinforcement

1.3 REFERENCES

A. SSCDOT - Standard Specifications, Department of Transportation, State of California (Caltrans), latest edition, except for references to method of payment, and references to any state furnished materials.

B. ACI standards, including but not limited to #304, 305, 306, 308, 309 and 347.

C. ASTM standards, including but not limited to #C-33, C-39, C-94, C-136, C-143, C-150, and C-309.

1.4 SUBMITTALS

A. Submit under provisions of Specification Section SUBMITTALS.
   1. Certificates of compliance for materials and mix designs.
   2. Load tags for delivered material.
   3. Strength testing as required by the approving agency.
   4. Integral color sample, where applicable.
   5. Application instructions for the architectural finish materials.

6. Accessories and manufacturer's installation specifications.

1.5 QUALITY ASSURANCE

A. Furnish concrete materials conforming with SSCDOT.

B. Perform work in accordance with SSCDOT, unless noted otherwise herein.

PART 2 - PRODUCTS

2.1 MIXES

A. Mix Design and Proportions in accordance with SSCDOT:
   1. Mix designs with Fly Ash content no greater than 15 percent of the total weight of cementitious materials shall be proportioned by SSCDOT.
   2. Provide a maximum of 4 percent air entrainment, unless noted otherwise.
   3. Owners Testing laboratory shall review all mix designs before submittal.
   4. All concrete shall have the following minimum compressive strengths in accordance with ACI 318 and SSCDOT at 28 days and shall be proportioned within the following limits:
      a. Site Concrete: Use for exterior concrete slabs on grade including, but not limited to sidewalks, curbs, gutters, mow strips, utility appurtenances and miscellaneous site improvements.
         1) Strength: 3,000 psi at 28 days
         2) Maximum Aggregate Size: 1-inch
         3) Cement Type: Type II
         4) Cement Content: 5.5 sacks/yd minimum
         5) Max Water/Cement Ratio: Per SSCDOT
         6) Admixture Per SSCDOT
      b. Structures & Vehicular Concrete Paving: Use for site structures and exterior slabs on grade subject to vehicle traffic.
         1) Strength: 4,000 psi at 28 days
         2) Maximum Aggregate Size: 1-inch
         3) Cement Type: Type II
         4) Cement Content: 6.5 sacks/yd minimum
         5) Max Water/Cement Ratio: Per SSCDOT
         6) Admixture: Per SSCDOT
      c. Slurry Backfill: Use for backfill of over-excavated trenches, encasement of all penetration, and site utility piping.
         1) Maximum Aggregate Size: 3/8-inch
         2) Cement Type: Type II
         3) Cement Content: 2.0 sacks/yd minimum

B. Reinforcement shall comply with relevant portions of Division 32 Specification Section CONCRETE REINFORCEMENT.

PART 3 - EXECUTION

3.1 PREPARATION

A. Subgrade shall conform to the requirements of Division 31 Specification Section EARTHWORK: EXCAVATION, FILLING AND GRADING. The District may elect to verify compacted subgrade elevations by measurement made from adjacent existing improvements or by a template supported by forms.

3.2 GENERAL CONCRETE

A. Concrete placement shall conform to the applicable requirements of Standard Specification Sections 51 and 90. Concrete shall not be placed when the air temperature in the shade at the project site exceeds 95º F or is below 45º F, or when the temperature of the concrete exceeds 85º F.

B. After the concrete has been placed, it shall be struck off to proper section and compacted with a grid of parallel metal bars until a layer of mortar not less than 3/8 inch thick has been brought to the surface. All exposed concrete surfaces shall receive a medium broom finish applied transversely to the line of pedestrian traffic or to the longest dimension of the concrete, as applicable.

C. General concrete surfaces shall be cured by the curing compound method and shall be protected in accordance with the provisions of Subsections 90-1 and 90-2 of the Standard Specifications.

3.3 PROTECTION OF CONCRETE

A. The Contractor shall be responsible for the condition of all concrete work until such time as all work has been completed and is accepted by the District. The Contractor shall limit vehicular travel across concrete until such time as the concrete has achieved strength sufficient that it can support traffic without damage. In no case, however, will vehicles be allowed to travel across new concrete improvements until seven calendar days have passed since the concrete was placed.

3.4 CONCRETE JOINTS

A. Expansion joints and weakened plane joints shall be constructed at the locations shown on the plans or as directed by the Engineer. Where joint locations are not specified on the plans, expansion joints shall be constructed at maximum intervals of 30 feet, and weakened plane joints shall be constructed at maximum intervals of 10 feet.

B. Expansion joints shall be considered as weakened plane joints for the purpose of spacing weakened plane joints. Expansion joints shall be tooled with a 1/4 inch maximum radius edger, and shall be filled with 3/8 inch pre-formed expansion joint filler.

3.5 CONCRETE FINISHES

A. Where concrete is being installed adjacent to or near existing concrete improvements, match the finish of similar concrete surfaces (i.e. new sidewalks shall match existing sidewalks, new curbs shall match existing curbs, etc.).

B. Sidewalks and Mowstrips: Medium sweat finish or medium broom finish perpendicular to the direction of travel.

C. Curbs: Trowel smooth and finish with a light brush.

D. Gutters: Medium broom finish parallel with curb or direction of flow.

E. Drive approaches and wheelchair ramps: medium broom finish, perpendicular to the direction of travel.

3.6 INSTALLATION OF ACCESSORIES

A. Strictly comply with manufacturer's instructions and recommendations and approved details. Securely anchor work to substrate.

3.7 REPAIR AND CLEAN-UP

A. Contractor shall legally remove all trash, debris, containers and excess materials from the site on a periodic basis, and shall keep the work broom clean until Owner’s acceptance.

B. The Contractor shall be held responsible for the repair and/or replacement of new or existing improvements damaged as a result of this work to the satisfaction of the Owner.

C. The Contractor shall provide roll-off bins for wash-out of ready mix concrete trucks and pumpers. Do not allow concrete debris or cement water onto soils scheduled for landscape planting.

END OF SECTION

SECTION 32 13 15 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This Section includes the following:

1. Deformed reinforcing bars for site concrete improvements.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1, General Requirements
2. Section 32 13 13 - Site Concrete Improvements

1.3 SUBMITTALS

A. Submit in accordance with Specification Section SUBMITTALS and the Contract General Conditions.

1. Mill test certificates identifying chemical and physical analysis of each load of reinforcing steel delivered. If mill test reports are not available and the quantity of steel for a structure exceeds 5 tons, provide a laboratory test to prove yield strength and bending.
2. Drawings and placing diagrams for each grade slab including dowels and corner bars.
3. On the placing diagrams, show all openings for pipelines and architectural features. Include additional reinforcing at openings and corner bar arrangements at intersecting beams, walls, and footings.
4. Coordinate placing diagrams with the concrete placing schedule.

1.4 PRODUCT DELIVERY

A. Deliver reinforcement to project site in bundles marked with tags indicating bar size and length.

B. Store on wooden supports above ground surface.

PART 2 - PRODUCTS

2.1 BARS

A. Bars shall be deformed billet steel conforming to ASTM A 615, Grade 60. Mixing of steel grades will not be allowed.

2.2 BAR SUPPORTS

A. Bar support shall be concrete or metal chairs, spacers or hangers. Reinforcing bars shall not be supported by forms.

2.3 TIE WIRE

A. Tie wire shall be annealed steel wire of not less than 16-gauge.

PART 3 - EXECUTION

3.1 PLACEMENT

A. Position reinforcement in accordance with the drawings, secure with wire ties or suitable clips at all intersections, and support by an adequate number of concrete or metal chairs, spacers, or metal hangers such that reinforcing bars do not sag more than one quarter of an inch (1/4") between supports. Do not place reinforcement or supports in contact with the forms. Bend tie wires away from the forms in order to provide the specified concrete coverage. To secure reinforcement in position, the Contractor may elect to locate bars additional to those shown on the drawings, but at no additional cost to the Owner.

B. Set reinforcing dowels and anchor bolts in place prior to placing concrete. Do not press them into the concrete after the concrete has been placed.

3.2 SPLICES

A. Splice bars only at locations shown on the drawings. Where splices are not detailed, lap bars 72 bar diameters.

3.3 CLEANING

A. Remove dirt, form oil, excessive rust, cement coating from previous pours, and foreign matter that will reduce bond with concrete.

3.4 PROTECTION DURING CONCRETING

A. Keep reinforcing steel in proper position during concrete placement.

END OF SECTION

SECTION 32 17 23 – PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Furnish and install paint markings for parking stall, traffic delineation, wording, ADA markings, and hatching area on concrete and asphalt concrete pavement.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1, General Requirements
2. Section 32 12 17 – Asphalt Paving
3. Section 32 13 13 – Site Concrete Improvements

1.3 REFERENCES

A. SSCDOT Standard Specifications, California Department of Transportation (Caltrans), latest edition, except for references to methods of payment and to furnishing of materials by State.

1.4 SUBMITTALS

A. Submit under provisions of Division 1.

B. Certificates of compliance for materials.

1.5 COORDINATION

A. Coordinate work with other work, including associated traffic signing.

B. Commence striping or marking of asphalt concrete no sooner than 7 days following any sealing of the asphalt concrete.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Paint: Quick drying, high visibility water soluble acrylic striping paint; Stripe Master, Wikel Mfg. Company, or similar by Sherwin Williams, J.E. Bauer, or PPG, or approved equal.

B. Paint shall be of color indicated on the construction plans.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that site is ready for application.

3.2 PREPARATION

A. Identify installation locations. Place parking stall striping, traffic marking, wording, disabled symbol and access striping at locations, as shown on construction plans.

B. Thoroughly clean all surfaces to be painted.

C. Employ equipment and methods appropriate to the work site.

D. Provide vehicular and traffic controls per Division 1.

3.3 INSTALLATION

A. Apply paint striping and marking as indicated on the plans.

B. Apply paint uniformly, straight and true, with equipment designed for traffic striping and marking applications.

C. Apply paint striping and marking per Section 84 of SSCDOT, except supply paint conforming to 2.1 A. of this specification.

D. Apply a minimum of 2 separate coats of paint at all striping and marking locations, including asphalt concrete and concrete surfaces.

E. Paint international symbol of accessibility at the location as shown on the plans.

F. Paint accessible access area striping at the location as shown on the plans.

3.4 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Division 1.

END OF SECTION

SECTION 32 28 52 – PARKING LOT FURNITURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Furnish and install signs, posts and concrete wheelstops.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1, General Requirements
2. Section 32 12 17 – Asphalt Paving
3. Section 32 13 13 – Site Concrete Improvements

1.3 REFERENCES

A. SSCDOT Standard Specifications, California Department of Transportation (Caltrans), latest edition, except for references to methods of payment.

B. CBC – California Building Code, latest edition.

1.4 SUBMITTALS

A. Submit under provisions of Specification Section - SUBMITTAL PROCEDURES.

1.5 COORDINATION

A. Coordinate work with Owner’s personnel.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Signs: As per detail drawing.

B. ADA Accessible Signs: As per detail drawing.

C. Sign Posts: 2 inch diameter galvanized iron pipe, A 120, Schedule 40, unless otherwise shown on drawing.

D. Concrete for Sign Footings: Specification Section - SITE CONCRETE IMPROVEMENTS

E. Wheelstop: pre-cast concrete per detail drawing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing and proposed site conditions.

3.2 PREPARATION

A. Identify installation locations.

B. Locate, identify, and protect existing above and below grade utilities from damage.

C. Employ equipment and methods appropriate to the work site.

3.3 INSTALLATION

A. Install all sign posts straight and plumb in concrete footings as shown on plans.

B. Secure all signs to posts with vandal resistant galvanized hardware furnished by the Contractor.

C. Orient direction of all signs as indicated on the plans.

D. Install concrete wheelstops at locations shown on drawings. Anchor each wheelstop with two deformed reinforcing bars driven into the asphalt concrete pavement per detail drawing.

3.4 FIELD QUALITY CONTROL

A. Field inspection will be performed under Division 01.

END OF SECTION

SECTION 32 31 13 – CHAIN LINK FENCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Provisions of constructing chain link fence and gates at locations shown on the Construction Documents.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1 Specifications
2. Section 312000 – Earthwork: Excavation, Filling, and Grading
3. Section 321313 – Site Concrete Improvements

1.3 QUALITY ASSURANCE

A. Qualifications of Installer

1. Throughout the progress of installation of the work of this Section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this Section.
2. In actual installation of the work of this Section, use adequate numbers of skilled workmen to insure installation in strict accordance with the contract documents.
3. In acceptance or rejection of work performed under this Section, the Engineer will make no allowance for lack of skill on the part of the workmen.

1.4 PRODUCT HANDLING

A. Protection

1. Use all means necessary to protect the materials of this Section before, during and after installation, and to protect the work of other trades.

B. Replacements

1. In the event of damage, immediately make all repairs and replacements necessary to the satisfaction of the Engineer and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The materials and fabrication of chain link fabric shall conform to these specifications, and as shown on the plans and details.

B. All ferrous materials shall be new and black vinyl wrapped. Imperfectly vinyl wrapped material or material upon which serious abrasions of the wrap occur shall not be used.

C. Height - all fencing shall stand at the heights shown on the plans.

D. Fabric

1. Standard: Chain link fabric shall conform to ASTM, designation: A392, Class 1. The wire used in the manufacture of the fabric shall be 9-gauge. All chain link fabric shall be woven into approximately 2-inch mesh. Fabric shall be furnished with knuckling at all selvages. The knuckled selvage shall be used along all corners and edges. Fabric shall be black vinyl wrapped.

E. Posts, braces and gate frames

1. The base material for the manufacture of steel pipe used for posts and braces shall conform to the specifications of ASTM, designation: A53 Type A, standard weight, Schedule 40, and the base material for the manufacture of other steel sections used for posts and braces shall be good commercial quality weldable steel.
2. All posts, braces and gate frames shall conform to the size and weight designations shown on the plans.
3. All posts shall be fitted with rainproof caps designed so as to fit securely over the top of the posts.
4. All posts shall be of a total length of not less than the depth of the concrete footing as shown on the plans, plus the length required above ground.
5. Posts and braces shall be galvanized in accordance with specifications of ASTM, designation: A123.
6. All horizontal braces shall be attached to posts by approved steel fixtures.

F. Stretcher bars and other required fittings and hardware shall be steel and shall be black galvanized in accordance with the specifications of ASTM, designation: A153.

G. All swinging gates and walk gates shall be installed with a gate holdback, Trimco 1209HOHA-626. Holdbacks shall be installed in the concrete mowstrip, unless otherwise noted.

H. Concrete mowstrip shall be in accordance with Section 321313 SITE CONCRETE IMPROVEMENTS.

I. Walk gates shall be constructed as per detail drawing and in accordance with CBC sections 11B-206.5 and 11B-404.

J. Drive gate and walk gates shall be constructed as per detail drawing.

K. Non-accessible swinging gates shall comply with the following:

1. Have a lockable fork latch.
2. Have heavy-duty malleable iron hinges

PART 3 - EXECUTION

3.1 INSTALLATION

A. All posts shall be set in concrete footings as shown on the plans to within 3 inches of bottom.

B. All vertical line and end posts shall be braced to the nearest adjacent vertical post with blacl galvanized horizontal braces as shown on the plans.

C. Welding

1. All welding shall conform to the requirements of the California Building Code, CBC, Chapter 22.
2. Where the black galvanized surface has been burned by welding, all surfaces of the welded connections shall be thoroughly cleaned by wire brushing and all traces of the welding flux and loose or cracked galvanizing removed. The damaged area and weld shall then be painted in accordance with the following details.
   a. All galvanized, welded, or damaged surfaces that are to be painted shall first be cleaned by washing with mineral spirit solvent sufficient to remove any oil, grease or other materials foreign to the galvanized coating.
   b. After washing, all areas shall be roughened by abrasive blasting using an abrasive that is no larger than 30-mesh. Galvanizing shall not be removed by this operation.
   c. After preparation, all galvanized surfaces that are to be painted shall be covered with one application of zinc dust-zinc oxide primer, federal specification TT-P-641, Type II. The zinc dust-zinc oxide paint shall be applied by spraying to produce a complete covering of the galvanized surface.
   d. After the application of the zinc dust-zinc oxide paint, one application of pre-treatment, vinyl wash primer, Section 91-2.7 of the state Standard Specifications, shall be applied to such surfaces. The vinyl wash primer shall be applied by spraying to produce a uniform wet film on the surface.
   e. Such surfaces shall then be covered with two separate applications of white tint base vinyl finish coat, Section 91-2.22 of the state standard specifications, sufficient to completely cover the preceding color. Paint for the first application shall be tinted with a compatible coloring agent to slightly contrast with the color of the second application. After drying for 24 hours, one application of aluminum paint, finish coat, Section 91-2.8 of the state standard specifications, shall be painted on the welded areas.

D. Perimeter fencing chain link fabric shall be fastened to the outside of the fence.

E. All fabric shall be stretched and securely fastened to the posts, as follows:

F. The fabric shall be fastened to end, corner and gate posts with 3/16 inch by 5/8 inch stretcher bars and not less than 1/8 inch by 3/4 inch stretcher bar bands spaced at one foot intervals for

whatever widths of fabric are supplied. The fabric shall be fastened to line posts with tie wires or post clips. Tie wires shall be at least 9-gauge (0.148 inch diameter) steel. Post clips shall be at least 6-gauge (0.192 inch diameter) steel. The wire or clip fasteners shall be spaced at approximately 14 inches on line posts, with a minimum of 5 fasteners per 6 foot high post. Top and bottom edges of the fabric shall be secured to each horizontal brace with tie wires or fastened to tension wire with hog rings spaced at 15 inch maximum intervals. Hog rings shall be at least 9-gauge (0.148 inch diameter) steel. Wire ties shall be given at least one complete turn. Hog rings shall be closed with ends overlapping. The distance from the selvage to the braces or top rails shall be 2 inch maximum and shall be fastened to the brace or rail by wire fasteners spaced at approximately 14 inches with a minimum of 8 fasteners per each 10 foot horizontal span.

G. Construct concrete mowstrip at the width as shown on the plans.

END OF SECTION

SECTION 32 31 19 – DECORATIVE METAL FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This Section includes the following:

1. Decorative metal fences and gates (shop fabricated)

B. Related Requirements:

1. Section 32 13 13 – Site Concrete Improvements

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including finishing materials.

B. Shop Drawings: Include plans, elevations, component details, and attachments to other work. Indicate materials and profiles of each metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing decorative metal fencing and gates similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Installer Qualifications: Fabricator of products.

C. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.

D. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, “Structural Welding Code – Steel.”
   2. AWS D1.3/D1.3M, “Structural Welding Code – Sheet Steel.”

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store decorative metal fencing and gates in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with decorative metal fencing and gates by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Requirements for Gates and Hardware: Pedestrian gates and hardware indicated to be accessible shall comply with accessibility requirements of the 2010 ADA Standards for Accessible Design and the 2022 California Building Code, Chapters 10 and 11B.
   1. Gates shall be capable of opening a minimum of 90 degrees.
   2. Gates in the open position shall provide a clear opening width of not less than 32 inches.
   3. The bottom 10 inches of the push side gates shall have a smooth uninterrupted surface that allows the door to be opened by a wheel chair footrest without creating a trap or hazardous condition.
   4. The effort to open gate shall not exceed a 5 pound force applied perpendicular to the face of the gate.
   5. Gates shall be openable from the secure side (inside) without the use of a key or special knowledge or effort. Operating hardware shall not require pinching or grasping to operate hardware.
      a. Gates may be designed for key operation from either or both sides when the gates are not required egress gates as determined by the Architect and the Division of the State Architect.

2.2 STEEL AND IRON MATERIALS

A. Metal Surfaces, General: Use materials with smooth, flat surfaces unless otherwise indicated. Use materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Tubing: ASTM A 500/A 500M (cold formed).

C. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M unless otherwise indicated.

F. Steel Sheet, Cold Rolled: ASTM A 1008/A 1008M, either commercial steel or structural steel, exposed.

2.3 FASTENERS

A. Fastener Materials: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating or Type 304 stainless steel.

B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.

C. Post-Installed Anchors: Mechanical fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
   1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 FABRICATION. GENERAL

A. Fabricate fence panels in sections to prevent the need for field welding or cutting. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
   1. Components of fabricated items shall not be finished until after fabrication.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.

D. Provide necessary brackets to assemble units and to attach other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.

E. Connect members with full-penetrations welds unless otherwise indicated. Use welding method that is appropriate for metal and finish indicated and that develops full strength of members joined. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.

2.6 DECORATIVE METAL FENCING

A. General: Fabricate decorative metal fencing from steel bars and shaped of sizes and profiles indicated.
   1. Fabricate fence panels in sections to facilitate galvanizing, transportations to the Project Site, and installation.

B. Fence Height: As indicated on Drawings.

C. Posts, Rails, and Pickets: Square steel tube sections complying with ASTM A-500 with hot dipped galvanized exterior zinc coating and as follows:
   1. Posts: Posts having a minimum yield strength of 45,000 psi and a minimum size as follows:
      a. Posts for Fences: 4 inches square x 1/8 inch thickness.
         1) Spacing: Nominal 8 feet on center maximum; posts shall be equally spaced on a standard module.
      b. Posts for Swing Gates: Size as follows:
         1) Gates to 48 inches Wide: 4 inches square x 1/8 inch wall thickness.
         2) Gates over 48 inches Wide to 96 inches Wide: 6 inches square x 1/4 inch thickness.
         3) Gates over 96 inches wide to 144 inches Wide: 6 inches square x 3/8 inch thickness.
   2. Horizontal Rails: 2 inches square x 11 gage (0.120 inch).
   3. Pickets: 1 inch square x 14 gage (0.080 inch).
      a. Spacing: Nominal 6 inches on center nominal.

D. Finish: Galvanize and powder coat after fabrication.

2.7 SWING GATES

A. General: Fabricate decorative metal swings from steel bars and shapes of sizes and profiles indicated in Drawings, match characteristics of fence design.

B. Gate Height: Match adjacent fence panels.

C. Gate Width: As indicated on Drawings; 32 inches minimum clear width when gate is in a 90 degree open position.

D. Gate Framing: Hollow tubular steel sections of size, wall thickness, and spacing as indicated on Drawings, not less than 2 inches x 2 inches x 11 gauge (0.120) minimum size).

E. Rails: Match fence rails.

F. Pickets: Match fence pickets.

G. Hinges: Butt hinges or pivots as selected by fabricator; hinges to be sized for not less than twice the weights of the gate and allow the gate to open 180 degrees.

H. Operating Hardware: Gates shall be prepared to receive a cylinder lock, mortise lock, or exit device as indicated on the drawings.

I. Finish: Galvanize and powder coat after fabrication

2.8 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plate, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M. Galvanize items after fabrication.
   1. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.
   2. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
   3. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filling of smooth.

B. Powder-Coat Finish for Galvanized Metal: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
   1. Prepare galvanized metal be thoroughly removing grease, dirt, oil, flux, and other foreign matter.
   2. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
   3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 2 mils.
   4. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal fences and gates

B. Proceed with installations only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Provide anchorage devices and fasteners where needed to secure decorative metal fencing to in-place construction.

B. Set posts accurately in location alignment, and elevation; measured from established lines and levels.
   1. Post Excavation: Drill or hand-excavate holed for posts to diameters and spacings indicated, in firm, undisturbed soil. Footings shall have a diameter not less than 4 times the width of posts and shall extend 6 inches below the bottoms of the post.
   2. Post Setting: Set posts in concrete into firm, undisturbed soil. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices. Crown top of exposed concrete to drain water away from posts. Protect aboveground portion of posts from concrete splatter.

C. Install gate level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Adjust hardware for smooth operation and lubricate where necessary.

D. Perform cutting, drilling, and fitting required to install decorative metal fencing. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concreter, masonry, or similar construction.

E. Fit exposed connections accurately together to form tight, hairline joints or, where indicted, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.

F. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations by complete refinishing, or provide new units as required.

G. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in “Fabrication. General” Article. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

H. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
   1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.3 ADJUSTING

A. Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortions, nonalignment, misplacement, disruptions, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

3.4 CLEANING AND PROTECTION

A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint exposed areas with same materials as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/ A 780M.

D. Protect finishes from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial Completion.

E. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 32 33 10 - TACTILE/DETECTABLE WARNING SURFACE TILE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes the following:

1. Provide all material, labor, equipment and services necessary to completely install tactile warning surface on new or existing surfaces.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1 Specifications.
2. Section 321313 – Site Concrete Improvements

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s literature describing products, installation procedures and routine maintenance.

B. Samples: Submit two tile samples minimum, 6 inch by 6 inch

C. Shop drawings are required for products specified showing fabrication details; composite structural system; plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.

D. Material Test Reports: Submit test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. All test reports shall be conducted on Surface Applied tactile tile system as certified by a qualified independent testing laboratory.

E. Maintenance Instructions: Submit copies of manufacturer’s specified maintenance practices for each type of tactile tile and accessory as required.

1.4 QUALITY ASSURANCE

A. Provide Surface Applied tactile tiles and accessories as produced by a single manufacturer.

B. Installer’s Qualifications: Engage an experienced Installer certified in writing by tactile manufacturer as qualified for installation, who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

C. Americans with Disabilities Act (ADA): Provide tactile warning surfaces that comply with detectable warnings on walking surfaces section of Americans with Disabilities Act (Title 49 CFR TRANSPORTATION, Part 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, 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 1, Articles 2, 3 and 4 and Part 2, Section 205 definition of “Detectable Warning”. Section 11B-406 for “Curb ramps, blended transitions and islands” and Section 11B-705 for “Detectable warnings and detectable directional texture”.

1.5 DELIVERY, STORAGE AND HANDLING

A. 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. Tiles shall be delivered to location at building site for storage prior to installation.

1.6 SITE CONDITIONS

A. Environmental Conditions and Protection: Maintain minimum temperature of 40°F in spaces to receive tactile tiles for at least 48 hours prior to installations, during installation, and for not less than 48 hours after installation. Store tactile tile material in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 40°F in areas where work is completed.

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 passengers or public. Provide barricades or screens to protect passengers or public.

C. Disposal of any liquids or other materials of possible contamination shall be made in accordance with federal state and local laws and ordinances.

D. Cleaning materials shall have code acceptable low VOC solvent content and low flammability if used on the site.

1.7 EXTRA STOCK

A. Deliver extra stock to storage area designated by engineer. Furnish new materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification for Surface Applied tactile tiles. Furnish not less than two (2) percent of the supplied materials for each type, color and pattern installed.

1.8 WARRANTY (DETECTABLE WARNINGS AND DIRECTIONAL TEXTURE)

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of detectable warnings and directional surface products that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Shape, color fastness, confirmation, sound-on-cane acoustic quality, resilience, and attachment will not degrade significantly.
   b. Degrade significantly means that product maintains at least 90 percent of its approved design characteristics, as determined by the authority having jurisdiction.
2. Warranty Period: Five years from date of Final Completion.
3. Authority: California Building Code Section 11B, Division of the State Architect Interpretation of Regulations (IR) 11 B-2, 11B-3 11B-4.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Engineered Plastics Inc., Armor Tile.
2. ADA Solutions, Inc., North Billerica, MA.

B. Detectable Warning Texture: Division of the State Architect (DSA/Access Compliance) approved products shall be used, compliance with CBC Section 11B-705.1, IRs 11B-2, 118-3 and 11B-4 and the California Accessibility Reference Manual.

1. Truncated Domes: provide raised Detectable Warnings with diameter of 0.9 inch at base tapering to 0.45 inch at top, height of 0.2 inch, with center-to-center spacing of 2.35 inches and corner domes spaced at 0.896 inch from the corner edges of tile; Provide raised truncated domes in a square grid (in-line) pattern.

2. Detectable Warning Texture (Truncated Domes): Plastics/Composites: Armor Tile, ADA Tactile Systems by Engineered Plastics Inc., North Billerica, or equal.

C. The Vitrified Polymer Composite (VPC) Surface Applied Tactile Tile specified is based on Armor-Tile manufactured by Engineered Plastics Inc. Existing engineered and field tested products which are subject to compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.

D. Color: Yellow conforming to Color No. 33538 of SAE AMS-STD-595A. Color shall be homogeneous throughout the tile.

2.2 MATERIALS

A. Fasteners: Color matched, corrosion resistant, flat head drive anchor: W diameter x 1 3/4” long, or manufacturer’s recommended fasteners.

B. Adhesive and Sealant: Manufacturer’s recommended adhesive and sealant.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface Applied: The following installation instructions shall be used for tactile warning tiles installed at existing concrete surfaces.

1. During all surface preparation and tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
2. The application of all tile, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers.
3. Ensure that surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review design drawings with the Contractor prior to the construction and refer any and all discrepancies to Engineer.
4. 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. Use thin permanent marker. Remove tile when done marking its location.
5. The surface to receive the detectable warning surface tile (not recommended for asphalt) is to be mechanically cleaned with 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 rag soaked in Acetone.
6. Immediately prior to installing the detectable warning surface 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 minimum of 30 days.
7. 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.
8. Apply the adhesive on the backside 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. A 3 x 4 foot tile will typically require an entire tube of adhesive.
9. Set the tile true and square to the curb ramp area as detailed in the design drawings.
10. Standing with both feet applying pressure around the molded recess provided in the tile, drill a hole true and straight to a depth of 3W using the recommended diameter bit. Drill through the tile without hammer option until the tile has been successfully penetrated, and then with hammer option to drill into the concrete.

11. Immediately after drilling each hole, and while still applying foot pressure, vacuum, brush or blow away dust and set the mechanical fastener as described below, before moving on to the next hole.
12. Mechanically fasten tiles to the concrete substrate using a hammer 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 hammer, taking care to avoid any inadvertent blows to the truncated dome or tile surface. A plastic deadblow or leather hammer is recommended.
13. Working in a sequence that will prevent buckles in the tile, proceed to drill and install all fasteners in the tile's molded recesses.
14. Following the installation of the tiles, the perimeter caulking sealant should be applied. Follow the perimeter caulking sealant manufacturer's recommendations when applying. Tape all perimeter edges of the tile and also tape the adjacent concrete back 1/2" from the tile's perimeter edge. Tool the perimeter caulking with a plastic applicator or spatula to create a straight edge in a cove profile between the tile and adjacent concrete. Remove tape immediately after tooling perimeter caulking sealant.
15. Do not allow foot traffic on installed tiles until the perimeter caulking sealant has cured sufficiently to avoid tracking.
16. If installing adjacent tiles, note the orientation of each tile. Careful attention will reveal that one of the long edges of the tile is different than the other, in regard to the tiny dotted texture. You may also note a larger perimeter margin before the tiny dotted texture pattern begins. Consistent orientation of each Tile is required in order that the truncated domes on adjacent tiles line up with each other.
17. In order to maintain proper spacing between truncated domes on adjacent tiles, the tapered edge should be trimmed off using a continuous rim diamond blade in a circular saw or mini-grinder. The use of a straightedge to guide the cut is advisable. All cuts should be made prior to installation of the tiles.
18. If installing adjacent tiles, care should be taken to leave a 1/8 inch gap between each. If tiles are custom cut to size, and if pre-molded recesses (to receive fasteners) are removed by the cut, then any truncated dome can be center-drilled with a 5 inch through hole, and countersunk with a suitable bit, to receive mechanical fasteners. New holes should be created no closer to the edge of the tile than any of the other perimeter fastener pre-molded recesses. Care should be taken to not countersink too deeply. Fasteners should be flush with the top of the truncated dome when countersunk properly.
19. Adhesive or caulking on the surface of the Tile can be removed with Acetone.

B. Wet Set: The following installation instructions shall be used for tactile warning tiles installed at new concrete surfaces.

1. During all surface preparation and tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
2. The application of all tile, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers.
3. Ensure that surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review design drawings with the Contractor prior to the construction and refer any and all discrepancies to Engineer.
4. Set the tile true and square to the curb ramp area as detailed in the design drawings.
5. Immediately prior to installing the detectable warning surface tile, the wet concrete surfaces must be inspected to ensure that it is clean and free of debris.

6. Do not remove protective plastic covering on detectable warning tile product until tile is installed and concrete is fully cured.
7. Slowly press the detectable warning tile into the wet concrete until the base of the truncated domes is flush with the adjacent concrete. Do not stand on the tile during installation. Tap the detectable tile with a rubber mallet as required to ensure all edges are flush with concrete. Install anchors into wet concrete as specified per manufacturer's recommendation and ensure that the anchors are flushed with the detectable tile surface. Provide weight to the detectable tile surface if "floating" occurs after tile placement. All detectable tile edges shall be flush with adjacent concrete.
8. While the concrete is workable, a 1/8" deep troweled edge shall be installed around the tile perimeter. Finish the concrete as required per specifications. Ensure concrete edge do not have any low areas that collect water.
9. Set the tile true and square to the curb ramp area as detailed in the design drawings.
10. If installing adjacent tiles, note the orientation of each tile. Careful attention will reveal that one of the long edges of the tile is different than the other, in regard to the tiny dotted texture. You may also note a larger perimeter margin before the tiny dotted texture pattern begins. Consistent orientation of each Tile is required in order that the truncated domes on adjacent tiles line up with each other.
11. In order to maintain proper spacing between truncated domes on adjacent tiles, the tapered edge should be trimmed off using a continuous rim diamond blade in a circular saw or mini-grinder. The use of a straightedge to guide the cut is advisable. All cuts should be made prior to installation of the tiles.
12. Remove protective plastic sheeting after all post-installation treatments are complete and the concrete has cured.

3.2 CLEANING AND PROTECTING

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 scheduled for inspection intended to establish date of substantial completion in each area of project. Clean tactile tile by methods recommended by manufacturer.

END OF SECTION

SECTION 328400 – IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide all materials, labor, equipment and services necessary to furnish, install and maintain the Irrigation System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. Related Work Specified Elsewhere
1. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division 01 Specification Sections, apply to work of this section.
2. Section 31 20 00 – Earthwork
3. Section 31 23 33 – Trench Excavation and Backfilling
4. Section 32 90 00 – Landscape Planting

1.2 CODES AND REGULATIONS

A. All work and materials shall be in full accordance with the following codes adopted and amended by the authority having jurisdiction. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes. The work described in these specifications shall govern in the event that the drawings or specifications call for material or methods of construction of higher quality or standard than required by these codes.
1. California Plumbing Code
2. California Administrative Codes:
a. Title 8, Industrial Relations
b. Title 19, Public Safety
3. California Electrical Code
4. California Green Building Standards Code, Section 5.304.
5. California Department of Water Resources, Model Water Efficient Landscape Ordinance (MWELO)
6. Standards and Regulations of other agencies, water utility provider, or organizations as listed in this specification relating to products or procedures, e.g. American Society for Testing and Materials.

1.3 DEFINITIONS

A. Piping: All pipe fittings, valves, and accessories as required for a complete piping system.

B. PVC: Polyvinyl Chloride.

C. Agencies and Organizations:
1. ASTM- American Society for Testing and Materials
2. AWWA- American Water Works Association

3. IAPMO- International Association of Plumbing and Mechanical Officials
4. NEC - National Electrical Code.
5. UL - Underwriter's Laboratories
6. SSPWC – Standard Specifications for Public Works Construction, by the American Public Works Assoc./Associated General Contractors of California.
7. Caltrans – State of California Department of Transportation

D. Owner: An authorized representative of the Owner or the Owner's authorized consultant.

1.4 QUALITY ASSURANCE

A. The work of this section shall be performed by a single firm experienced in irrigation work and holding a current California Contractor's A or C27 License.

B. Qualifications of Workers

1. The Contractor shall employ skilled workers who are thoroughly trained and experienced in irrigation system installation and who are completely familiar with the specified requirements and methods needed for proper performance of this work.
2. The Contractor shall provide adequate supervision by a qualified foreman fluent in English that will be continuously onsite during the performance of this work.

1.5 SUBMITTALS

A. An operational assessment report of any existing irrigation system in the area of work shall be submitted prior to the start of the project's work, including demolition and clearing. See Subsection 1.7.

B. The Contractor shall submit complete lists of proposed materials and equipment per the Division 01 Submittal Section, including manufacturer's name and model numbers. Only provide additional product data and/or catalog cut sheets if a substitute material or equipment is proposed. No substitution will be allowed without prior written approval.

C. Shop drawings shall be provided for the layout and description of all equipment assemblies, including dimensions, capacities, and other characteristics as listed in product specifications. Shop drawings for booster pump assemblies shall clearly and neatly indicate the layout of the assemblies and proposed piping in the pump yard, and shall show adjacent equipment, required clearances, walls, fences, piping and other existing permanent improvements affecting the layout. Materials and equipment shall not be ordered until given written acceptance. Equipment or materials installed or furnished without prior approval or acceptance may be rejected and the Contractor shall be required to remove such materials from the site at his own expense.

D. When specific name brands of equipment and materials are used, they are intended as preferred standards only. This does not imply any right upon the part of the Contractor to furnish other materials unless specifically approved in writing as equal in quality and performance by the Owner. Decisions by the Architect/Engineer shall govern as to what name brands of equipment and materials are equal to those specified on the plans and his decisions shall be final. It shall

be the responsibility of the Contractor to furnish proof as to equality of any proposed equipment or material.

E. Approval of any item, alternate or substitute indicates only that the products apparently meet the requirements of the drawings and specifications on the basis of the information or samples submitted. Manufacturer's warranties shall not relieve the Contractor of his liability under the guarantee. Such warranties shall only supplement the guarantee.

F. Acceptance of any submittals, deliverables, or other work product of the Contractor shall not be construed as assent that the Contractor has complied with, nor in any way relieved the Contractor of compliance with (i) the applicable standard of care, and/or (ii) applicable statutes, regulations, rules, guidelines, and contract requirements.

G. Irrigation Equipment: When the Contractor desires to transfer salvaged irrigation equipment and/or new spare equipment and/or parts to the Owner, he must submit along with the equipment an itemized list. The Contractor is solely responsible to obtain a written confirmation by the Owner that all materials received by the Owner matches his material list. The transfer of materials will not be considered executed without written confirmation of same.

H. Submit any required or requested testing data and/or Certificates, including but not limited to the backflow prevention assembly testing Certificate after the assembly is installed prior to regular system operation.

1.6 EXPLANATION OF DRAWINGS

A. The intent of the drawings and specifications is to indicate and specify a complete and efficient sprinkler irrigation system ready for use in accordance with the manufacturer's recommendations, and all applicable local codes and ordinances. Interpretation of irrigation plans and specifications shall be the responsibility of the Landscape Architect or Owner.

B. All existing systems and improvements are shown in their approximate locations. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions and shall report any variations to the Owner.

C. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, etc., which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all his work, and plan his work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed in the most direct and workmanlike manner, so that conflicts between sprinkler systems, planting, utilities, and architectural features will be avoided. Locate pipe, valves and other equipment in planting areas unless specifically noted otherwise.

D. All work called for on the drawings by notes shall be furnished and installed whether or not specifically mentioned in the specifications.

1.7 EXISTING CONDITIONS

A. The Contractor shall not install the irrigation system and equipment as shown on the Drawings when it is obvious in the field that obstructions or differences in existing conditions and/or systems are present. Such obstructions or differences should be immediately brought to the attention of the Owner. Failure to provide notification prior to the start of this work shall make the Contractor liable for any and all repairs and/or corrections necessary for proper functioning and coverage of the system without any additional cost to the Owner.

B. The Contractor shall examine carefully the site of work contemplated and the proposal, plans, specifications, and all other contract documents. By submitting a bid, the Contractor attests that he has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantity of work to be performed and materials to be furnished, and the requirements of the specifications. The Contractor shall take necessary precautions to protect existing site conditions that are to remain. Should damage be incurred, the Contractor shall make the necessary repair or replacement to bring it back to its original condition at his own expense.

C. Prior to cutting into the soil, the Contractor shall coordinate with the Owner to locate all cables, conduits, sewers, septic tanks, and other such underground utilities as are commonly encountered and he shall take proper precaution not to damage or disturb such improvements. If a conflict exists between such obstacles, notify the Owner who will consider realignment of the proposed work. The Contractor will proceed in the same manner if a rock layer or any other condition encountered underground makes change advisable. Should utilities not shown on the plans be found during excavations, Contractor shall promptly notify the Owner for instructions as to further action. Failure to do so will make Contractor liable for any and all damage thereto arising from his operations subsequent to discovery of such utilities not shown in plans.

D. The Contractor shall verify the correctness of all finish grades within the work area in order to insure the proper soil coverage (as specified) of the sprinkler system pipes. The Contractor shall verify and be familiar with location and size of the proposed water supply (P.O.C.). He shall make approved type connection and install new work.

E. The Contractor shall be responsible for notifying the Owner prior to installation that equipment or methods indicated on the drawings or in the specifications conflict with local codes, are incompatible or an error is apparent. It the event the Contractor neglects to do this, he will accept full responsibility for any revisions necessary.

1.8 PERMITS

A. The Contractor shall obtain and pay required fees to any governmental or public agency. Any permits for the installation or construction of any of the work included under this contract, which are required by any of the legally constituted authorities having jurisdiction, shall be obtained and paid for by the Contractor, each at the proper time. He shall also arrange for and pay all costs in connection with any inspections and examination required by these authorities.

1.9 TESTING

A. General: Unless otherwise directed, tests shall be witnessed by the Owner. Work to be concealed shall not be covered until prescribed tests are made. Should any work be covered before such tests, the Contractor shall, at his expense, uncover, test and repair his work and that of other contractors to original conditions. Leaks and defects shown by tests shall be repaired and entire work re-tested. Tests may be made in sections, however, all connections between sections previously tested and new section must be included in the test.

B. Main Line Piping: Hydrostatically test main line pipe segments after a minimum of twenty-four (24) hours after any solvent connections. Purge any free air in the test pipe sections. Partially backfill pipe but keep all joints exposed. Maintain 125 psi water pressure in new main line piping for a minimum duration of two (2) hours. There can be a maximum +/- 5psi change in pressure during the test.

1.10 OBSERVATION

A. General:
1. Installation and operations must be approved by the Owner.
2. In no event shall the Contractor cover up or otherwise remove from view any work under this contract without prior approval of the Owner. Any work covered prior to inspection shall be opened to view by the Contractor at his expense.
3. In all cases, where inspection/observation of the irrigation system work is required and/or where portions of the work are specified to be performed under the direction and/or review of the Owner, including but not limited to the review items in the Irrigation plan Observation Log, the Contractor shall notify the Owner at least 72 hours in advance of the time when such review and/or direction is required. Any necessary re-excavation or alterations to the system needed because of failure of the Contractor to provide the required notification and/or to obtain the review/observation, shall be performed at the Contractor's own expense.

B. Periodic observations shall be required for basic operations and installations during progression of the project. The Owner’s Representative, Owner or Landscape Architect shall perform the observations and shall record the observation on the Irrigation System Observation Log form on the As Built Record Drawings. Such observations will include but not necessarily be limited to the following items as included in the scope of work:
1. Layout and flagging of sprinkler heads.
2. Trenching.
3. Main line installation.
4. Main line sustained pressure check.
5. Wire placement.
6. Partial fill compaction of trenches.
7. Control valve installation.
8. Drip line installation prior to backfilling.
9. Irrigation controller installation and operation.
10. Sprinkler/emitter coverage prior to the start of planting operations.
11. Overall system operation and primary/secondary communication.

C. Coverage & Operations Review:

1. When the irrigation system is operational and prior to soil conditioning operations, the Contractor in the presence of the Owner shall perform a coverage test of the irrigation system. The Contractor shall furnish all materials and labor required to perform the coverage test and to correct any minor inadequacies of coverage disclosed. The Contractor shall inform the Owner and Owner of any deviation from the plan required due to wind, planting, soil, or site conditions that bear on proper coverage. If such notification of necessary corrections or additions to the irrigation system is not provided prior to or during the coverage test, the Contractor shall make all subsequent adjustments and corrections needed for proper coverage without any extra cost to the Owner.
2. Prior to the start of the maintenance period, the irrigation system shall be reviewed by the Owner for proper operations, and a review of and training on equipment and associated controls performed. Any corrections and/or adjustment shall be made as a condition for the start of the maintenance period and subsequent Final Acceptance.

D. Final Acceptance: The work will be accepted in writing when the entire project improvements have been completed to the satisfaction of the Owner. In judging the work, no allowance for deviation from the original plans and specifications will be made unless already approved in writing at proper time. Should it become necessary for the Owner to occupy any portion of the work area before the contract is fully completed, such occupancy shall not constitute acceptance. The Contractor will not be responsible for any damage caused by the Owner's separate work forces.

1.11 REJECTION OF NON-CONFORMING MATERIAL OR WORK

A. The Owner reserves the right to reject any material or work which does not conform to the contract documents. The rejected material or work shall be removed or corrected by the Contractor at no additional cost to the Owner.

1.12 OPERATIONS AND MAINTENANCE INSTRUCTIONS & RECORD DOCUMENTS

A. The Contractor shall prepare and deliver to the Owner’s Representative within ten (10) calendar days prior to completion of the construction and as a prerequisite to the start of the maintenance period, all required and necessary descriptive material in complete detail and sufficient quantity, properly prepared in two individually bound sets of Operating and Maintenance Manuals. These manuals shall describe the material installed and shall be in sufficient depth to permit operating personnel to understand, operate and maintain all equipment. Spare part lists and related manufacturer identification shall be included for each installed equipment item. Each complete, bound manual shall contain the following information:

1. Cover sheet stating Contractor's address and telephone number, duration of guarantee period, and a list of equipment, with names and addresses of local manufacturer representatives and warranty periods.
2. The Contractor to issue a "CERTIFICATE OF CONSTRUCTION COMPLIANCE" which indicates that all work done, materials and equipment used and installed are in compliance with the approved plans, specifications and all authorized revisions and that the system functions properly.
3. Complete operating and maintenance instructions and warranties on all major equipment.

4. Complete set of manufacturer's literature and specifications of material installed, including parts list.
5. A list of the controller station number for each control valve if different than the control valve number shown on the drawings.
6. Initial electrical data on each control valve:
    a. Ohms reading for each valve taken at the controller (circuit is OFF).
    b. Voltage reading for each valve taken both at the controller and at the valve (circuit is ON).

B. The contractor shall furnish one set of As-Built full-scale drawings on bond, and two compact disks with complete sets of digital PDF files of all close-out documents after the As-Built Record Drawings have been reviewed and accepted by the Landscape Architect.
1. Label first page of each document, or set of documents, "AS-BUILT PROJECT RECORD" in neat large printed letters on lower right hand corner. Record information concurrently with construction progress. Prints for this purpose may be obtained from the Owner. This set of drawings shall be kept on the site and shall be used only as a record set. Do not conceal any work until required information is recorded. These drawings shall also serve as work in progress sheets, and the Contractor shall make **neat and legible** annotations thereon daily as the work progresses, showing the work as actually installed. These drawings shall be available at all times for inspection and shall be kept in a location designated by the Owner.
2. Drawings: Legibly mark to record actual construction:
    a. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Give sufficient horizontal and vertical dimensions to accurately trace route and depth of each concealed line or item. Accurately locate each capped, plugged or stubbed line.
    b. Field changes of dimension and detail.
    c. Changes made by Field Order, Addenda, or other change document.
    d. Show the final controller station number for each control valve if different than the control valve number shown on the drawings.
3. Deliver all Close-out Documents (As-Builts) to the Owner. Accompany submittal with transmittal letter in duplicate, containing:
    a. Date.
    b. Project title.
    c. Contractor's name and address.
    d. Title and number of each Record Document (As-Built).
    e. Signature of Contractor or his authorized representative.

C. The Contractor shall provide controller chart(s) as follows:
1. The Contractor shall provide two controller charts for each controller’s area of work.
2. The chart shall show the area of work controlled by the automatic controller and shall be the maximum size that the controller door will allow.
3. Show the controller station number for each control valve if different than the control valve number shown on the drawings.
4. The chart may be a reduced drawing of the actual as-built system. However, in the event the valve numbering is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced.
5. The chart shall be colored with a different permanent color for each station.

6. The chart shall be enclosed in a waterproof envelope or laminated.

D. Per MWELO Section 492.9, upon completion of the landscape planting and irrigation system, and as a condition of Final Acceptance and/or the issuance of a Certificate of Occupancy, the licensed landscape contractor shall submit to the approving agency and/or Owner, the following items in a form acceptable to the approving agency and/or Owner:
   1. Project information and contact information for the Owner and Applicant (Contractor).
   2. Certification that the installation complies with the approved Landscape Documentation Package.
   3. Irrigation scheduling parameters used in programming the controller during the establishment and maintenance periods.
   4. A Schedule of Irrigation System Maintenance.
   5. A Landscape Irrigation Audit Report per MWELO Section 492.12. Provide the Audit Report unless the report is not required by the approving agency or Owner.

1.13 SPARE PARTS AND EQUIPMENT

A. Prior to the conclusion of the maintenance period, furnish the Owner with the following spare parts and equipment:
   1. One quick coupler key with attached hose swivel for each set of four quick coupler valves installed.
   2. Ten spare nozzles for each different sprinkler head arc and/or radius nozzle installed.
   3. One valve key for the 2” operating nut and/or hand wheel isolation valve.
   4. One hundred feet of in-line emitter tubing with ten straight and ten ninety degree compression fittings.

1.14 WORK AREA AND SAFETY

A. The Contractor shall furnish, erect, and maintain all temporary facilities; perform all temporary work during the period of construction, including those herein specified. All facilities shall be maintained in proper and safe operating and sanitary conditions at all times.

B. The Contractor shall comply with the provisions of the Construction Safety Orders, and General Safety Orders issued by the State Division of Industrial Safety, as well as all other applicable laws, ordinances and regulations.

C. The project site shall be maintained in a neat and safe condition at all times. Cleanup shall be accomplished as the work progresses and upon completion of the work. The Contractor shall provide adequate safety measures to protect workers and the public from injury.

1.15 GUARANTEE

A. Irrigation system consisting of materials, equipment and workmanship shall be guaranteed for proper operation a minimum of one year from date of Final Acceptance of the Work or the Notice of Substantial Completion of the Project, whichever is later. Manufacturer’s warranty periods may be longer, and shall be noted in the close-out documents.

B. The Contractor shall be held responsible for repair and/or replacement of damages to new or existing improvements resulting from the defects of materials, equipment or workmanship one year from the date of Final Acceptance of the Work or the Notice of Substantial Completion of the Project, whichever is later.

C. The Owner reserves the right to make temporary repairs as necessary to keep the irrigation system equipment in operating condition. The exercise of this right by the Owner shall not relieve the Contractor of his responsibilities under the terms of the Guarantee as herein specified.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Schedule rated white rigid PVC Pipe shall be made from NSF approved Type 1, Grade I, PVC compound conforming to ASTM D-1785.

B. Class rated (Standard Dimension Ratio) white rigid PVC Pipe shall be made from NSF approved Type 1, Grade I, PVC compound conforming to ASTM D-1784.

C. PVC pipe shall be of the Class or Schedule as follows:
1. PVC pipe shall meet ASTM D-2241 for solvent weld, plain end, ASTM D-2672 for solvent weld, bell end, and ASTM D-3139 for gasketed bell end. Pipe shall be of the Schedule and/or Class as indicated herein.
2. Pipe sleeves under paving shall be PVC Schedule 40 for 3-inch and smaller or SDR 35 for 4-inch and larger pipes.
3. Riser and/or manifold pipe connecting valves to main line fittings shall be Schedule 80 PVC.
4. Pressurized main line pipe shall be Schedule 40, belled end with solvent welds for pipe sizes less than 2 inches. Pipe sized 2 inches and greater shall be Class 200, SDR 21, with gasketed bell ends.
5. Non-pressurized lateral line pipe shall be Schedule 40, belled end with solvent welds.

D. All pipes shall be continuously and permanently marked and conform with the following information: manufacturer's name or trademark, nominal pipe size, Schedule or Class of pipe, pressure rating in PSI, ASTM designation and (NSF) seal of approval.

E. Rigid polyvinyl chloride (PVC) Fittings:
1. White Schedule 40 type I and II grade 1, solvent weld socket fittings ASTM D-2466 for all lateral lines 2-1/2 inches and smaller.
2. Gray Schedule 80 type I and II grade 1 solvent weld socket fittings ASTM D-2464 for all main line less than 2 inches diameter, and lateral lines 3 inches and larger.
3. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable (IPS) schedule, and (NSF) seal of approval.
4. All plastic fittings and connectors shall be injection molded of an improved polyvinyl chloride compound featuring high tensile strength, high chemical resistance and high

impact strength in terms of current ASTM standards for such fittings. Where threads are required in plastic fittings, these shall be injection molded also.

F. PVC Solvent Weld Adhesive: All socket and bell type connections shall be joined with primer and PVC solvent cement which shall meet the requirements of ASTM F656 for primer and ASTM D2564, "Standard Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings." Solvent cement joints for plastic pipe and fittings will be made as prescribed by manufacturer. The high chemical resistance of the pipe and fitting compounds specified in the foregoing sections makes it mandatory that an aggressive colored primer, which is a true solvent for PVC be used in conjunction with a solvent cement designed for the fit of pipe and fittings specified. A heavy bodied, medium set solvent cement, e.g. Weld-On 711 gray, shall be used for all classes and schedules of pipe and fittings.

G. PVC Pipe Thread Sealant: A non-hardening all purpose sealant and lubricant similar to Permatex #51 or Lasco blue pipe thread sealant which is certified by the manufacturer to be harmless to PVC pipe and fittings. Apply sealant to clean male threads, brushing into grooves and to the first three threads of the female threads. A good quality grade of teflon tape recommended by the manufacturer for use with plastics may be used in lieu of sealant. Minimum width of tape to be used is 3/4". A minimum of two wraps and a maximum of three wraps to be used.

H. PVC Swing Joints: Connections to sprinkler heads from lateral lines shall be made with swing joints as detailed. Pre-assembled swing joints from Hunter, King Brothers or Spears are acceptable.
1. Use 6” length nipples for 1/2 inch inlet heads.
2. Use 12” length nipples for 3/4 or 1 inch inlet heads.

I. Coated Ductile Iron pipe and fittings:
1. Ductile Iron pipe shall be centrifugally cast pipe conforming to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, thickness Class 50, with cement - mortar lining and seal coating per ANSI/AWWA C104/A21.4.
2. Ductile Iron flanged pipe shall conform to ANSI/AWWA C115/21.15.
3. Ductile Iron flanged fitting to PVC pipe shall use a ‘Megalug’ mechanical joint restraint Series 2000PV by EBAA Iron per either ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53, or equal.
4. Joints shall comply with the following standards:
    a. Rubber gasketed/mechanical joints: ANSI/AWWA C111/A21.11.
    b. Flanged joints: ANSI/AWWA C110/A21.10, B16.1, B16.2.

J. Coated ductile iron push-on mechanical fittings meeting ANSI/AWWA C110 or C153/A21.10 shall be used for:
1. Main line connections for pipe 2 inches and greater in diameter.
2. New main line service tee at valve connections where a service saddle is not acceptable.
3. Self-restrainted fittings or joint restraints (Leemco LH or equal) shall be used for all elbows, tees, bends, etc fittings.

K. Coated ductile iron service saddles with stainless steel double straps, Smith-Blair 317, Romac Industries 202NS, or equal, shall be used for remote control/quick coupler valve service

connections on main lines 1.25 inch or greater, and where the available outlet size can match the largest lateral line size downstream of the remote control valve.

L. Galvanized pipe and fittings:
1. Galvanized Pipe shall be hot dip galvanized continuous welded, seamless steel SCH 40 pipe conforming to current ASTM A53 standards.
2. Galvanized Fittings shall be galvanized, threaded malleable iron SCH 40 conforming to current ASTM A865 standards.

2.2 BACKFLOW PREVENTION ASSEMBLY

A. The backflow prevention assembly is existing and shall remain in place.

2.3 VALVES

A. Electric Control Valves:
1. Globe valves operated by low-power solenoid, normally closed, manual flow adjustment. Sizes and types as shown on drawings.
2. Provide a pressure regulating module on all control valves, or other pressure regulating components as part of the operating spray head or low volume head zones when the dynamic system pressure is, or may be greater than 45 psi.

B. Control Valve Marking: Christy's valve identification tag (or equal), yellow color with text designating controller and valve station number, e.g. "A12", or equivalent.

C. Isolation Valves:
1. Cast bronze, coated ductile iron or coated cast iron gate valve with resilient wedge, non-rising stem and two inch operating nut for main line 2 inch size or greater. Match size of mainline.
2. Cast bronze threaded gate valve with bronze cross handle for main line less than 2 inch size.

D. Quick Coupling Valve: Two piece quick coupling valve as shown on the Drawings.

2.4 VALVE BOXES

A. Control Valve/Master Valve/Flow Sensor boxes:
1. Shrub/Ground Cover areas: Carson 1419 body with lockable tan plastic cover, or equivalent. Drip Valve Kits shall use a Jumbo body with lockable tan plastic cover.
2. Turfgrass areas: Carson 1419 body with lockable green plastic cover, or equivalent.
3. Hardscape areas: Christy B16 concrete box (11.75" x 22.25") with N16R composite lid, or equivalent.

B. Quick Coupler Valve boxes:
1. Shrub/Ground Cover areas: Carson 910 body with lockable tan plastic cover, or equivalent.
2. Turfgrass area: Carson 910 body with lockable green plastic cover, or equivalent.

C. Isolation Valve boxes:
   1. Gate Valve box in hardscape: Christy G05 round concrete valve box (10.375” ID) with cast iron G05C lid, or equivalent.
   2. Gate Valve box in planting areas: Christy F08 round concrete valve box (8” ID) with F08R concrete lid, or equivalent. Use F14 ADS adapter and extension for sizes 2.5 inches and larger.
   3. Ball Valve box: Same as 2.04, A.

D. Control Valve box marking: Plastic lids shall have branded markings, and concrete lids shall have painted markings on the top of lid with minimum 2 inch high stenciled letters showing controller letter and station number.

2.5 CONTROLLER

A. The irrigation controller is existing and shall remain in place. Verify open stations if any for the area of work.

2.6 CONTROL AND TRACER WIRE, COMMUNICATION CABLE

A. Connections between the automatic controllers and the electric control valves, and tracer wire shall be made with direct burial AWG – UF 600 volt copper wire manufactured for irrigation system use.

B. Hot control wires for the first controller shall be red. If multiple controllers are installed, the hot wire color shall be orange, yellow, purple in order for each controller. Common ground wire shall be white, with a color stripe corresponding to the hot control wire color when multiple controllers are installed. Spare control wires shall be black and spare common wire blue. Tracer wire shall be green.

C. Install in accordance with valve manufacturer’s specifications and wire chart. In no case shall wire size be less than #14. Common wire shall be a minimum #12 size.

D. All control wire splices/caps shall be made with direct bury rated, waterproof wire connectors with silicone sealant, Spears DS-500 Dri-Splice, 3M DBR/DBY or approved equal. Use one splice per connector sealing pack.

E. Apply waterproof numbered wire markers or sleeves at both sides of all splices and at the controller terminal board corresponding to the controller (A, B, etc.) and station number (02, 14, etc.). If multiple valves are connected to one station, add a single digit indentifier (1, 2, etc.) to the station number (XX), e.g. A02-1, A02-2, etc.

F. Communication/flow sensor cable shall be a shielded and jacketed, minimum 16 gauge twisted pair with drain wire, Paige P7162D or equal compliant with the controller manufacturer’s specifications.

G. Below-grade conduit for control wires and/or cables shall be PVC for electrical use with long radius sweeps at direction changes and at valve/splice/pull box terminations.

2.7 IRRIGATION HEADS

A. Spray/Bubbler Pop-up Head: Molded plastic body with pop-up plastic riser and nozzle. Refer to schedule on drawings. Manufacturer's model numbers are listed with description.

B. Rotor Pop-up Head: Molded plastic body with plastic riser and nozzle, stainless steel clad riser if specifically noted or standard. Gear driven rotation with memory arc, balanced nozzle sets. Manufacturer's model numbers are listed with description.

2.8 DRIP IRRIGATION EQUIPMENT

A. Flexible distribution tubing shall be 0.66” – 0.70” OD (17mm nominal) fabricated from virgin polyethylene resin specifically designed for subsurface drip irrigation use and conforming to ASTM D 1248 for Type I, Class C, Category 4 Grade P14, and to ASTM D-3350 for PE 122111C. Provide all fittings, connectors and accessories compliant with the tubing for a complete, properly functioning system.

B. Pressure rating of tubing shall be as defined in Standard ASAE S435. Burst strength shall be minimum 50 psi at 176 degrees F for 4,200 hours.

C. In-line wye filters shall be type as noted on the Drawings. Filter element shall be molded polyester screen cylinder with minimum 150 mesh screen (blue).

D. Preset pressure regulators shall be type as noted on the Drawings for above or below ground application.

E. In-line emitter tubing shall be a below grade product with self-cleaning emitters. Manufacturer as noted on the Drawings.

F. Flush valve as noted on the Drawings.

G. Operation indicator shall be a 6 inch pop-up sprinkler body with built-in check valve. Install a bubbler or variable arc nozzle that can be adjusted to a no-flow condition, Hunter ECO-INDICATOR, or equal.

2.9 CONCRETE

A. Cast-in-place Portland cement concrete used for pipe encasement, cover, thrust blocks, pipe support or other below-grade use shall at minimum comply with 2,800 psi 28 day strength.

2.10 OTHER MATERIALS

A. Materials not specifically indicated but necessary for the proper execution of this work shall be of first quality as selected by the Contractor subject to the acceptance of the Owner.

B. All materials appearing in the legend and details of the irrigation drawings are to be furnished and installed by the Contractor unless specifically noted to the contrary. Contractor is responsible for installation according to plans and details. The system shall efficiently and uniformly irrigate all areas and perform as required by these plans and specifications.

C. Granular bedding material shall be clean natural occurring sand, free from clay, salt, sea shells or organic material, suitable for the purpose intended, and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve.

PART 3 - EXECUTION

3.1 SYSTEM DESIGN AND VERIFICATION

A. Contractor shall verify existing pressure and any existing irrigation equipment, and shall inform the Owner of any discrepancies between the exsiting systems' make and model of equipment, such as sprinkler heads, control valves, etc., and those indicated in the Drawings in writing prior to the start of irrigation system installation. Failure to inform the Owner of any discrepancy within seven working days prior to beginning of system installation will place the responsibility of any and all corrective action on the Contractor at no expense to the Owner.

3.2 PIPING INSTALLATION

A. General:

1. Any equipment installed by the Contractor and deemed to be for the use of the Owner in various situations (i.e., control valves, control panels, etc.) shall be so installed to be readily accessible and quickly operable. Equipment deemed by the Owner to be inoperable for its intended purpose shall be reinstalled by the Contractor in an operable position before approval will be given. Any changes made by the Contractor shall be done without any additional cost to the Owner.
2. The Contractor shall be responsible for layout of proposed facilities and any minor adjustments required due to differences between existing conditions and the Drawings. Any such deviations in layout shall be within the intent of the original drawings, and without additional costs to the Owner. The Owner will indicate the proposed precise location of the control panels. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage with a minimum spray on non-planted areas. Where head spacing is not specifically noted, Contractor shall install sprinkler heads evenly along the irrigation area's perimeter. Flush all lines prior to installation of heads.
3. Support piping without strain on joints or fittings and allow for piping expansion and contraction. "Snake" pipe into trench in accordance to manufacturer's recommendations to allow for expansion. Lay on solid bedding, at uniform depth.

B. The Contractor shall examine all other portions of working drawings and plan trenching and pipe layout so that no conflict will arise between irrigation and any other work. Any corrective action will be the Contractors responsibility at no further expense to the Owner.

C. Excavations:

1. Excavations shall be open vertical construction, sufficiently wide to provide clear working space around the work installed and to provide ample space for backfilling and tamping.
2. The use of a vibratory plow or methods other than open vertical trenching will not be allowed without the written approval of the Owner. To obtain such approval, a field test must be performed, at the proposed site, with the equipment to be used in the presence of the Owner and Owner. The field test is to indicate if the proposed site is favorable to the plowing method. Approval for plowing at one location does not allow the use of plowing at another location. Approval for plowing must be obtained for each location where the use of plowing is proposed. If, at previously approved plowing locations, conditions for plowing become unfavorable as determined by the Owner, plowing shall be terminated.
3. Trenches for pipe and equipment shall be cut to required grade lines, and compacted to provide an accurate grade and uniform bearing for the full length of the line.
4. Unless written approval for using native soils as bedding material is given by the Owner, main line pipe shall be placed on a minimum 6 inch depth of granular bedding material.
5. Excess trench soil with rocks greater than ½ inch diameter shall be removed from the planted area and spread as directed by the Owner.
6. When two pipes are to be placed in the same trench, it is required to maintain a minimum four inch (4") horizontal separation between pipes.
7. Depth of trenches shall be sufficient to provide a minimum cover above the top of the pipe as follows:
    a. 24-inch minimum over main lines.
    b. 18-inch minimum over non-pressure (rotary pop-up) lateral lines.
    c. 12-inch minimum over non-pressure (pop-up spray head) lateral lines.
    d. 24-inch minimum over any lines located out in road surface area of paved streets.
    e. Maximum cover above the top of the pipe shall not exceed twelve inches (12") greater than the required minimum cover.
    f. 12-inch minimum cover over drip line non-pressure lateral lines.
    g. 3-inch minimum cover over in-line emitter or main distribution tubing.

D. Assemblies:

1. Routing of pressure supply lines as indicated on drawings is diagrammatic. Install lines (and various assemblies) in such a manner as to conform with details on plans.
2. Install all assemblies specified herein according to the respective detail drawings or specifications pertaining to specific items required to complete the work. Perform work according to best standard practice.
3. Install no multiple assemblies on plastic lines. Provide each assembly with its own outlet.
4. All threaded pipe and fittings shall be assembled using an approved teflon tape, or equivalent, applied to the male threads only. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved teflon tape will be required.
5. No main line elbows, branch tees or isolation valves are to be located closer than five (5) feet to each other without prior approval of the Owner.

E. Line Clearance: All lines shall have a minimum clearance of four inches (4") from each other, and six inches (6") from lines of other trades. Parallel lines shall not be installed directly over one another.

F. Plastic to Steel Connections:
1. At all plastic (PVC) pipe connections, the Contractor shall work the steel connections first. Connections shall always be plastic into steel, never steel into plastic. An approved teflon tape shall be used on all threaded (PVC) to steel, never steel into plastic. An approved teflon tape shall be used on all thread (PVC) to steel pipe joints applied to the male threads only, and light wrench pressure is to be applied. A minimum of two (2) wraps and a maximum of three (3) wraps of an approved 3/4" wide teflon tape will be required.
2. A non-hardening sealant and lubricant similar to Permatex #51 or LASCO blue pipe sealant may be used in lieu of teflon tape. Apply sealant to clean male threads brushing into grooves and to the first three threads of the female threads.

G. Plastic Pipe:
1. The Contractor shall exercise care in handling, loading, unloading, and storing plastic pipe and fittings. All plastic pipe and fittings shall be stored under a weatherproof roofed structure before using and shall be transported in a vehicle with a bed long enough to allow the length of pipe to lie flat so as not to be subject to undue bending or concentrated external load at any point.
    a. All lumber, rubbish, rubble, concrete and rocks shall be removed from the trenches by the Contractor. Pipe shall have a firm uniform bearing for the entire length of each pipe line to prevent uneven settlement. Wedging or blocking under riser tees shall be done only if specified on the plans. Pad trenches with soil as necessary to provide uniform bearing surfaces.
    b. Where extensive lengths of pipe are installed, snake pipe in trench from side to side to allow for expansion and contraction. One additional foot per one hundred (100) feet of pipe is the minimum allowance for snaking. Never lay pipe when there is water in the trench or when the temperature is 32 degrees F or below.
    c. All changes in direction of pipe shall be made with fittings, not by bending. No main line fittings for changes in direction shall be greater than 45 degrees. Provide a minimum five (5) feet between changes in direction elbows.
    d. Safely handle primers and cements per ASTM F-402. Make solvent weld joints per ASTM D-2855 with a non-synthetic bristle brush in the following sequence:
        1) Make sure pipe is cut square and all rough edges and burrs are removed. All connecting surfaces are properly cleaned and dry prior to application of pipe primer.
        2) Apply an even coat of colored primer to pipe and fitting prior to application of solvent.
        3) Apply an even coat of solvent to the outside of the pipe, making sure that the coated area is equal to the depth of the fitting socket.
        4) Apply an even light coat of solvent to the inside of the fitting.
        5) Apply a second coat of solvent to the pipe.
        6) Insert the pipe quickly into the fitting and turn pipe approximately one-eighth to one-quarter turn to distribute the solvent and remove air bubbles. Hold the joint for approximately fifteen seconds so the fittings do not push off the pipe.

7) Using a clean rag, make sure to wipe off all excess solvent to prevent weakening at joint.
8) Exercise care in going to the next joint so that pipe is not twisted, thereby disturbing the last completed joint.
9) Allow at least fifteen minutes setup time for each welded joint before moving.
10) Repairing plastic pipe when damaged shall be done by replacing the damaged portion of pipe.

H. Concrete Thrust Blocks: Concrete anchors or thrust blocks shall be provided on pressure main pipelines 2 inches or greater in diameter at abrupt changes in pipeline grade, changes in horizontal alignment (bends, tees and crosses), reduction in pipe size (reducers, reducing tees or crosses), end-line caps or plugs, and/or in-line isolation valve to absorb any axial thrust of the pipeline. The pipe manufacturer's recommendation for thrust control shall be followed. Thrust blocks must be formed against solid unexcavated earth (undisturbed). Do not enclose entire joint in concrete. Provide a minimum of three cubic feet of concrete for each thrust block.

I. Concrete thrust blocks may be eliminated if the main line piping system uses self-restrainted fittings and bell joint restraints per manufacture’s specifications throughout.

3.3 PIPE DEPTH AND BACKFILL

A. Backfill shall not be placed until the installed system has been inspected, pressure tested and approved by the Owner.

B. Backfill for first 6 inches underneath, and 4 inches around and above main line pipe and control wires shall be granular bedding material, unless the Owner approves in writing that native soil may be used for initial backfill in lieu of granular bedding material. Backfill material for the upper portion of the trench shall be approved soil. Unsuitable martial, such as pipe remnants and wire including clods and rocks over two inches (2") in size, shall be removed from the premises and disposed of legally at no cost to the Owner.

C. Backfilling for all pipe shall be carried out in two basic stages.
1. Stage One Backfilling: This shall be accomplished as soon as possible after the pipe is laid. A bedding of uniform depth with no voids must be provided along the entire length of the pipe. The bedding material should be placed in the trench and tamped into the areas under the pipe, using a suitable tool. Joints should be left exposed until hydrostatic tests are completed. Cover only those portions of the pipe necessary to prevent movement or damage.
2. Stage Two Backfilling: This shall be completed after all hydrostatic tests are completed and the piping system has been thoroughly checked for leaks or other defects. Continue to add backfill material in four inch (4") layers and hand tamp to achieve density similar to adjacent soil. After twelve inches (12") in main line trenches and eight inches (8") in lateral line trenches of hand tamped soil is in place over the pipe and fittings, backfilling can be continued, using light machinery to place dirt in the trenches in six inch (6") layers and to compact the dirt to conform to adjacent soil. Extreme care should be taken to avoid damage to the pipe from machinery that is too heavy. All trenches shall then be water jetted to assure uniform settling and compaction. Backfilling operations will not be

considered complete until the top surface has been graded to conform to the adjacent soil. All rocks uncovered and not used as backfill must be collected and removed from the site.

D. All backfilling shall be done carefully and shall be properly tamped. All soil shall be tamped and puddled to eliminate any voids.

E. Surplus earth remaining after backfilling shall be disposed of as directed by the Owner.

F. PVC piping and fittings shall not be backfilled during periods of extreme heat or when a sudden lowering of temperature of the pipe may cause separation of joints or fittings.

G. Contractor shall fill with properly amended topsoil any irrigation trench that subsides during the warranty period. Contractor shall assume all cost associated with the trench repair, including but not limited to plant replacement of a size of plant disturbed at the time of the repair.

3.4 CONTROL AND TRACER WIRE

A. Do not tape wires together when encased in sleeve or conduit. Minimum cover shall be 24 inches. Crimp wires together at valve manifold with Scotchlok connector. Conventional valve wire splices shall use a 3M DBY splice kit. Tag all control wire at splices with approved control wire markers.

B. Wire size shall be determined by the number of valves operating on a given wire and the distance from the controller to the farthest valve, as specified by the charts furnished by the remote control valve manufacturer. Splices are only allowed when rerouting or repairing existing wire. All splice connections must be provided in a valve box.

C. Communication/sensor cable shall be installed in electrical conduit with long radius sweeps at direction changes and at valve/splice/pull boxes. Maintain a minimum six inch clearance to adjacent pipe. Minimum cover shall be 24 inches.

D. Install tracer wire along the top of pipe at the following locations:
1. All pipe sleeves.
2. Main line pipe without adjacent control wire.

3.5 VALVES

A. The Contractor shall make all necessary connections for operation, and shall be connected and aligned to provide the most efficient flow of water to the irrigation heads. Where pressure regulating electric control valves are specified, the Contractor shall adjust the valve so a uniform distribution of water is applied by the heads, and that the most remote heads operate at the pressure recommended by the head manufacturer.

B. Each valve is to be enclosed in a separate valve box. The valve box shall be secured on firm soil clear of valves and wiring connections. Valve boxes and lids shall be set to finished grade

as indicated on the Drawings. Use valve box extensions of the same material as the box to the proper depth below the pipeline. Valve boxes shall be supported by common bricks at each corner and at the long side of the box. Use a minimum of six bricks to support rectangular boxes and four bricks to support round boxes. Backfill carefully and properly compact in order to prevent settlement and subsequent damage.

C. Install a concrete collar around valve boxes when located in asphaltic concrete pavement or in turfgrass areas.

D. When existing valve and/or splice boxes are within the area of work, replace in kind any damaged boxes and/or lids, unless noted otherwise. Adjust the elevation of all existing boxes within the area of work to final grade per the drawings.

E. Locate valve boxes in ground cover/shrub planting areas instead of turfgrass areas whenever possible. Locate valve boxes 18” from and perpendicular to adjacent paving. When grouped together, provide equal spacing of at least 36" between boxes.

F. Permanently attach the plastic valve identification tag to the remote control valve body and locate so it’s clearly visible in an open valve box.

G. Permanently secure the control valve identification label to the top of the valve box lid with non-corrosive connectors.

3.6 AUTOMATIC CONTROLS

A. Program valve schedules appropriately for new planting.

B. The Owner shall review the fully functional operation of the irrigation control system prior to acceptance of the system, and as a requirement for the start of maintenance.

C. Install automatic controller chart in laminated or watertight plastic envelope inside controller cover showing which valves are connected to which stations on controller in the work area.

3.7 SPRINKLER HEAD INSTALLATION

A. Head spacing on drawings is diagrammatic. Head spacing and patterns shall be adjusted to provide complete and adequate coverage with a minimum spray on non-planted areas. Flush all lines prior to installation of heads.

B. Overhead distribution sprinkler heads shall be installed as detailed, set adjacent to the edge of hardscape elements (2 - 4 inches for spray heads, 6 - 8 inches for rotary heads) and perpendicular to the finish grade. Sprinkler spray heads directed toward a building shall be a minimum 7 feet from building walls, and a minimum 2 feet when directed away from the building. Sprinkler heads in turfgrass areas shall have a minimum 10 foot radius except for corners.

C. The top of the nozzle in pop-up bodies shall be flush to the finish grade in areas to receive turfgrass seed/stolons, and in ballfield skinned infields. The top of the nozzle shall be one-half inch (1/2") above the finish subgrade in areas to receive standard cut turfgrass sod.

D. High speed or other sprinkler heads in dust control zones at ballfield skinned infields shall be installed in turfgrass areas where directly adjacent to the skinned infield.

E. Where individual shrub bubblers are installed, each plant shall have a bubbler within 10 - 14 inches of the shrub center.

F. Upon completion of the installation, the Contractor shall adjust or change sprinkler head nozzles to uniformly distribute water without overspray and shall place entire irrigation system in first-class operating condition without any additional cost to the Owner.

G. Sprinkler heads shall be adjusted in order by fully opening the sprinkler furthest from the control valve and working back toward the control valve. Adjust sprinkler heads which spray toward buildings or adjacent hardscape so that water spray does not contact the side of buildings or significantly over-spray onto hardscape .

3.8 DRIP IRRIGATION SYSTEM

A. Install control valves, wye strainer, pressure regulator and rigid PVC lateral distribution lines or manifolds prior to planting soil conditioning operations.

B. Install in-line emitter tubing as follows:
1. After planting soil has been amended, tilled and rough graded, remove and stockpile the planting soil to the required depth of the in-line tubing, and install and stake drip tubing taking into account adjustments needed in the tubing location based on the planting layout. Stake in-line tubing at every-other emitter. Install flush and air relief valves, and operation indicator. Install the operation indicator on the supply manifold with a swing joint in a location easily visible by maintenance personnel.
2. After system flushing, verification of proper operation and inspection, reinstall the stockpiled planting soil and finish grade to final elevation.

C. Operate the system to moisten the planting soils to a minimum 8 inch depth prior to planting operations.

D. Program the controller to operate the drip system using the controller's "cycle and soak" feature in order to apply the required daily watering amount in three equal cycles with a one hour delay between cycles.

3.9 COMPLETION AND MAINTENANCE

A. After the system has been completed but prior to the start of maintenance, the Contractor shall operate the automated system with the Owner, shall instruct the Owner in the operations and maintenance of the system and controls, and shall program the controller for each station.

B. If site satellite controller(s) for a central control system is installed, an authorized central control distributor/installer shall program the central base station to communicate with the site satellite controller(s), and shall verify that proper communication protocols are operational.

C. The irrigation system shall be maintained and adjusted as required to provide proper coverage throughout the maintenance period or until Final Acceptance of the project, whichever is greater. Irrigation system maintenance shall commence upon an acceptable review following the completion of irrigation installation, planting operations and general clean-up.

D. The maintenance period shall not terminate until the close-out documents and as-builts record drawings have been submitted and accepted.

3.10 REPAIR AND CLEAN-UP

A. All areas shall be maintained in a neat and orderly condition at all times. All reasonable precautions shall be taken to avoid damage to new planting and improvements. Disturbed and/or damaged areas shall be restored to their original condition to the satisfaction of the Owner.

B. Where trenching or other work disturbs newly planted turfgrass or planting, the Contractor shall reinstall the existing sod if viable, or install a full width of new turfgrass sod or planting to match the existing turfgrass/planting species/variety and size, after first conditioning the top 6 inches of soil per the Landscape Planting specification. Adjust finish grades to account for the new turfgrass sod’s soil mat so that the new sod is flush to the adjacent turfgrass.

C. After the irrigation operations are completed, the Contractor shall remove all trash, excess materials, empty containers or any other debris accumulated by the work from the site. All damage caused by the work shall be repaired or material replaced at the Contractor's expense. The site shall be left in a neat and orderly condition to the satisfaction of the Owner.

END OF SECTION

SECTION 329000 – LANDSCAPE PLANTING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The Contractor shall furnish all material, labor and equipment necessary to install all landscape work as indicated in the plans and specifications.

B. The landscape work includes but is not necessarily limited to the following:
1. Soil preparation including cross ripping of all planting soil.
2. Weed control including an application of a pre-emergent herbicide.
3. Providing import planting topsoil at raised grade planters and/or at planting areas needing fill.
4. Fine grading, conditioning and amending planting topsoil.
5. Installation of turfgrass sod.
6. Planting new trees, plants and ground covers.
7. Tree drainage sump boring and testing.
8. Root Barriers.
9. Installation of mulch.
10. Sixty (60) day maintenance.

C. Related Work Specified Elsewhere
1. Contract Drawings, Addenda, general provisions of the Contract, including General and Supplemental Conditions, and Division 01 Sections apply to work of this section.
2. Section 31 20 00 – Earthwork
3. Section 31 22 22 – Soil Materials
4. Section 32 84 00 – Irrigation System

1.2 DEFINITIONS

A. Unless noted otherwise, the term "approved" shall mean by the Owner in writing.

B. Agencies and Organizations:
1. ASTM- American Society for Testing and Materials
2. ANSI – American National Standards Institute
3. ISA – International Society of Arborists
4. SSPWC – Standard Specifications for Public Works Construction, by the American Public Works Assoc./Associated General Contractors of California.
5. TPI – Turfgrass Producers International

C. Owner: The Owner’s authorized representative or authorized consultant.

1.3 QUALITY ASSURANCE

A. The work of this Section shall be performed by a single firm experienced in landscape

planting and holding a current California Contractor's A or C27 License.

B. Tree and plant quality and sizes shall conform to the current edition of "American Standard for Nursery Stock" for Number One nursery stock as adopted by the American Nursery & Landscape Association (ANSI Z60.1). Plants shall be of uniform, standard size for their listed container size, neither overgrown and root bound or encircling, nor so recently transplanted that the root system is not thoroughly well established throughout the container. Roots should reach the sides of the container and maintain a firm root ball. Pruning shall not be done prior to delivery except by prior approval.

C. Trees shall also comply with quality characteristics described in "Guideline Specifications for Nursery Tree Quality" current edition, published by the Urban Tree Foundation. Trees not in compliance with any of the following characteristics may be subject to removal and replacement, whether planted or still in their containers.
   1. Acceptable caliper and height ranges for the Type, Form and Size of tree.
   2. An intact central leader, or after heading of an old leader, the new leader diameter is greater than one-half the diameter of the old leader. Co-dominant leaders are not acceptable.
   3. Scaffold branch diameters are less than two-thirds the diameter of the trunk, and without included bark at the attachment.
   4. Scaffold branches shall be balanced, well spaced vertically, and with a radially blank section no greater than one-third of the canopy circumference.
   5. Temporary branches on the lower trunk shall be less than three-eighths inch diameter, and the clear trunk height shall be no more than forty (40) percent of the overall tree height.
   6. The root collar and rootball shall be free of defects, including circling, kinked and girdling roots. Roots at the edge and bottom of the container shall be less than one-quarter inch diameter, and uniformly distributed throughout the container.
   7. The tree canopy width shall be a minimum of twenty-five percent of the standard form tree height, except for naturally columnar forms.

D. Botanical names shall take precedence over common names. Provide plants that are true to name. Tag one representative plant of each species and size with the botanical name and size.

E. Inspection:
   1. All landscape work and materials shall comply with applicable Federal, State, County and City regulations.
   2. All plant material shall be reviewed onsite by the Owner's Representative and/or Landscape Architect prior to positioning and planting. Review shall not limit the right of rejection during any stage of the work until Final Acceptance for any reason including condition of the foliage or root ball, size, variety, form, appearance, latent defects or injuries. Rejected plants shall be removed from the site and replaced immediately by the Contractor at no additional cost to the Owner.

F. Qualifications of Workers
   1. Employ skilled workers who are thoroughly trained experienced in landscape planting and who are completely familiar with specified requirements and methods needed for proper performance of the work in this section.
   2. Provide adequate supervision by a qualified foreman fluent in English that will be continuously onsite during the performance of this work.
   3. Weed control pesticides shall only be applied by an individual holding a valid

Qualified Applicator Certificate (Category A) issued by the Department of Pesticides Regulation. Submit a copy of the Certificate.

G. Any pruning of existing trees specified as part of this Work shall be performed under the direct supervision of an ISA Certified Arborist and in compliance with ANSI A300-Part 1 Standard Practices (Pruning).

1.4 SUBMITTALS

A. In accordance with the Submittal section, submit:
   1. A complete materials list of all items proposed to be furnished including estimated quantities.
   2. Laboratory analyses of soil conditioning materials shall have been performed within one year of the submittal date.
   3. Quality Certificates and/or Certificates of Inspection required by government agencies (providing duplicate copies for the Owner's Representative).
   4. Qualified Applicator Certificate, and DPR Registration Certificates and Material Safety Data Sheets for all pesticides/herbicides proposed for use.
   5. Submit photos with a scale marker of all boxed trees proposed for use from the nursery source. Photos shall clearly show the individual tree form without background greenery.

B. Soil amendments: Submit one (1) pint sample and an analysis of organic compost and mulch.

C. Other Samples: When requested by the Landscape Architect and/or Owner's Representative.

D. Soil Fertility Analysis and Recommendations:
   1. The Contractor shall provide and pay for a fertility analysis of the existing topsoil and any proposed import planting topsoil. After mass grading operations are completed, native soil samples shall be collected for the fertility analysis by collecting a minimum of 5 representative samples of the soil per acre throughout the area of work. Separate samples shall be produced for cut and fill areas, and for any other area composed of soils not similar to the existing soils. Each sample shall be a minimum of one pint each, and shall be thoroughly mixed together to prepare a homogenous sample. A one quart representative sample for cut, fill and any other special conditions shall be submitted to the soil testing laboratory as a representative sample for fertility analysis. The fertility analysis shall at a minimum provide the following data:
      a. soil texture class and percent sands, silts and clays per ASTM D422
      b. estimated soil infiltration and percolation rates
      c. pH
      d. organic matter (%)
      e. total soluble salts (ECe)
      f. Cation Exchange Capacity (CEC) and Percent Cation Saturation for K, Mg, Ca and Na
      g. major and minor nutrients (ppm).
   2. Recommendations for improvement of the soil conditions for optimum plant growth shall be made by the testing laboratory, and at a minimum shall include the following:

a. A fertilizer and amendment application program (including macro and micro nutrients) for both pre-planting and maintenance fertility applications for broad area tillage and for planting pit backfill (pre-plant only).
b. Treatments to neutralize soil pH and to correct any adverse conditions as warranted.
c. Recommendations shall address soil conditioning for both planting area tillage and tree/plant planting pit backfill.

3. The soil analysis and recommendations shall be performed by one of the following laboratories capable of providing the above analyses by a licensed soil scientist:
   a. D&D Agricultural Laboratory. Contact Darrin Peters at 559-348-1818.
   b. Wilber-Ellis Company. Contact Michael Cline at 209-442-1220.
4. The Contractor shall submit the results of the soil testing investigations and shall receive written direction from the Landscape Architect before proceeding with any soil conditioning activities such as fertilizing and/or adding amendments.

E. Within seven days from the start of the maintenance period, submit a calendar of maintenance activities, including scheduled dates for mowing, fertilizing, weed control and all other activities. Provide the quantities of maintenance fertilizer and any other materials scheduled to be used in each application during the maintenance period.

F. Submit invoices and/or delivery tags from material suppliers for all amendments, fertilizer, seed, plants, mulch and any other materials provided for the landscape planting installation and applied during the maintenance period. Submit tags from seed packaging indicating seed varieties, percent purity and percent germination minimums. The invoices and/or delivery tags shall be provided directly to the Owner’s Representative/Inspector of Record within 24 hours of delivery to the site, as well as to the normal submittal recipients per the Contract Documents.

G. Close Out Documents: Submit prior to the start of the maintenance period, two bound copies of the following:
1. Cover sheet stating Contractor's address and telephone number, duration of guarantee period, and a list of plant nurseries, materials and equipment vendors with names and addresses of the vendor/manufacturer representatives and warranty periods.
2. A "CERTIFICATE OF CONSTRUCTION COMPLIANCE" which indicates that all work done, materials and equipment used and installed are in compliance with the approved plans, specifications and all authorized revisions.
3. Maintenance Manuals and Instructions: Submit a monthly schedule of procedures to be established by Owner for maintenance of landscapes (trees, mixed planting and turfgrass) for one full year and shall include recommendations for fertilizing, pest and disease control, mowing, aeration and top dressing.
4. Soil Amendment and Seed/Stolon Confirmation Form noting the installed quantities of materials and the person who confirmed the delivery and installation of the materials.
5. Operations and Maintenance Manuals and Warranty certificates for any maintenance equipment turned over to the Owner.
6. As-built Record Drawings with all modifications to the Drawings noted in red ink, and the Landscape Planting Observation Log completed.

1.5 AVAILABILITY

A. The Contractor shall confirm availability of plants, supplies, and materials prior to submitting his landscape bid. Plant variety substitutions are not desired.

B. If a plant is found not to be suitable or available, the Contractor is to notify Landscape Architect before bidding. The Landscape Architect is then required to select a reasonable alternate and to inform all those bidding of the availability of the original plant. If a substitute is selected it must be of the same size, value and quality as the original plant. Failure to inform the Landscape Architect of unavailable plants prior to bidding will require that all plants specified shall be provided by the Contractor at time of installation.

C. Plant container size listed on construction documents are minimum acceptable size. If plant material specified is not substituted prior to award of the contract the minimum container size specified shall be provided by the Contractor. If the Contractor can not provide the minimum specified size plant material at the time of installation, the Contractor shall be required to install a larger size container of the plant specified at no additional cost to the Owner.

1.6 EXISTING CONDITIONS

A. The Contractor is to visit the job site to verify existing conditions including soils, vegetative growth, subsurface conditions, existing grade and drainage, irrigation system etc. making allowances in his bid for any required work to provide the landscape installation as specified in the construction documents.

B. The Contractor shall notify the Owner to locate underground lines prior to hole boring or trenching. Do not permit heavy equipment such as trucks, rollers, or tractors to damage utilities. Hand excavate as required to minimize possibility of damage to underground utilities. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned. Prevent damage to temporary risers of underground irrigation system and similar obstructing work located in the landscape areas.

C. If there is a conflict with existing utilities, improvements and/or planting and the proposed planting, Contractor shall promptly notify the Owner's Representative for instructions as to further action. Failure to do so will make Contractor liable for any and all damage or corrective actions arising from his operations.

D. Prior to the start of this work, the Contractor and the Owner’s Representative shall verify the operational condition of that portion of the existing irrigation system pertaining to the proposed planting area. The Contractor shall notify the Owner’s Representative of any repairs and/or corrections necessary for proper functioning and coverage. The repairs and/or corrections shall be completed before any plant material is planted. Failure to perform system verification and provide notification prior to the start of this work will make the Contractor liable for any and all repairs and/or corrections necessary for proper functioning and coverage, as well as any required plant replacement, without any additional cost to the Owner.

E. No plants shall be planted in situations that show poor drainage infiltration or low areas that result in standing water. Such situations shall be corrected by the Contractor as directed by the Landscape Architect or Civil Engineer. Failure by the Contractor to notify the Owner of poor drainage conditions prior to proceeding with the conditioning or planting operations shall place the responsibility for any plant removals, additional soil

conditioning and replanting on the Contractor without any additional cost to the Owner. Any corrections of finish grading not in compliance with the Contract Documents including plant removal, soil conditioning and replanting shall be performed by the Contractor at no additional cost to the Owner.

1.7 PROTECTION

A. The Contractor shall guarantee repair of damage to any part of the premises resulting from but not limited to leaks, defects in materials or workmanship, operation of equipment, storage of materials and/or equipment, installation of underground or overhead utilities. The Contractor shall be liable for any and all accidents resulting from his work, including open holes and trenches during construction.

B. Protect new and existing landscape areas in the area of work from theft, loss, damage and deterioration during storage, installation and maintenance. Protect from unauthorized persons (trespassers) as well as from operations by other contractors and tradesmen, and landscape operations. Protect all planted turf and shrub areas from persons as well as operations of other contractors and the Owner. Cost of protection shall be born by the Contractor with means of protection such as temporary fencing as approved by Owner. Cost for protection shall be included in the Contractor's bid for the work.

C. Contractor shall repair or replace damaged work and/or damage to existing improvements/landscape as identified by the Owner's Representative to a condition acceptable to the Owner's Representative. No additional payment will be made to the Contractor for repair or replacement of damaged work and/or damage to existing improvements/landscape.

1.8 OBSERVATIONS

A. The Owner's Representative, Project Inspector or Landscape Architect shall perform periodic observations and shall record the observation on the Landscape Planting Observation Log form on the As Built Record Drawings. Such observations shall include but are not necessarily be limited to:
   1. Weed control operations prior to other portions of work.
   2. Ripping and soil conditioning of the planting area.
   3. Layout of the plant material and trees at the site prior to planting in order to avoid conflicts and to meet the design intent.
   4. Condition and quality of plant material prior to planting.
   5. Auguring, digging and preparation of plant pits and drainage sumps for trees and shrubs.
   6. Planting and staking of trees.
   7. Planting of shrubs, ground cover and turfgrass.

B. Any corrective action called for shall be immediately performed by the Contractor.

C. Failure by the Contractor to obtain the above observations shall place the responsibility on the Contractor for any relocation and/or replacement of planted trees or shrubs.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Plant label shall identify each species and variety. A label shall be attached to each individual plant or block of identical plants grouped together.

B. Adequately protect plants from sun and wind prior to planting. Do not allow stored plant material to dry out at any time.

C. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at the site. Store materials and equipment in a location as directed by the Owner's Representative.

1.10 PESTICIDE NOTIFICATION

A. A written notification of any and all pesticide/herbicide products scheduled for use by the Contractor or their representative on the Owner's property must be submitted to the Owner's Representative at least seven days prior to the scheduled application. Notification shall include the product name, manufacturer's name, the pesticide active ingredient, the U.S. EPA and CalDPR registration numbers, the scheduled date and application areas, and the reason (target species) for the application.

1.11 REPAIR OF DAMAGED EXISTING PLANTING AREAS

A. The Contractor shall be responsible to repair all damage and/or distress to existing planting areas including turfgrass, shrubs, ground covers, perennials, etc., whether specifically shown on the Contract Documents or not, as a result of construction operations, material and/or equipment storage, site access, site offices, utility and/or irrigation line installations or other actions.

B. Replacement shrubs shall be 15 gallon size, replacement ground cover and perennial plants shall be 5 gallon size, and turfgrass shall be full width sod. Damaged areas shall be amended and finish graded per the Contract Documents prior to planting. Non-turfgrass planting areas shall also receive wood mulch as specified herein. The limits of repair shall be determined by the Owner.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil used in planting areas shall be a clean, friable soil with no noxious weeds, clods or stones larger than 0.5 inch in diameter, subsoil, hardpan, wood, debris, fine organic material greater than 5%, undesirable insects, plant disease or any other natural or extraneous objects detrimental to normal plant growth to a minimum depth of 18 inches from finish grade.

B. The Contractor shall provide a particle size analysis, fertility testing and amendment recommendations of proposed native and/or import topsoil, and the Landscape Architect reserves the right to reject topsoil not conforming to the minimum specifications. Stockpiled onsite topsoil may be used if analysis and testing determines compliance with

these requirements prior to placement. Failure to meet minimum specifications shall result in the removal of any unauthorized placed topsoil at the Contractors expense.

C. Particle size distribution for topsoil shall meet the following per ASTM D422:
1. 100% passing a 12.2 mm (1/2") screen.
2. Minimum 95% passing a 9.5 mm (3/8") screen.
3. Minimum 75% passing a 2.36 mm (No. 8) screen.
4. Maximum 45% passing a No. 200 screen.
5. Silt content shall be a maximum 35%.
6. Clay content shall be a maximum 25%.
7. Silt to Clay ratio shall be less than 2 and greater than 0.5.

D. Other characteristics shall conform to the following:
1. Permeability rate shall be not less than one (1.0) inch per hour or not more than 20 inches per hour.
2. The sodium absorption ratio (SAR) shall not exceed 3.0 and the electrical conductivity (ECe) shall not exceed 2.5 milliohms per centimeter at 25 degrees centigrade.
3. Soluble boron shall be no greater than 1.0 part per million (mg/l).
4. Soil pH range shall be 6.5 – 7.9.
5. Maximum concentration of soluble chloride shall be 150 parts per million.
6. Maximum concentration of heavy metals shall not exceed the following when the pH is between 6 and 7:
   a. Arsenic: 0.5 ppm
   b. Cadmium: 0.5 ppm
   c. Chromium: 5 ppm
   d. Cobalt: 1 ppm
   e. Lead: 15 ppm
   f. Mercury: 0.5 ppm
   g. Nickel: 2.5 ppm
   h. Selenium: 1.5 ppm
   i. Silver: 0.25 ppm
   j. Vanadium: 1.5 ppm
7. Petroleum hydrocarbons shall not exceed 100 mg/kg dry soil.
8. Aromatic volatile organic hydrocarbons shall not exceed 2 mg/kg dry soil.

2.2 SOIL AMENDMENTS

A. Organic Compost: "Harvest Premium" as supplied by Harvest Power (559) 435-1114; "WonderGrow Compost" by Grover, Inc. (866) 764-5765, or "Allgro Compost" by Synagro (559) 341-5158, and conforming to the following minimums:
1. Certified as "Mature" or better.
2. Pass EPA Class A standards for pathogens and heavy metals.
3. Particle size: 1/8" maximum.
4. pH: 6.0-7.5.
5. Macro-nutrients: Minimum of 1.0% Nitrogen, 0.5% Phosphorus, 0.5% Potassium.
6. AgIndex ratio (Nutients/Salts) 10 or more.
7. Ammonia N/Nitrate N ratio: rated Mature or Very Mature
8. Organic matter content greater than 50% dry weight.
9. Ash: equal or greater than 6%, not grater than 20%

10. Carbon/Nitrogen ratio: less than or equal to 25.
11. Salinity (ECe): less than 10.0 dS/m.
12. Odor shall be soil-like (musty or earthy) without any sour, ammonia-like or putrid smell.
13. No measured component shall be rated as “Extreme” or “Very High” that will be detrimental to plant growth.

B. Gypsum shall be mined agricultural grade gypsum composed of no less than 95% $CaS0_4$-$2H_20$ hydrated calcium sulfate in a pelletized form. Elemental Sulfur shall be a minimum 95% pure agricultural grade.

C. Dry Humate organic soil conditioner comprised of 70% humic acid from Leonardite.

D. Endo 120 Mycorrhizae containing a minimum 60,000 living propagules per pound.

E. Amendment material types and application rates may be subject to change based on the findings and recommendations of the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

2.3 FERTILIZER

A. Trees and Shrubs: Fertilizer for all trees and shrubs to be BEST PAKS (20-10-5) controlled release fertilizer in a biodegradable 10 gram packet. The BEST PAKS shall be applied at the following rates:
1. 1 Gallon Can: 1 Best-Pak
2. 2 Gallon Can: 2 Best-Paks
3. 5 Gallon Can: 5 Best-Paks
4. 15 Gallon Can: 10 Best-Paks
5. 24” Box: 16 Best-Paks
6. 36” Box: 24 Best-Paks

B. The pre-plant fertilizer shall be a commercial homogeneous, granular pellet:
1. Pre-plant fertilizer for turfgrass shall be:
   a. BEST 6-24-24-5S XB+ with Avail
2. Pre-plant fertilizer for mixed plantings shall be:
   a. BEST Landscape Color 14-14-14 (14-6-11.6-3S and micronutrients) with 9.9% slow release N, or equal.

C. The maintenance fertilizer shall be a commercial homogeneous, granular pellet:
1. Maintenance fertilizer for turfgrass shall be one or more of the following:
   a. Urea 46-0-0
   b. BEST Ammonia Sulfate 21-0-0-24S, standard grade, or equal
   c. BEST Nitra King 21-2-4-14S-2Fe, or equal.
   d. BEST Nitex 20-2-3-12S-5Fe, or equal.
   e. BEST Polyon 43 (43-0-0) slow release N, or equal.
   f. Wil-Gro Pro Choice Plus, 31-3-7-6S-3Fe with 9.3% slow release N, or equal.
   g. Best Landscape Color 14-14-14 (14-6-11.6-3S and micronutrients) with 9.9% slow release N, or equal.
2. Maintenance fertilizer for mixed plantings shall be the pre-planting fertilizer. Use slow release above for one time fertilization.

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D. Fertilizer material types and analysis may be subject to change based on the findings and recommendations from the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

2.4 MULCH

A. Mulch for on-grade or raised native soil planters shall be a walk-on type of chipped and aged greenwaste woody material without leaves, green wood, sticks, dirt, stones, dust and other non-organic debris as accepted by the Landscape Architect. Particle size 1/2” to 3" in general size.

2.5 STAKING & GUYING MATERIALS

A. Stakes: 2" Diameter lodgepole pine or Douglas Fir, pressure treated and pointed one end.

B. Ties: V.I.T. Cinch Tie, 32 inches long, V.I.T. Products, Inc. (619) 673-1760, or equivalent.

2.6 PLANTS

A. Plants shall be typical of their species and variety, shall have normal growth habits, well developed branches and be densely foliated, and shall have fibrous root systems. No substitutions will be allowed unless approved in writing by the Landscape Architect.

B. Plants shall be free from defects and injuries including disease, insects, insect eggs and larvae and girdled or matted roots.

C. Quality and size of plants shall be in accordance with ANSI Z60.1-2004, "American Standard for Nursery Stock", and as described in Quality Assurance.

D. Plants shall not be pruned before planting.

E. Plant material must be selected from nurseries that have been inspected by State or Federal Agencies.

F. Plants shall be nursery grown and shall have been transplanted or root pruned at least once in the past three (3) years. Plants shall have been grown under climatic conditions similar to those in the locality of the project.

G. Each bundle of plants shall be properly identified by weatherproof labels securely attached thereto before delivery to the project site. Label shall identify plant by name.

H. Nomenclature shall be in accordance with Sunset Western Garden Book, current edition.

I. No plants shall be removed from their container until a review has been made in the field or at the nursery, or except when specifically authorized in writing by the Owner.

J. Collected plant material may be used only when approved. Approval shall not limit the right of rejection during work progress for conditions of the root ball, latent defects or injuries.

K. Where shown a "MULTI" provide trees with a minimum of three trunks.

L. Plant sizes listed on the planting plan are minimum acceptable sizes. The quantities listed are the Landscape Architect's estimate only. The Contractor is responsible for the quantities of plant symbols shown on the plan, and/or the quantities in hatched planting areas at the specified triangular spacing.

2.7 TURFGRASS SOD

A. Sod shall be produced from certified or approved seed/stolons, fresh and labeled in accordance with U. S. Department of Agriculture Rules and Regulations. Sod quality shall be Premium or Standard Grade per TPI specifications. Harvested sod shall be big roll size.

B. Sod shall be neatly mowed and be mature enough that when grasped at one end it can be picked up and handled without damage, delivered to the project site, adequately protected and installation commenced within 24 hours of harvesting.

C. Turfgrass shall be a species and variety as specified in the Contract Drawings. If a warm-season grass is specified and the installation is to be performed between the months of October and April, a species with an established perennial ryegrass overseeding shall be installed. Submit the overseeded product information for approval prior to the installation.

2.8 ROOT BARRIER

A. A ribbed polyethylene panel of minimum 0.080” thickness equal to Deep Root Partners #UB 24-2 PANEL, (800) 458-7668.

2.9 TREE TRUNK PROTECTOR

A. ArborGard+ polyethylene tree guard by Dimex (800) 334-3776, or equal.

2.10 HERBICIDES

A. Herbicide products for removal of unwanted grass and broad-leafed weeds shall be registered and approved for use by the U.S. EPA and CalDPR, and shall comply with the Owner’s Standards and with the “Healthy Schools Act” with current amendments, and with the current list of prohibited herbicides at Schools and Child Care facilities per California Assembly Bill 405.

B. Provide pre-emergent and post-emergent, selective herbicide formulations for use on turfgrass areas and/or ornamental shrub/ground cover areas that are not injurious to the proposed plantings and turfgrasses.

C. Provide a non-selective contact herbicide formulation only for use to remove existing established weeds prior to new plantings. The herbicide shall be certified for organic use, broad-spectrum with systemic function, ‘Weed Slayer’ by Agro Research International, or equal.

2.11 OTHER MATERIALS

A. Materials not specifically indicated, but necessary for proper execution of the work, shall be of first quality as selected by the Contractor subject to approval of the Landscape Architect.

PART 3 - EXECUTION

3.1 EXAMINATION & PREPARATION

A. General: Verify that existing site conditions are as specified and indicated before beginning this work.

B. Damaged Earth: Verify that earth rendered unfit to receive planting due to concrete water, mortar, limewater, hydrocarbons or any other contaminant dumped on it has been removed and replaced with clean earth from a source approved by the Owner's Representative.

C. Examine the area and conditions under which the work in this section is to be performed. Verify that any existing irrigation system within the limit of work is in proper working order with full coverage. Correct conditions detrimental to the timely and proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of the work signifies acceptance of the existing conditions.

D. Protection:
   1. Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment within the area of work prior to commencing work.
   2. Mark existing irrigation heads, valves, valve boxes and other below grade equipment or components that are scheduled to remain. Protect in place.

E. Runoff and Erosion Control: Furnish equipment, materials and labor necessary to control the flow, drainage, and accumulation of excess water running off the work area and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site per the approved SWPPP.

3.2 ROUGH GRADING, SOIL PREPARATION, PLANTER BACKFILL

A. Rough grading shall be performed by other subcontractors to the extent of establishing rough pads, slopes and drainage patterns. The Contractor is responsible for placement of topsoil and grading required to ensure positive drainage in all turfgrass and planting areas. All planting areas shall have a minimum topsoil depth of 18 inches from on-site native and/or approved import sources. Rough grading shall be completed prior to weed control, cross ripping or rock removal operations.

B. After the completion and acceptance of the weed control operations outlined below, and unless directed otherwise by the Landscape Architect or noted on the Drawings, and except for the area under the canopy of existing trees, the Contractor shall cross rip and till (break up large clumps and clods in excess of 2 inch diameter) the existing soil within all planting areas outside the canopy drip line of existing trees until the soil is loose and friable. Ripping shall be to a minimum depth of twelve inches (12") in turfgrass areas and eighteen

inches (18") in shrub/ground cover areas, with ripping tines a maximum 18" apart performed in a minimum of four passes total in different directions (perpendicular and diagonal). The Contractor shall review the completed ripping operation with the Owner's Representative and Landscape Architect to determine compliance. The first 6 inches of any new topsoil fill shall be tilled into the existing soil to a minimum depth of 6 inches prior to placing any further topsoil fill. The Contractor shall provide any additional work as directed by the Owner's Representative after the review to obtain compliance. Do not proceed with the addition of topsoil and/or amendments, or commence rock picking or fine grading until the completed ripping operation is accepted in writing by the Owner's Representative.

C. Planting area soil under the canopy drip line of existing trees, or in planting beds not accessible by motorized equipment, shall be ripped to a minimum depth of 12 inches using manual spading shovels, forks and/or broadforks and working around major tree roots and/or utilities. In areas receiving new mulch, rip to a minimum depth of 4 inches while protecting any existing plants and their root system. Break up and/or remove rocks and clods as indicated below.

D. Do not work soil when moisture content is so great that excessive compaction will occur, or when it is so dry that dust will form in air or clods will not break up readily, or when a full ripping depth cannot be achieved. Apply water, if necessary, to bring soil to an optimum moisture content for tilling and dust control. Maintain within 2 percent above or below optimum moisture content for the existing soil type at all times during the work.

E. After soil ripping and preliminary finish grading is completed, the topsoil shall be cleared of all concrete, wire, sticks, roots, debris and foreign materials. Remove native stones and clods as follows:
   1. In shrub/ground cover areas, remove stones and clods greater than one (1.0) inches in diameter from the top 3 inches of finish grade.
   2. In general, non-traffic turfgrass areas, remove stones and clods greater than three-quarter (0.75) inch in diameter from the top 3 inches of finish grade.
   3. In designated play or sports field turfgrass areas, remove stones and clods greater than one-half (0.50) inch in diameter from the top 4 inches of finish grade using a mobile tractor pulled, PTO powered, hydraulic controlled rock picker, Cherrington Model 4500 or similar.

F. Add clean planting topsoil where needed to bring grade to elevation to promote positive drainage. Spread approved planting topsoil over ripped subgrade prior to incorporating amendments.

G. Backfill all raised grade planters with a minimum depth of 18 inches of imported clean sandy loam planting topsoil conforming to Subsection 2.02 and approved prior to import and/or placement. Failure to obtain import approval prior to backfilling raised grade planters shall result in the removal of any planting and non-approved backfill, and the reinstallation of the work with approved materials.

3.3 WEED CONTROL

A. Weed control pesticides shall only be applied by an individual holding a valid Qualified Applicator Certificate (Category A) issued by the Department of Pesticides Regulation.

B. The Contractor shall treat any weeds in proposed new turfgrass and planting areas with a post-emergent contact weed killer at manufacturer's approved rates prior to any commencement of work at the site including any irrigation work, ripping of soils or fine grading.

C. Weed eradication shall be ongoing throughout the course of the landscape installation. The Contractor shall apply a pre-emergent herbicide after shrub/ground cover planting and prior to mulch installation. Manually remove weed seed heads. At no time will weeds be allowed to become established. Contractor shall provide all weed control operations as directed by the Owner's Representative.

D. All weed control operations using pesticides/herbicides shall comply with the CalDPR and Owner Standards as well as AB2260 "Healthy Schools Act". The Contractor shall comply with the notification and posting requirements of the "Healthy Schools Act".
   1. The Contractor shall notify the Owner per Subsection 1.11, A.
   2. The Contractor shall post highly visible signs around the treatment area in conformance with the "Healthy Schools Act" warning of a scheduled pesticide/herbicide application a minimum of 24 hours before to 72 hours after a pesticide application.

E. A non-selective contact herbicide for grassy weeds, '20% Vinegar Weed Slayer' by Good Natured, CA DPR Reg# 85208-1-AA-42177, shall be applied directly to the weed foliage. Only apply to dry surfaces, and a minimum of 8 hours before a rain event. Allow a minimum of 14 days from herbicide application to commence any planting.

F. Perform pre-plant clearing and weed control for native open ground areas planned to receive planting as follows:
   1. Apply irrigation to encourage weed growth prior to ripping, and to maintain moisture in the soil.
   2. Apply a contact herbicide to weed foliage. Remove weeds and expose bare soil.
   3. Lightly disk/till to a depth of three-inches.
   4. Perform a "grow and kill" operation after the first disking/tillage:
      a. Water and lightly fertilize to encourage weed germination.
      b. Follow with a second application of a contact herbicide.
      c. Remove weeds and perform a light harrowing or disking.
   5. Apply irrigation to encourage weed growth. If additional weeds germinate, perform a second "grow and kill" operation.
   6. Once existing weeds are completely removed, obtain authorization from the Owner's Representative to proceed with deep ripping, rock removal, soil conditioning and finish grading operations. Allow a minimum of 14 days from herbicide application to commence any planting.

G. After the shrub/ground cover planting is complete and prior to mulch installation, apply an approved pre-emergent herbicide per the manufacturer's recommended rates.

3.4 SOIL CONDITIONING

A. Before commencement of any soil conditioning, weed and rock removal shall be completed as outlined above.

B. Uniformly amend the entire area of topsoil in turfgrass and mixed planting areas per the

following bid rates and per the approved modifications as a result of the soils analysis recommendations:

1. Turf and Non-Sloped (less than 4h:1v) Planting Area Soil Conditioning (per 1,000 square feet).
    a. Compost at a rate of six (6.0) cubic yards (a 2.0 inch thick layer).
    b. Gypsum at a rate of 100 pounds, or Sulfur at 19 pounds, or an equivalent combination.
    c. Humate soil conditioner at a rate of thirty (30) pounds.
    d. A pre-planting fertilizer to turfgrass areas at a rate of 1.25 pounds of actual P and K.
    e. A pre-planting fertilizer to mixed planting areas at a rate of 1 pound of actual N.
    f. Endo 120 per Subsection 3.06, Mycorrhizae Application.

C. Till soil amendments into the entire planting area soil to a minimum depth of six (6) inches. Perform the cultivation in at least two passes, one in each perpendicular directions to the first, so that the amendments are homogeneously incorporated into the topsoil. All cultivation inside the dripline of existing trees shall be preformed manually with minimal disturbance to the root system.

D. If the contractor chooses amendments, conditioners, fertilizers and/or other materials that do not meet the specified characteristics, the contractor shall be responsible to obtain from the original sol testing lab recommendations to mitigate the out-of-spec material use. Any and all costs for testing and providing the recommended mitigation measures shall be the responsibility of the contractor without any increase in the project cost or time.

E. Planting backfill for trees and shrubs shall be a mix of three parts native soil and one part Compost by volume. Add Humate at 2.0 pounds and Mycorrhizae at 0.5 pounds per cubic yard of backfill.

F. Amendment material types and application rates may be subject to change based on the findings and recommendations of the horticultural soil testing lab, and as such may result in an increase or decrease in the Contract Amount.

3.5 FINE GRADING

A. Upon completion of soil preparation, fine grade all planting and turfgrass areas to a smooth and even slope conforming to and establishing drainage patterns per the approved Grading Plan. Grading shall eliminate all humps and hollows and promote positive drainage in all planting and turfgrass areas.

B. Where hardscape is installed in existing mixed planting areas, a minimum transition grade width of 2 feet adjacent to the edge of hardscape shall be constructed unless noted otherwise. The maximum slope of any transition grade in mixed planting areas shall be 20 percent (1v:5h). The area of transition grading shall be planted or repaired as specified herein.

C. Tolerance of grade differential for planting and general turfgrass areas shall be plus or minus 0.04 foot. If requested, the Contractor shall water test all turf and planting areas after the grading operations are completed in the presence of the Owner’s Representative and Landscape Architect. The water test shall consist of applying water to the turf and planting

areas to the point where water begins to run over the soil to show the drainage pattern. Make all corrections to the finish grading as required by the Owner's Representative to re-established positive drainage patterns. Acceptance of the finish grading shall be obtained in writing from the Owner's Representative and Landscape Architect prior to proceeding with soil conditioning and planting operations.

D. Turfgrass sports fields shall be fine graded using a laser controlled machine capable of producing final grades within 0.02 foot plus or minus from the proposed elevations. The Contractor shall provide an as-graded topographical survey with finish elevations shot on a 25' grid and along transition edges to confirm that the finish grading complies with the design grades with allowances for sod soil mat thicknesses, etc. The Contractor shall allow seven (7) working days in their contract schedule for the as-graded survey to be evaluated and returned to the Contractor and Owner. Acceptance of the finish grading shall be obtained in writing from the Owner's Representative and/or Landscape Architect prior to proceeding with soil conditioning and planting operations.

E. After the finish grading process, relative compaction of the soil in turf and planting areas shall range between 82% and 85% relative density. Compaction/moisture levels are generally acceptable if an Oakfield probe is able to penetrate a minimum of six inches into the cultivated planting topsoil with moderate pressure. The Owner reserves the right to require the Contractor to test for over compaction. If the compaction is within the acceptable range, the test will be paid for by the Owner. All testing due to non-compliance will be paid for by the Contractor.

F. Remove all rocks produced as a result of the soil conditioning and finish grading operations per the requirements of Subsection 3.02.

G. Finish grades shall be one-half inch (1/2") to three-quarter inch (3/4") for turfgrass sod areas, flush (0.0") for turfgrass seed/stolon areas and two inches (2") for shrub/ground cover planting areas below the finish surface of all adjacent walks, curbs, mowstrips and utility/valve boxes or collars. Transition any non-compliant grade in existing turfgrass areas at a maximum 12h:1v slope to meet finish grades above, unless shown otherwise on the grading plan.

3.6 MYCORRHIZAE APPLICATION

A. In turfgrass planting areas, after fine grading is completed broadcast Mycorrhizae at a rate of one and one half (1.5) pounds per 1,000 square feet (65 lbs. per acre). Lightly rake into the top one inch (1") of topsoil immediately prior to turfgrass installation.

B. In shrub and/or ground cover planting areas, the Mycorrhizae inocculant shall be incorporated into the soil with the other soil amendments at five (5.0) pounds per 1,000 square feet (218 lbs. per acre) per Subsection 3.04, Soil Conditioning. Innocculant shall also be incorporated into the planting backfill per Subsection 3.04, E.

C. In areas receiving turfgrass renovation/aeration, broadcast Humate at a rate of ten (10.0) pounds per 1,000 sf in conjunction with the sand/compost topdress application prior to spreading operation.

D. In existing mixed planting areas where new mulch is to be installed, broadcast and rake Humate into the top 2" of planting soil at a rate of five (5.0 lbs) per 1,000 sf prior to the

new mulch installation.

3.7 PLANTING

A. General Requirements
1. Obtain written approval from the Landscape Architect or Owner's Representative to begin planting operations. The irrigation system shall be fully automated and operational, all weeding, soil conditioning and finish grading completed, and the tree and plant layout approved.
2. Planting shall be performed by workmen familiar with planting procedures and under the supervision of a qualified foreman. The planting foreman shall be on the job site al all times when planting is in progress.
3. Planting operations shall not occur under unfavorable weather conditions.
4. Boxed trees shall be planted first. Shrub planting shall be completed before groundcover is planted.
5. Proceed and complete the landscape work as rapidly as portions of the site become available, working within the seasonal limitations for each kind of planting required.
6. Cooperate with other contractors and trades working in and adjacent to the planting work areas. Examine drawings which show the development of the entire site and become familiar with the scope of other work required.

B. Planting Preparation and Operations
1. Planting material shall be provided with adequate protection of root system and balls from drying winds and sun. Do not bend or bind trees or shrubs in such a manner as to damage bark, break or destroy natural shape. Provide protective covering during delivery.
2. Deliver trees and shrubs after preparations for planting have been completed, and plant immediately. If planting is delayed more than six (6) hours after deliver, set trees and shrubs in shade, protect from weather and mechanical damage and keep roots moist. Do not remove container grown stock from containers until planting time.
3. All planting areas shall be smooth and even. Finish grades shall be done prior to any placement of plants.
4. Place all trees and shrubs in locations shown on the planting plan and obtain written field approval of the Landscape Architect before planting or digging planting pits. Inform the Landscape Architect seven (7) days prior to placing the plants. Maintain a minimum 15 foot clearance from trees to any light pole, unless specifically noted otherwise.
5. Carefully remove all canned stock from containers with tin snips or approved cutter. Cut away and remove any girdled or matted roots.
6. Excavate holes of circular outline with vertical sides for all plants 15 gallon or less. Boxed trees shall have square planting holes. The vertical sides and bottom of the holes shall be thoroughly scarified to promote union of backfill with existing soils. All trees shall have two drainage sump holes drilled with a twelve inch (12") diameter auger penetrating hardpan layers to a minimum one (1) foot into a sand/gravel layer or to a minimum depth of ten (10) feet below the planting pit bottom. Precautions shall be exercised to avoid smooth sides on the holes. Offset augured holes a minimum of eighteen inches (18") from planned tree location to avoid settling of tree after planting.
7. After cleaning out the sump holes, the Contractor shall test the sumps for drainage

by flooding with water. If the water does not drain out within twenty-four (24) hours, auger down as required to achieve such drainage by breaking through the hardpan layer, or by extending the drainage sumps to a minimum depth of 15 feet below the bottom of the planting pit. After obtaining approval of the sump holes, fill the augured drainage sump holes with coarse concrete sand.

8. Tree and shrub planting pits shall be at least two and one half (2.5) times the width of the plant container, but a minimum of 36” wide for trees and 18” wide for container shrubs. Planting pits shall be as deep as the soil depth in the container or box, less the additional height of the crown above the finish grade.
9. Set each plant in the center of the pit, plumb and straight. Set the crown of the plant at one inch (1") for shrubs, two inches (2”) for trees above finish grade. When 1/2 of the backfill mix has been placed, tamp-in, insert fertilizer (BEST PAKS as per Section 2.1B1) and allow no air pockets as remainder of backfill is added.
10. Compact soil around the rootball of all plants and thoroughly water in the entire backfill depth.
11. Excess soil from plant holes shall be cultivated and raked to a smooth outline.
12. Shrubs and groundcovers shall be installed in relation to walks and paving to allow for future growth without obstructing traffic with clearance as shown on the drawings.
13. All plants shall be set in watering basin which shall be as wide as the planting pit, but at least four feet (4') in diameter and four inches (4") deep for trees and two feet (2') in diameter and three inches (3") deep for shrubs and vines.
14. Ground cover plants shall be planted at the spacing noted on the drawings. Not more than fifteen minutes shall elapse from the time any groundcover plant is planted until it is watered.

C. Pruning: Prune plants in accordance with established horticultural practice. Shearing of any plants will not be acceptable. Tree pruning shall only be performed with the written approval of the Landscape Architect and under the direction of a certified arborist, and shall comply with ISA Pruning Standards (ANSI 300).

3.8 MULCH

A. Prior to any mulch application, perform weed control operations as specified herein.

B. Where mulch is to be installed in an existing planting area, breakup/till the existing soil in open areas around existing plantings to a minimum 4” depth per section 3.02, and adjust finish grade adjacent to hardscape elements per section 3.05 where not prohibited by existing plantings.

C. Install a minimum 3” compressed layer of mulch in all non-turf planting areas, except for slopes greater than 3h:1v and seeded areas. Install a minimum 2” compressed layer of mulch in all areas receiving flatted plants.

D. Install a minimum 3” compressed layer of wood mulch at a minimum 3’ radius from the tree trunk of all trees located in turfgrass areas. Provide a smooth finish grade transition to a 2” compressed depth where the mulch meets the turfgrass, so that the top elevation of the mulch is flush to the turfgrass soil. Keep mulch off the trunk. For new trees in turfgrass areas, remove the watering berm just prior to the turfgrass planting but maintain the mulched area within the planting pit.

3.9 STAKING & GUYING

A. Trees shall be supported by two (2) tree stakes as shown on the drawings. Cut off the top of stakes damaged by installation or where the stake conflicts with canopy branches.

B. Stakes shall be set firmly in the ground outside the rootball and where possible set stakes perpendicular to the prevailing northwest wind.

C. Trees shall be tied to upright stakes loosely with tree ties (see planting detail). Remove the nursery stake.

D. Multi-trunked trees shall be guyed, or individual branches may be staked and loosely tied as shown on the Drawings.

3.10 ROOT BARRIER

A. Install root barrier along hardscape edges whenever the distance from the center of the trunk to the hardscape edge is less than eight (8) feet. Install per the planting details and manufacturers recommendations.

3.11 ARBOR GUARD

A. Install ArborGard+ on all newly planted tree trunks in turfgrass areas per manufacturer's recommendations.

3.12 TURFGRASS SOD

A. The area to be planted shall be finish graded to present a smooth and even surface free of humps and hollows and conforming to the finish grading plans. Where new sod is abutting existing turfgrass, fine grade to allow for the thickness of the new sod soil so that the new and existing sod grades are flush. Immediately prior to planting, the surface of the area to be planted shall be sufficiently loose and friable, with adequate moisture to receive the sod. Avoid laying sod on hot or dry soil.

B. Lay first strip of sod slabs along a straight line (use a string in irregular areas). Butt joints tightly. Do not overlap edges. On second strip, stagger head joints (similar to a running bond brick pattern). Use a sharp knife to cut sod in order to fit curves, edges, and sprinkler heads.

C. Install with turf-tired machinery full width sections big roll sod as delivered and flush to adjacent surfaces. Terminating sod edges shall be straight and at right angles to hardscape elements whenever possible.

D. As the sod is being installed, water the sod lightly to prevent drying out. Continue to lay sod and lightly water until installation is complete.

E. After laying sod, roll to eliminate irregularities and to form good contact between sod and soil. Avoid a too heavy roller or excessive initial watering which may cause roller marks.

F. Water the completed lawn surface thoroughly. Topsoil should be constantly moist for a minimum two inches deep. Repeat irrigating at regular intervals to keep sod moist until rooted. The areas shall not be watered to the extent of saturating the soil and causing "flotation" or "flowing" of the top surface of the soil. After water has once been applied, no portion of the planted areas shall be allowed to dry out during the entire maintenance period. After sod roots are established, decrease frequency and increase amount of water per application as necessary to maintain good soil moisture to a minimum 6” depth without standing water or excess runoff. The Contractor shall be responsible to monitor the site and alter the watering times and frequencies to meet site and climatic conditions.

G. Prior to the start of the maintenance period, fill all seam joint gaps greater than 1/8 inch and less than 0.5 inch with washed concrete sand. Fill any joint gaps of 0.5 inch or greater width with a minimum two foot long replacement sod section in order to achieve a tight joint.

H. Replace dead or distressed sod with equivalent material as directed by the Landscape Architect.

I. Do not install turfgrass inside the watering basin of new trees planted in turf areas, or within a 3’ radius of existing tree trunks located in turf areas.

3.13 CLEAN-UP AND REPAIR

A. All areas shall be maintained in a neat and orderly condition at all times. All reasonable precautions shall be taken to avoid damage to existing planting and structures. Disturbed and/or damaged areas, whether a part of this work or from the work of other trades, shall be restored to their original condition.

B. Plants and/or turfgrass shown to remain and damaged or removed by construction operations and/or utility/electrical/drainage lines shall be replaced with plants that match as closely as possible to the existing plant species, variety and size. The replacement turfgrass sod variety shall be the same as shown in the Planting Legend if for new work, or shall match the existing turfgrass variety where the turfgrass is existing. Adjust the finish grade so that the new turfgrass sod abuts flush to the existing turfgrass or to hardscape. The replacement plants and/or turfgrass sod shall be maintained as part of the original scope of work.

C. After the planting operations are completed, the Contractor shall remove all trash, excess soil, empty containers or any other debris accumulated by the work from the site. All damage caused by the work shall be repaired at the Contractor's expense and the site shall be left in a neat and orderly condition to the satisfaction of the Owner.

3.14 PRE-MAINTENANCE REVIEW

A. A general review will be held prior to the start of the maintenance period upon conclusion of the planting operations, irrigation system installation and after clean-up has occurred. The Owner’s Representative shall be informed in writing a minimum of seven (7) working days prior to the time the work is ready for review in order to arrange a suitable time and date for such review.

B. At the time of review, Contractor shall have all planting areas free of weeds and neatly cultivated and fine graded. All plant basins shall be in good repair. All trees shall be properly staked and tied. All planting areas shall be clear of weeds.

C. The establishment of turfgrass is herein defined as being all work necessary to grow a full, healthy, uniform stand of smooth and even texture and grade with clean straight edges without weeds, distressed areas or bare spots, and has been mowed at least twice per the specifications. The establishment of turfgrass is further defined as being all work necessary to develop a minimum rooting depth of 2 inches into site soil for a majority of the profile sample section.

D. Work requiring corrective action or replacement in the judgment of the Owner's Representative shall be performed within five (5) days after the inspection. Corrective work and materials replacement shall be in accordance with the drawings and specifications and shall be made by the Contractor at no cost to the Owner. A subsequent review shall then be arranged.

E. If after the review, the Landscape Architect is of the opinion that all the work has been performed as per the Contract Documents, and a uniform stand of healthy dense turfgrass has been established without weeds or bare spots, the Contractor will be given written notice that the maintenance period may begin.

3.15 MAINTENANCE - GENERAL

A. After all work indicated on the drawings or herein specified has been completed, reviewed, and approved, and the turfgrass has been successfully established per the requirements below, the Contractor shall commence a sixty (60) calendar day maintenance period in which the Contractor shall continuously maintain all areas included in the contract during the progress of the work and throughout the maintenance period, or until Final Acceptance of the project, whichever is greater.

B. Establishment and maintenance work includes monitoring the site to control all watering, replanting, fertilizing, mulching, weeding, cultivating and mowing necessary to bring the planted areas to a healthy and vigorous growing condition, and any additional work needed to keep the areas neat, edged, weed and trash free, and attractive.

C. All trees, shrubs, ground cover shall be kept at optimum growing condition by watering weeding, replanting, fertilizing, cultivating, tree stake repair, spraying for diseases and insects, replace dead or dying materials, pruning as directed, maintaining proper grades of plants, and providing any other reasonable operations of maintenance and protection required for successful completion of the project.

D. Any date when the Contractor fails to adequately water, replace unsuitable planted areas and other work determined to be necessary by the Owner, will **NOT** be credited as part of the establishment/maintenance period.

E. No additional payment will be made for additional time necessary for turfgrass establishment. The maintenance period shall not start until all contract work has been completed and all close-out documents and materials have been submitted. Turfgrass will be considered weed-free if there is a maximum of one percent undesirable turfgrass species, and nine weeds or less per 50 square yards (one per 50 square feet).

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F. During the progress of the maintenance period, the Contractor and the Owner's Representative shall conduct reviews at no more than 21 day intervals to determine that ongoing maintenance activities have been conducted by the Contractor. If in the opinion of the Owner, ongoing maintenance has not been conducted by the Contractor in a satisfactory manner the maintenance period shall be suspended. The Contractor shall provide remedial work as directed by the Owner's Representative to correct the found deficiencies and schedule another review. If after the subsequent review the work is deemed acceptable, the maintenance period shall resume.

3.16 MAINTENANCE – MOWING AND DRESSING

A. For new sod, mow when 1.4 inch tall and cut down to 1.0 inch.

B. Turfgrass areas shall be mowed during the growing season a minimum of twice a week for warm-season varieties and a minimum of once a week for cool-season varieties, or at any time the grass reaches 1.4 times its mowing height. Turfgrass shall be edged weekly. The Contractor shall coordinate his watering and weed control schedules to accommodate his mowing schedule. If the Contractor is unable to mow the turf areas on the required day, he has until 5:00 pm of the next day to do the work. After that time, the Owner reserves the right to secure the services of an alternate mowing entity to perform the work. The cost for the alternate mowing will be deducted from monies owed to the Contractor. The Contractor will remain responsible to perform all scheduled mowings and maintenance of the site. The turfgrass shall be mowed and edged, and all trash and debris removed prior to Final Acceptance.

3.17 MAINTENANCE - FERTILIZATION

A. The Contractor shall fertilize the warm-season turfgrass (Bermudagrass) at the start of the maintenance period and every twenty-eight (28) days with the turfgrass maintenance fertilizer at a rate of 1.5 lb. of actual N, and/or P and/or K /1,000 s.f. and as modified by the soil fertility recommendations and as directed by the Landscape Architect. The Contractor shall allow for at least three separate fertilizer formulation applications in each fertilization operation. The Contractor shall continue the fertilizer applications until the established turf is accepted.

B. The Contractor shall fertilize the temporary cool-season turfgrass at the start of the maintenance period every twenty-eight (28) days with the turfgrass maintenance fertilizer at a rate of 1.0 lb. of actual N, and/or P and/or K /1,000 s.f. and as modified by the soil fertility recommendations and as directed by the Landscape Architect. The Contractor shall allow for at least three separate fertilizer formulation applications in each fertilization operation. The Contractor shall continue the fertilizer applications until the established temporary turf is accepted.

C. The Contractor shall fertilize the turfgrass areas during the last week of the maintenance period with the turfgrass maintenance slow-release N fertilizer (43-0-0) at a rate of three and one-half (3.5) lbs./1,000 s.f. and as modified by the soil fertility recommendations and as directed by the Landscape Architect. The Contractor shall allow for at least three separate fertilizer formulation applications in each fertilization operation.

D. The Contractor shall fertilize the non-turf planted areas during the last week of the

maintenance period with the mixed pre-planting fertilizer (14-6-11.6) at a rate of six (6.0) lbs./1,000 s.f. and as modified by the soil fertility recommendations and approved by the Landscape Architect. The Contractor shall allow for at least three separate fertilizer formulation applications in each fertilization operation.

3.18 MAINTENANCE – REPAIR AND WEEDING

A. Between the twenty-first (21) day and the twenty-eigth (28) day after turfgrass planting, the Contractor shall perform the following: replant all spots or areas where normal germination or growth is not evident; remove all rocks or other debris that would constitute a hindrance to mowing or cultivating; repair all damage done by his operations. Where poorly compacted trench backfill shows settlement, remove turfgrass or plants, fill all depressions and eroded channels with sufficient conditioned topsoil to raise to proper grade, compact lightly and replant the filled areas. Roll all planted or replanted turfgrass areas with a lightly weighted turf roller in order to provide a smooth and even mowing surface.

B. Visible weeds shall be removed at least weekly during the maintenance period. At the end of the maintenance period, all planting areas shall be without weeds. If weeds are present, the Contractor shall manually remove the weeds and shall then apply a granular, selective pre-emergent herbicide at manufacturer's approved rates. Coordinate application with the Owner’s Representative and provide certificates of application to Owner’s Representative. The turfgrass will be considered weed-free if there are 9 weeds or less per 50 square yards (one per 50 square feet).

3.19 FINAL REVIEW

A. A Final Review will not be scheduled until all Close-out Documents and materials have been submitted and accepted.

B. A Final Review will be performed before the end of the Maintenance Period or upon the pending Final Acceptance of the work, whichever is earlier, provided all deficiencies revealed during the maintenance period have been corrected. If deficiencies have not been corrected by the end of the stated maintenance period, the Contractor shall continue to fully maintain the project at his own expense. After all deficiencies have been corrected, a Final Review will be held with the Landscape Architect, Owner’s Representative, and Contractor.

C. Final Acceptance of turfgrass is contingent on a weed free, healthy uniform stand without dead, bare or distressed areas with a minimum rooting depth of five (5) inches into site soil.

D. If after the Final Review, the Landscape Architect and Owner’s Representative are of the opinion that the work is acceptable and complete, the Contractor’s maintenance responsibility shall terminate on an agreed upon date.

3.20 WARRANTY AND REPLACEMENT

A. All trees and plants provided under this Contract shall be guaranteed to be in good, healthy, disease/pest free and in a flourishing condition one growing year from the date of Final

Acceptance of the work, provided the Owner maintains the plants properly and in accordance with accepted horticultural practices. Species and size of any tree and/or plant replacements, either prior to or after Final Acceptance, shall be equal to that of the same adjacent trees and/or plants at the time of replacement as determined by the Landscape Architect.

B. The Contractor shall be responsible to replace all lost plants due to theft, vandalism or any other preventable causes till Final Acceptance of the work by the Owner. Replacement trees and plants shall be planted as originally specified and detailed. Replacement trees and plants shall be guaranteed as specified above from the date of replacement. The maintenance period may be extended for a duration of not more than the original maintenance period duration for the establishment of replacement plants.

C. The Contractor shall be held responsible for repair and/or replacement of damages to new or existing improvements resulting from the defects or actions of trees, plants, materials, equipment or workmanship one year from the date of Final Acceptance or the Notice of Completion, whichever is later.

END OF SECTION

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SECTION 33 40 00 - STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This section includes the following:

1. Provide all materials, labor, equipment and services necessary to furnish and install Storm Drainage System, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.

B. RELATED SECTIONS

1. Contract General Conditions and Division 1 Specifications.
2. Section 31 11 00 – Site Clearing
3. Section 31 20 00 – Earthwork: Excavation, Filling, and Grading
4. Section 31 22 22 – Soil Materials
5. Section 31 23 33 – Trench Excavation and Backfilling
6. Section 32 13 13 – Site Concrete Improvements

1.3 REFERENCES

A. ANSI/ASTM C76 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

B. ANSI/ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

C. ANSI/ASTM C478 - Precast Reinforced Concrete Manhole Sections.

D. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

1.4 DEFINITIONS

A. Bedding: Fill placed under, around, beside and directly over pipe, prior to subsequent backfill operations.

B. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.5 SUBMITTALS

A. Submit under provisions of Division 01.

B. Certificates of compliance for material.

C. Product Data: Provide data indicating pipe, accessories, and associated equipment to be furnished.

D. Submit manufacturer's data and/or fabrication drawings for all pipes, and appurtenances installed under this Section. No items shall be incorporated into the work until submittals are approved by the Architect/Engineer

1.6 COORDINATION

A. Coordinate work with Owner’s personnel.

B. Verify that the location of existing utilities have been indicated at work site by utility authorities and Owner’s personnel.

C. Coordinate work with other project work.

1.7 EXISTING UTILITIES

A. The Engineer has made a diligent attempt to indicate on the plans the location of all main and trunkline utility facilities which may affect the Work. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

B. Service laterals and appurtenances have also been shown where information was available as to their location. In most cases, however, the only available information relative to the existing location of said facilities was small scale undimensioned plats. The location of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.

C. At new work location, expose by hand methods all existing utilities along the route of the new work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand methods to locate all existing facilities as indicated on the plans, and as indicated at the work site by Owner’s personnel.

D. Maintain all existing utility mains and service lines in constant service during construction of the Work

1.8 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 01.

B. Accurately record actual locations of utilities encountered.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforced Concrete Pipe for pipe larger than fifteen (15) inches: ANSI/ASTM C76, Class 3, with rubber gasket joints per ANSI/ASTM C443.

B. Storm drainage sewer pipeline shall be polyvinyl chloride (PVC) pipe for storm sewer conforming to ASTM designation 3034, SDR 35, with elastomeric gasket joints per ASTM D 3212 for pipe fifteen (15) inches or less.

C. Storm drainage pipeline shall be polyvinyl chloride (PVC) pipe for storm sewer conforming to ASTM D1785, Schedule 40, for pipe three (3) inches or less.

D. Poured in Place Concrete: Specification Section SITE CONCRETE IMPROVEMENTS.

E. Mortar: Composed of one part, by weight, portland cement (Type II low alkali per ASTM C150), 2 parts, by weight, sand, and water.

F. Manhole Frames, Covers and Grates: Cast Iron per ASTM A48, Class 25.

G. Soil Fill for Concrete Pipe Bedding Envelope: Specification Section TRENCH EXCAVATION AND BACKFILL.

H. Catch basins and drain inlets shall be constructed as per detail drawing.

I. Concrete collar shall be constructed as per detail drawing.

J. Cleanout shall be precast concrete with cast iron lid marked for service Christy G5 or approved equal and constructed as per detail drawing.

K. All metallic pipe, fittings and appurtenances in contact with soil shall be coated or wrapped with an approved material, as required to protect it from corrosive soil.

L. Locator Tape: Tape shall be an inert material such as polyethylene plastic with a metallic core, and highly resistant to alkalis, acids, or other chemical components likely to be encountered in soils. The tape shall be bright colors for contrast with the soils with identifying print in black letters. The tape shall be six inches wide and be printed “CAUTION – STORM SEWER LINE BELOW”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

3.2 PREPARATION

A. Identify location of proposed storm drainage facilities to be constructed. Expose connection points to existing system.

B. Locate, identify, and protect existing above and below grade utilities from damage.

C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.

D. Protect existing structures and other improvements to remain from damage from excavation equipment and vehicular traffic.

E. Employ equipment and methods appropriate to the work site.

F. Protect excavated areas from drainage inflow, and provide drainage to all excavated areas. Dewater existing drainage basins and existing drainage pipeline systems as necessary to accomplish the work.

G. Comply with safety requirements as they pertain to excavations, per Specification Section EARTHWORK.

H. Remove all interfering surface and subsurface improvements authorized for removal.

3.3 EXCAVATION

A. Excavate soil required to locate existing utilities and install the work.

B. Excavate trenches and pits per Specification Section EARTHWORK.

C. Excavate trenches and pits to allow installation and construction of the storm drainage facilities to the alignment, grades, depths and cross-sections as indicated on the construction plans.

D. Excavate trench to depth which is 6 inches below the outside bottom of the pipe barrel to be placed therein.

E. Cut trenches just wide enough to allow the installation of the pipe and pipe bedding as indicated on the plans. Minimize trench width above the pipe.

F. Provide protection to public per Division 01.

3.4 INSTALLATION AND BEDDING OF STORM DRAIN PIPE

A. Install the pipe and fittings to the lines and grades shown on the construction plans.

B. Install pipe and fittings in accordance with the manufacturer's recommendations, and these specifications.

C. Unless otherwise approved by the Engineer, lay all pipe upgrade from structure to structure, with bell or socket ends of pipe upgrade.

D. Excavate suitable bell (or socket) holes in the bedding material, so that the bells do not bear on the subgrade or bedding. Provide uniform bearing of pipe barrel on bedding material.

E. Ensure that all joints are properly "homed" and are watertight.

F. Bed pipe in sandfill and compact to a minimum of 90% relative compaction. Place and compact the bedding material under, around and over the pipe, filling the trench cavity and extending from the bottom of the trench (6 inches below the outside bottom of the pipe barrel) to a level 12 inches above the outside top of the pipe barrel.

3.5 INSTALLATION OF STORM DRAINAGE STRUCTURES AND APPURTANCANCES

A. Install storm drainage structures as indicated on the construction plans, in accordance with the manufacturer's recommendations, and as specified herein.

B. Construct poured-in-place concrete per Specification Section SITE CONCRETE IMPROVEMENTS.

C. Key top of poured-in-place concrete bases for structures to receive the tongue of precast riser sections.

D. Construct cleanout, outfall structure per detail drawing.

3.6 BACKFILLING TO FINISHED GRADE AND FINISHED GRADING

A. Place and compact backfill per Specification Section TRENCH EXCAVATION AND BACKFILL.

B. Conform finished surface to the lines, grades and cross-sections shown on the plans, or as otherwise directed by the Inspector.

C. In areas to receive paving or a significant thickness of sealing material, temporarily set manhole frame and cover below finish grade, then return after final surfacing and/or pavement sealing and bring manhole frame and cover to final grade, as shown on the plans.

D. Fine grade all finished soil surfaces disturbed to the lines, grades and cross-sections shown on the plans.

E. Rake and smooth all finished dirt surfaces.

3.7 TOLERANCES

A. Pipe laying tolerances:
   1. Above grade: Not to exceed 1/4-inch above planned grade.
   2. Below grade: Not to exceed 1/2-inch below planned grade.
   3. Alignment: Not to exceed 2 inches from planned alignment, if gradual and regular over a distance of 20 feet.

B. Structure finish grade tolerance: Within 1/4 inch of planned grade, but must match adjacent improvements.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Division 01.

B. Compaction testing of bedding and backfill will be performed in accordance with ASTM D 1557.

C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest at no additional cost to Owner.

END OF SECTION

APPENDIX A

FACS
Forensic Analytical Consulting Services

August 14, 2025

Hazardous Building Materials Survey Report

Sierra Elementary School / Professional Development Center
1730 East Brookdale Drive
Merced, CA 95340

Prepared for:

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FACS Project #PJ87706

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Appendix B: Lead Paint Chip Summary, Sample Chain-of-Custody, Laboratory Results Report, XRF Testing Data and CDPH 8552 Form

Appendix C: Site Photos and Sample Location Drawing

Appendix D: Certifications of Personnel and Laboratories

List of Acronyms

AAS	Atomic Absorption Spectroscopy
ACBM	Asbestos-Containing Building Material
ACCM	Asbestos-Containing Construction Material
ACM	Asbestos-Containing Material
AHERA	Asbestos Hazard Emergency Response Act
AIHA	American Industrial Hygiene Association
CAC	California - Certified Asbestos Consultant
Cal/OSHA	California Occupational Safety and Health Association
CCR	Code of California Regulations
CFR	Code of Federal Regulation
CSST	California – Certified Site Surveillance Technician
DOSH	Department of Occupational Safety and Health
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency (EPA)
FACS	Forensic Analytical Consulting Services, Inc.
ICP	Inductively Coupled Plasma
LCP	Lead-Containing Paint
LBP	Lead-Based Paint
ND	None Detected
NESHAP	National Emissions Standard Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Science and Technology
NVLAP	National Voluntary Laboratory Accreditation Program
PCM	Phase Contrast Microscopy
PLM	Polarized Light Microscopy
SGS	SGS - Forensic Laboratories
TEM	Transmission Electron Microscopy
TTLC	Total Threshold Limit Concentration
XRF	X-Ray Fluorescence Spectrum Analyzer
<	Less Than Reporting Limit

Executive Summary

Forensic Analytical Consulting Services, Inc. (FACS) was retained by Merced City School District to perform an asbestos and lead paint survey at Sierra Elementary School / Professional Development Center, located at 1730 East Brookdale Drive in Merced, California. The survey included any suspect asbestos-containing materials (ACM) and suspect paints and coatings which may be disturbed during the planned renovation project. A summary list of suspect asbestos-containing materials which were identified and sampled is included in Appendix A of this report. A table reporting suspect lead-containing paints or coatings which were identified and sampled is included in Appendix B of this report. The survey was performed on July 30, 2025.

Asbestos

The following suspect material was sampled during this survey and identified to **contain** asbestos by laboratory analysis:

- **12” VFT & Mastic – Beige Streaks – Trace Chrysotile in Mastic (must handle as more than 1%)**

The following suspect materials were sampled during this survey and identified to **not contain** asbestos by laboratory analysis:

- **Carpet & Mastic – Blue/Purple Multi**
- **4” Baseboard & Mastic – Grey**
- **Tackboard over Drywall**
- **12” ACT – Pinhole Fissure**
- **Drywall – Orange Peel Texture**
- **2” Ceramic Tile & Grout – Brown**
- **4” Ceramic Tile & Grout – White/Grey**
- **12” VFT & Mastic – White/Grey Oatmeal**
- **4” Baseboard & Mastic – Blue**
- **2x4 FCP – Pinhole Fissure**
- **4” Baseboard & Mastic – Brown**
- **Concrete**

Please see Appendix A for a complete listing of materials sampled at the work areas and results from this survey. Any suspect materials not included must be assumed to be asbestos-containing materials until tested and proven not to contain asbestos.

Lead

The following paints/coatings did not contain detectable concentrations of lead above the laboratory’s reporting limit:

- **White Paint on Wood Doors**
- **White Paint on Drywall Walls**
- **Blue Paint on Drywall Walls**
- **Ceramic Tiles – Brown**

All other paints contained detectable concentrations of lead by XRF analysis.

Please see Appendix B for a complete listing of paints / coatings samples at the work areas and results from this survey. Any paints not included in the survey, or paints with results of 0.00 mg/cm² by XRF analysis without confirming representative laboratory result, must be handled as lead-containing unless sampled and proven otherwise.

FACS recommends that the results of this report be incorporated into any renovation plans provided for this project for informational purposes.

Introduction

Forensic Analytical Consulting Services, Inc. (FACS) was retained by Merced City School District to perform an asbestos and lead paint survey at Sierra Elementary School / Professional Development Center, located at 1730 East Brookdale Drive in Merced, California. The survey included any suspect asbestos-containing materials (ACM) and suspect paints and coatings which may be disturbed during the planned renovation project. The survey was performed on July 30, 2025.

Scope of Work

The purpose of this survey was to identify asbestos-containing materials (ACMs) and lead-containing paints and coatings which may be disturbed during the upcoming project. The visual inspection, bulk sampling, and survey documentation were performed by Trevor Leitz. Mr. Leitz is a Division of Occupational Safety and Health (DOSH) Certified Site Surveillance Technician (CSST #19-6682) and a California Department of Public Health (CDPH) Certified Lead Sampling Technician (LRC-00003432). All work was completed under the supervision and direction of Chris Chipponeri, who is a DOSH Certified Asbestos Consultant (CAC #10-4633) and CDPH Certified Lead Inspector/Assessor (LRC-00000782), as required under California regulations. The scope of the survey and the services provided by FACS included:

- Performing a visual inspection of the project area to identify accessible suspect asbestos-containing materials (ACMs) and lead-containing paints and coatings that will be disturbed during the planned project;
- Collection of bulk material samples for asbestos laboratory analysis by polarized light microscopy (PLM);
- Performance of a lead paint survey using a SciAps x-ray fluorescence (XRF) spectrum analyzer;
- Collection of bulk paint chip samples for lead laboratory analysis using atomic absorption spectrometry (AAS);
- Ensuring the technical quality of all work by using Asbestos Hazard Emergency Response Act (AHERA) accredited Building Inspectors;
- Ensuring the technical quality of all work by using California Department of Public Health (CDPH) Certified Lead Sampling Technicians and Inspector/Assessors; and
- Consolidating data and findings into a report format.

Site Characterization

The Sierra Elementary School is a relatively modern structure constructed using standard commercial building materials. The interior finishes throughout the building include vinyl floor tile and carpet floorings, vinyl baseboards, drywall walls and ceiling finishes and associated construction mastics for the applicable materials. These materials are typical for facilities of this type and age and were observed in good condition at the time of inspection, unless otherwise noted in this report.

Survey Methods

Document Review

No previous documentation was reviewed prior to the inspection. The extent of the planned renovation project was provided by Merced City School District.

Visual Inspection

Accessible building materials were visually inspected using the methods presented in the Federal AHERA regulations (40 CFR, Part 763). AHERA inspection methodology is required to be used for inspections of K-12 schools and is generally accepted as the industry standard for all ACM inspections regardless of structure or facility type. Suspect ACMs were also physically assessed for friability, condition and possible disturbance factors.

All areas were accessible during this inspection.

Asbestos Inspection

Bulk Sample Collection

Bulk samples of identified homogeneous materials were collected in building areas that may be impacted by the planned renovation/demolition activities. Samples were collected of each separate homogeneous area. A homogeneous area is defined as a surfacing material, thermal system insulation, or miscellaneous material that is uniform in use, color and texture. Examples of homogeneous areas could include:

Vinyl floor tiles
False ceiling panels
Drywall with joint compound
Vinyl sheet flooring

The specific number of samples collected was determined by using the methods required by the Federal AHERA regulations (40 CFR, Part 763.86) as noted below:

1) For Surfacing Material:
   1,000 ft^2 or less - collect 3 samples
   1,001 to 5,000 ft^2 - collect 5 samples
   5,001 ft^2 or greater - collect 7 samples

2) For Thermal System Insulation:
   “In a randomly distributed manner” - collect 3 samples
   6 linear feet of patching or less - collect 1 sample
   cementitious pipe fittings - “In a manner sufficient to determine”

3) For all Miscellaneous Material:
   Collect samples "In a manner sufficient to determine whether material is ACM (asbestos-containing material) or not ACM..."

The suspect ACMs were sampled using a knife, chisel, scraper, drill or other similar coring device suitable to the type of material sampled to cut through its entire thickness and to ensure that a cross-section of the material was obtained. The material was then placed in an appropriately labeled container

that was sealed and submitted to SGS-Forensic Laboratories for analysis. A unique sample number (e.g. PJ87706-01A) was assigned to each sample.

Bulk samples will be retained by the laboratory for one month unless otherwise instructed. After this period, the samples will be disposed of appropriately.

Bulk Sample Analysis

A total of thirty-one (31) bulk samples were collected from a total of thirteen (13) suspect materials. Bulk samples were analyzed by SGS-Forensic Laboratories (SGS) in Hayward, California. SGS is accredited by the California Department of Public Health (CDPH) Environmental Laboratory Accreditation Program (ELAP) and the National Institute of Science and Technology's (NIST) National Voluntary Laboratory Accreditation Program (NVLAP). SGS participates in the National Institute for Occupational Safety and Health (NIOSH) Proficiency Analytical Testing Program and has substantial experience in the analysis of asbestos.

All samples were analyzed using Polarized Light Microscopy with Dispersion Staining (PLM/DS) techniques in accordance with the methodology approved by the U.S. Environmental Protection Agency (EPA). The percentage of asbestos present in the samples was determined on the basis of a visual area estimation. The EPA defines asbestos-containing materials (ACM) as any material containing more than one percent (1%) asbestos as determined using the method specified in Appendix A, Subpart F, 40 CFR Part 763, Section 1, Polarized Light Microscopy (PLM). 40 CFR Part 763 identifies the lower limit of reliable quantification for asbestos using the PLM method as approximately one percent (1%) by volume. Regulations in California (CAL/OSHA Title 8 CCR 1529) define asbestos-containing construction materials (ACCM) as those materials having asbestos content of greater than one tenth of one percent (> 0.1%); therefore, for the purpose of this survey, any amount of asbestos detected will be considered positive. In addition to the percentages, the types of asbestos minerals are also reported. The PLM method is the standard method used to analyze asbestos bulk samples.

When "None Detected" (ND) appears in the laboratory results, it should be interpreted as meaning asbestos was not observed in the sample material.

Lead Inspection

The client-defined lead inspection was conducted in accordance with the CDPH Lead-Related Construction Program and modeled upon the sampling protocol described in “Chapter 7: Lead Based Paint Inspection” of the HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (1997 Revision).

Cal/OSHA, in Title 8 California Code of Regulations (CCR) Section 1532.1, Lead in Construction Standard which implements California Labor Code 8716-6717, regulates all construction work where an employee may be occupationally exposed to lead. Paint or materials with any detectable level of lead is considered lead-containing by Cal/OSHA.

XRF Testing Methodology

Surfaces and components were surveyed for lead content utilizing a portable X-ray fluorescence (XRF) analyzer, SciAps X-550Pb, serial number 01149. The XRF analyzer contains a battery-powered x-ray cathode source which bombards tested surfaces with X-rays and gamma rays. This external energy source excites any lead atoms within the tested paint or coating, causing their atoms to emit X-ray photons with a characteristic energy profile. The instrument analyzes the emitted energy to identify and quantify the amount of lead in the tested paint or coating, with lead content reported in milligrams per square centimeter.

Testing combinations of homogeneous components in one area are representative of similar components found in other areas with similar construction and painting histories. During this survey, the inspector visually identified the painted or coated component to test, an XRF reading was collected, and the reading was documented in the XRF data table contained in Appendix B. For each test reading, the data table identifies the room equivalent/space designation, the tested component name, the substrate material, the sample location, paint/coating color, condition assessment, and the XRF result expressed as lead content by weight in milligrams per square centimeter (mg/cm^2).

Bulk Sampling Methodology

During this inspection, FACS personnel collected four (4) bulk paint chip samples for laboratory confirmation of lead-content. Each sample was scraped from the substrate it had been applied to using a knife or chisel to obtain sufficient material for analysis. Each sample was given a unique marker number, identified on a chain-of-custody, packaged, and sent via FedEx to SGS in Hayward, California for analysis. SGS is accredited by the American Industrial Hygiene Association's Environmental Lead Laboratory Accreditation Program for the analysis of lead in bulk paint chips by flame atomic absorption.

Regulations

Background

Asbestos is the name of a class of magnesium-silicate minerals that occur in fibrous form. Minerals that are included in this group are chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos. Although the chrysotile minerals are the most common type of asbestos found in the construction industry, all types of asbestos are regulated in the same manner. Asbestos has been used in more than 3,000 different building materials. Asbestos was added to building materials to: increase fire-resistance, insulate against heat, cold and sound, resist corrosion, and increase tensile strength. Common building materials that may contain asbestos include but are not limited to the following: floor tile, resilient sheet flooring, ceiling tile, mastics, roofing materials, fireproofing, acoustical treatments, wallboard, pipe and boiler insulations. Adverse health effects have been associated with the inhalation of airborne asbestos. However, asbestos fibers that are tightly bound in the building material, may not represent an exposure hazard, unless disturbed in such a way that releases airborne fibers (i.e., cutting, drilling, sanding, and other abrasive methods).

Building Surveys

The following is a summary of some current Federal and California State regulations which contain requirements related to the performance of building surveys for asbestos. These summaries are not intended to be all inclusive and do not contain every aspect of the regulations discussed.

U.S. EPA National Emission Standard for Hazardous Air Pollutants (NESHAPs), 40 CFR Part 61

Under the NESHAPs regulation, no visible emissions are allowed during building demolition or renovation activities which involve regulated asbestos-containing materials. For this reason, all buildings must be surveyed for asbestos-containing materials prior to demolition or renovation. The EPA, CARB, and/or the local Air Quality Management District which implements EPA actions, must be notified prior to any building demolition even if no asbestos-containing materials are present. Regulated asbestos-containing material (RACM) is defined as a) any friable material with an asbestos content of greater than one percent, or b) any non-friable material with asbestos content of greater than one percent that will, or could, become friable.

Asbestos Hazard Emergency Response Act (AHERA), 40 CFR Part 763, Subpart E

AHERA requires performance of asbestos surveys and the development of Asbestos Management Plans for all primary and secondary schools in the United States. Although this regulation applies to primary and secondary schools only, the procedures mandated under AHERA are considered the industry standard and are applied to all surveys performed by FACS unless otherwise specified by the building owner.

Worker Protection

California Assembly Bill AB3713, Health and Safety Code Division 20, Chapter 10.4, Section 25915-25924

The state of California has enacted legislation that requires building owners, employers, lessees, etc. to notify tenants, employees and contractors of the presence of asbestos in both friable and non-friable forms. In addition, preventive maintenance activities must be developed and communicated to these parties. Notification is required 15 days after the identification of ACM in the building, and annually thereafter.

Occupational Safety and Health Administration (OSHA) 29 CFR 1926.1101 and 8 CCR 1529

The Federal and State Occupational Safety and Health Administrations (OSHA) require employers to implement specific work practices which protect workers from airborne asbestos exposure.

Building materials which contain even low levels of asbestos (<1%) can potentially generate significant concentrations of airborne asbestos fibers when disturbed. Therefore, control measures should be instituted which adequately address worker health and safety during planned renovation or demolition activities involving these materials. Cal/OSHA defines asbestos-containing construction materials as those materials having greater than one tenth of one percent asbestos (>0.1%). As stated previously, there is currently no viable method to accurately quantify asbestos at this level.

Hazardous Waste

Building materials reported to contain less than one percent (<1%) of asbestos are not considered hazardous by the U.S. EPA, and hence, may not require removal and disposal prior to demolition or renovation. Regulations may vary, however, between regional air quality management districts and/or other state agencies responsible for implementing EPA's rules. Therefore, local agencies should be contacted for specific ACM definitions and handling requirements. Cal/OSHA may also require special packaging and labeling on containers with asbestos-containing construction materials.

Composite sampling, which may potentially reduce the total asbestos content of the material, is only permitted when sampling joint compound, tape, and gypsum wallboard according to EPA’s Asbestos NESHAP Clarification Regarding Analysis of Multi-Layered Systems (40 CFR Part 61 FRL-4821-7).

Lead

Cal/OSHA Lead (8 CCR 1532.1) & CDPH (Title 17)

If paints or coatings containing any detectable concentration of lead will be impacted, a project should be considered regulated by Cal/OSHA as lead-related construction (8 CCR 1532.1).

A contractor who has employees that may be occupationally exposed to lead during a project must perform an initial determination regarding worker exposures to lead, which may be based on personal air

monitoring at the start of the project or prior employee monitoring from the past 12 months under workplace conditions closely resembling the current project, that demonstrates exposures will not exceed the Cal/OSHA action level (2 micrograms per cubic meter of air). It is the contractor's responsibility to conduct their initial determination and comply with any relevant Cal/OSHA requirements.

Workers disturbing existing paints or coatings during a project must have lead awareness or action level training, depending on the initial exposure determination. Workers that will disturb paints with detectable concentrations of lead must use lead-safe work practices regardless of results of any exposure monitoring data. Disturbance of lead-containing paints or coatings must be performed within a contained area to prevent the spread and build-up of lead dust in order to comply with CDPH requirements. HEPA vacuums, dustless tools or shrouds, and/or intact removal of components should be employed to minimize lead dust generation and properly cleanup work areas following disturbance to lead-containing materials during a project. Waste generated during disturbance to lead-containing materials must be profiled in a hazardous waste determination to ascertain proper disposal requirements.

If the initial determination or initial exposure monitoring shows that workers impacting lead can be expected to be, or are shown to be, exposed to lead above 50 micrograms per cubic meter of air, workers and supervisors must have the requisite training and CDPH lead worker or supervisor certification.

The Cal/OSHA regulation was recently revised and additional requirements must be met by employers with employees that disturb lead paint. Any contractor / employer that may require workers to disturb lead-containing paints found with the project area should ensure that they are familiar and in compliance with the new revisions to the regulation.

Findings and Recommendations

Forensic Analytical Consulting Services, Inc. (FACS) was retained by Merced City School District to perform an asbestos and lead paint survey at Sierra Elementary School / Professional Development Center, located at 1730 East Brookdale Drive in Merced, California.

Asbestos

The following suspect materials were sampled during this survey and identified to **contain** asbestos by laboratory analysis:

- **12" VFT & Mastic – Beige Streaks – Trace Chrysotile in Mastic (must handle as more than 1%)**

The following suspect materials were sampled during this survey and identified to **not contain** asbestos by laboratory analysis:

- **Carpet & Mastic – Blue/Purple Multi**
- **4" Baseboard & Mastic – Grey**
- **Tackboard over Drywall**
- **12" ACT – Pinhole Fissure**
- **Drywall – Orange Peel Texture**
- **2" Ceramic Tile & Grout – Brown**
- **4" Ceramic Tile & Grout – White/Grey**
- **12" VFT & Mastic – White/Grey Oatmeal**
- **4" Baseboard & Mastic – Blue**
- **2x4 FCP – Pinhole Fissure**
- **4" Baseboard & Mastic – Brown**
- **Concrete**

Please see Appendix A for a complete listing of materials sampled at the work areas and results from this survey. Any suspect materials not included must be assumed to be asbestos-containing materials until tested and proven not to contain asbestos.

The presence of asbestos-containing building materials at K-12 school sites require additional steps to be taken as part of any renovation activities. This includes for response actions, which includes removal of asbestos-containing building materials, the project be designed by an AHERA Project Designer to ensure all requirements are met by the selected abatement contractor to protect site staff and students. At the conclusion of abatement, clearance air monitoring must be performed prior to removal of abatement containment barriers and occupancy by any parties of the site or as part of a larger construction project. If the ACBMs will remain in place and not disturbed as part of the project, the presence of these materials should be noted in the site's AHERA Management Plan and noted to the site staff members, parents and any contractors working onsite moving forward.

Removal of more than 100 square feet of asbestos-containing materials must be completed by a contractor registered with DOSH as an asbestos abatement contractor. The contractor must also hold the C-22 asbestos abatement license from the CSLB to perform abatement of more than 100 square feet of asbestos-containing materials.

Workers abating asbestos-containing materials must have AHERA Worker training and one worker shall be trained to the AHERA Contractor-Supervisor level. Workers will need to use containment, work practices, and engineering controls as required by Cal/OSHA for the various classes of work that may be required to be performed. The contractor performing abatement must also file a "report of use" temporary worksite notification to the local Cal/OSHA office at least 24 hours prior to mobilizing to the site.

The US EPA NESHAP regulation requires the abatement of asbestos-containing materials that are friable or likely to become friable by forces impacting them as part of any renovation activities. If more than 160 square feet of RACM will be generated by the project, a 10-working day notification must be filed with the San Joaquin Valley Air Pollution Control District prior to work commencing onsite. Those materials that are friable, or non-friable materials made friable during removal, would need to be disposed of as hazardous (regulated) asbestos-containing material. Non-friable materials that are not made friable may be disposed of as non-hazardous asbestos-containing waste material at a landfill that will accept the waste.

See the Regulations section above for additional information regarding asbestos compliance.

Lead

The following paints/coatings did not contain detectable concentrations of lead above the laboratory's reporting limit:

- **White Paint on Wood Doors**
- **White Paint on Drywall Walls**
- **Blue Paint on Drywall Walls**
- **Ceramic Tiles – Brown**

All other paints contained detectable concentrations of lead by XRF analysis.

Please see Appendix B for a complete listing of paints / coatings samples at the work areas and results from this survey. Any paints not included in the survey, or paints with results of 0.00 mg/cm² by XRF analysis without confirming representative laboratory result, must be handled as lead-containing unless sampled and proven otherwise.

Workers that impact paints containing any detectable amount of lead must use lead-safe practices and have valid training for the method of impact to comply with Cal/OSHA, 8 CCR 1532.1. To comply with CDPH requirements, any disturbance to paints or coatings that contain lead must be completed within a contained area to prevent the creation of a lead hazard. To comply with California Department of Toxic Substance Control and Title 22 requirements, any waste streams containing lead must be profiled prior to disposal.

See the Regulations section above for additional information regarding lead compliance.

FACS recommends that the results of this report be incorporated into any renovation plans provided for this project for informational purposes.

Limitations

This investigation is limited to the conditions and practices observed, and information made available to FACS. The methods, conclusions and recommendations provided are based on FACS' judgment, expertise, and the standard of practice for professional service. They are subject to the limitations and variability inherent in the methodology employed. As with all environmental investigations, this investigation is limited to the defined scope and does not purport to set forth all hazards, nor indicate that other hazards do not exist.

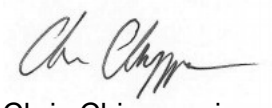
Please do not hesitate to contact our office at (209) 551-2000 with any questions or concerns. Thank you for the opportunity to assist Merced City School District with promoting worker safety and a healthy environment.

Respectfully,
FORENSIC ANALYTICAL



Trevor Leitz
Environmental Health Specialist, Modesto
Cal/OSHA CSST #19-6682
CDPH LRC-00003432

Reviewed by:
FORENSIC ANALYTICAL



Chris Chipponeri
Director, Central Valley Offices
Cal/OSHA CAC #10-4633
CDPH LRC-00000782

Appendix A

Functional Space Notes, Sample Chain-of-Custody and Laboratory Results Report

Functional Space Notes

Forensic Analytical Consulting Services, Inc.

Client: Merced City School District

Site: Sierra Elementary School / Pro Dev Center

FACS Project Number: PJ87706

Date of Inspection: July 30, 2025

Table of Contents

Building A - Professional Development 1

Functional Space Notes

Forensic Analytical Consulting Services, Inc.

Client: Merced City School District

Site: Sierra Elementary School / Pro Dev Center

HMS Project Number: PJ87706

Date of Inspection: July 30, 2025

Materials		Material Class	Percent Asbestos	Hmgns Matrl #	Sampled Here?	Footage Sq/Ln/Jnts	Friable? Yes/No
Building: Building A - Professional Development Center		**Room:**	**01 - Multipurpose Area - 39 x 30 x 9**				
Floor:	Carpet & Mastic - Blue/Purple Multi	MISC	None Detected	1	1A	1053 sq	
Baseboard:	4" Baseboard & Mastic - Grey	MISC	None Detected	2	2A	138 ln	
Walls:	Drywall - Orange Peel Texture	MISC	None Detected	6	6A	373 sq	
Walls:	Tackboard over Drywall	MISC	None Detected	3	3A	869 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4	4A	1170 sq	
Building: Building A - Professional Development Center		**Room:**	**02 - Men's Restroom - 14 x 13 x 8**				
Floor:	2" Ceramic Tile & Grout - Brown	MISC	None Detected	7		182 sq	
Walls:	4" Ceramic Tile & Grout - White/Grey	MISC	None Detected	8	8A	432 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4		182 sq	
Building: Building A - Professional Development Center		**Room:**	**03 - Women's Restroom - 14 x 13 x 8**				
Floor:	2" Ceramic Tile & Grout - Brown	MISC	None Detected	7	7A	182 sq	
Walls:	4" Ceramic Tile & Grout - White/Grey	MISC	None Detected	8	8B	432 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4		182 sq	
Building: Building A - Professional Development Center		**Room:**	**04 - Room 1 - 30 x 27 x 9**				
Floor:	12" VFT & Mastic - White/Grey Oatmeal	MISC	1 % Ch	9	9A	810 sq	No
	Comment: Materials not point counted must be handled as 1%						
Baseboard:	4" Baseboard & Mastic - Blue	MISC	None Detected	10	10A	114 ln	
Walls:	Tackboard over Drywall	MISC	None Detected	3	3B	1026 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4	4B	810 sq	
Building: Building A - Professional Development Center		**Room:**	**05 - Room 2 - 30 x 27 x 9**				
Floor:	12" VFT & Mastic - White/Grey Oatmeal	MISC	1 % Ch	9		810 sq	No
	Comment: Materials not point counted must be handled as 1%						
Baseboard:	4" Baseboard & Mastic - Blue	MISC	None Detected	10		114 ln	
Walls:	Tackboard over Drywall	MISC	None Detected	3		1026 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4		810 sq	

Functional Space Notes

Forensic Analytical Consulting Services, Inc.

Client: Merced City School District

Site: Sierra Elementary School / Pro Dev Center

HMS Project Number: PJ87706

Date of Inspection: July 30, 2025

Materials		Material Class	Percent Asbestos	Hmgns Matrl #	Sampled Here?	Footage Sq/Ln/Jnts	Friable? Yes/No
Building: Building A - Professional Development Center		**Room:**	**06 - Room 3 - 30 x 27 x 9**				
Floor:	12" VFT & Mastic - White/Grey Oatmeal	MISC	1 % Ch	9		810 sq	No
	Comment: Materials not point counted must be handled as 1%						
Baseboard:	4" Baseboard & Mastic - Blue	MISC	None Detected	10		114 ln	
Walls:	Tackboard over Drywall	MISC	None Detected	3	3C	1026 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4		810 sq	
Building: Building A - Professional Development Center		**Room:**	**07 - Staff Room - 19 x 14 x 8**				
Floor:	12" VFT & Mastic - White/Grey Oatmeal	MISC	1 % Ch	9	9B	266 sq	No
	Comment: Materials not point counted must be handled as 1%						
Baseboard:	4" Baseboard & Mastic - Blue	MISC	None Detected	10	10B	66 ln	
Walls:	Drywall - Orange Peel Texture	MISC	None Detected	6	6C	528 sq	
Ceiling:	2x4 FCP - Pinhole Fissure	MISC	None Detected	11	11A, 11B, 11C	266 sq	
Building: Building A - Professional Development Center		**Room:**	**08 - Staff Restroom - 5 x 5 x 8**				
Floor:	2" Ceramic Tile & Grout - Brown	MISC	None Detected	7	7B	25 sq	
Baseboard:	4" Ceramic Tile & Grout - White/Grey	MISC	None Detected	8		20 ln	
Walls:	Drywall - Orange Peel Texture	MISC	None Detected	6	6B	160 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4		25 sq	
Building: Building A - Professional Development Center		**Room:**	**09 - Center Office - 19 x 14 x 9**				
Floor:	12" VFT & Mastic - Beige Streaks	MISC	None Detected	12	12A	266 sq	
Baseboard:	4" Baseboard & Mastic - Brown	MISC	None Detected	13	13A	66 ln	
Walls:	Drywall - Orange Peel Texture	MISC	None Detected	6		594 sq	
Walls:	Tackboard over Drywall	MISC	None Detected	3		59 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4		266 sq	
Building: Building A - Professional Development Center		**Room:**	**10 - North Office - 19 x 13 x 9**				
Floor:	Carpet & Mastic - Blue/Purple Multi	MISC	None Detected	1	1B	247 sq	
Baseboard:	4" Baseboard & Mastic - Grey	MISC	None Detected	2	2B	64 ln	
Walls:	Drywall - Orange Peel Texture	MISC	None Detected	6	6D	576 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4		247 sq	

Functional Space Notes

Forensic Analytical Consulting Services, Inc.

Client: Merced City School District

Site: Sierra Elementary School / Pro Dev Center

HMS Project Number: PJ87706

Date of Inspection: July 30, 2025

Materials		Material Class	Percent Asbestos	Hmgns Matrl #	Sampled Here?	Footage Sq/Ln/Jnts	Friable? Yes/No
Building: Building A - Professional Development Center		**Room:**	**11 - North Staff Room - 19 x 8 x 8**				
Floor:	12" VFT & Mastic - Beige Streaks	MISC	None Detected	12	12B	152 sq	
Baseboard:	4" Baseboard & Mastic - Brown	MISC	None Detected	13	13B	54 ln	
Walls:	Drywall - Orange Peel Texture	MISC	None Detected	6		432 sq	
Ceiling:	12" ACT - Pinhole Fissure	MISC	None Detected	4		152 sq	
Building: Building A - Professional Development Center		**Room:**	**12 - North Staff Restroom - 14 x 7 x 8**				
Floor:	2" Ceramic Tile & Grout - Brown	MISC	None Detected	7		98 sq	
Baseboard:	4" Baseboard & Mastic - Brown	MISC	None Detected	13		42 ln	
Walls:	Drywall - Orange Peel Texture	MISC	None Detected	6	6E	336 sq	
Ceiling:	Drywall - Orange Peel Texture	MISC	None Detected	6		98 sq	
Building: Building A - Professional Development Center		**Room:**	**13 - Custodian Office - 8 x 5 x 8**				
Floor:	Concrete	MISC	None Detected	14	14A, 14B	40 sq	
Walls:	Drywall - Orange Peel Texture	MISC	None Detected	6		208 sq	
Ceiling:	Drywall - Orange Peel Texture	MISC	None Detected	6		40 sq	

Bulk Material Analysis Request Form

Forensic Analytical Consulting Services, Inc.

Modesto
P.O. Box 576848
Modesto, CA 95356
(209) 551 - 2000
FAX: (209) 575 - 5657

Date Submitted:	07/30/25	**Analysis Requested:**	**PLM with Dispersion Staining**
Contact:	Chris Chipponeri	**Turn Around Time:**	**5 DAY**
Collected By:	Trevor Leitz	**Laboratory:**	SGS Forensic Laboratories
Date(s) Collected:	07/30/25	**Special Instructions:**	
Job ID:	Merced City School District	**Project ID / Job No:**	PJ87706
Job Site:	Sierra Elementary School / Pro Dev Center	**Bill to:**	Forensic Analytical Consulting Services, Inc.

Sample ID	Material Description / Location
PJ87706-1A	Carpet & Mastic - Blue/Purple Multi Building A - Professional Development Center, 01 - Multipurpose Area, SW Corner
PJ87706-1B	Carpet & Mastic - Blue/Purple Multi Building A - Professional Development Center, 10 - North Office, South Center
PJ87706-2A	4" Baseboard & Mastic - Grey Building A - Professional Development Center, 01 - Multipurpose Area, East Center
PJ87706-2B	4" Baseboard & Mastic - Grey Building A - Professional Development Center, 10 - North Office, SW Corner
PJ87706-3A	Tackboard over Drywall Building A - Professional Development Center, 01 - Multipurpose Area, North Center at Damage
PJ87706-3B	Tackboard over Drywall Building A - Professional Development Center, 04 - Room 1, West Center
PJ87706-3C	Tackboard over Drywall Building A - Professional Development Center, 06 - Room 3, NE Corner
PJ87706-4A	12" ACT - Pinhole Fissure Building A - Professional Development Center, 01 - Multipurpose Area, East Center
PJ87706-4B	12" ACT - Pinhole Fissure Building A - Professional Development Center, 04 - Room 1, South Center
PJ87706-6A	Drywall - Orange Peel Texture Building A - Professional Development Center, 01 - Multipurpose Area, NE Corner
PJ87706-6B	Drywall - Orange Peel Texture Building A - Professional Development Center, 08 - Staff Restroom, NW Corner
PJ87706-6C	Drywall - Orange Peel Texture Building A - Professional Development Center, 07 - Staff Room, SW Corner
PJ87706-6D	Drywall - Orange Peel Texture Building A - Professional Development Center, 10 - North Office, SE Corner
PJ87706-6E	Drywall - Orange Peel Texture Building A - Professional Development Center, 12 - North Staff Restroom, North Center
PJ87706-7A	2" Ceramic Tile & Grout - Brown Building A - Professional Development Center, 03 - Women's Restroom, East Center
PJ87706-7B	2" Ceramic Tile & Grout - Brown Building A - Professional Development Center, 08 - Staff Restroom, SE Corner
PJ87706-8A	4" Ceramic Tile & Grout - White/Grey Building A - Professional Development Center, 02 - Men's Restroom, NE Corner
PJ87706-8B	4" Ceramic Tile & Grout - White/Grey Building A - Professional Development Center, 03 - Women's Restroom, SW Corner

Submitted By: _____ **Date Submitted:** 7/30/25 **Submitted Via:** _____

Received By: Kyle Statler **Date Received:** 7/31/25 9:30am **Received Via:** FX

Date Printed: 7/30/2025

Bulk Material Analysis Request Form

Forensic Analytical Consulting Services, Inc.

Modesto
P.O. Box 576848
Modesto, CA 95356
(209) 551 - 2000
FAX: (209) 575 - 5657

Date Submitted:	07/30/25	**Analysis Requested:**	**PLM with Dispersion Staining**
Contact:	Chris Chipponeri	**Turn Around Time:**	**5 DAY**
Collected By:	Trevor Leitz	**Laboratory:**	SGS Forensic Laboratories
Date(s) Collected:	07/30/25	**Special Instructions:**	
Job ID:	Merced City School District	**Project ID / Job No:**	PJ87706
Job Site:	Sierra Elementary School / Pro Dev Center	**Bill to:**	Forensic Analytical Consulting Services, Inc.

Sample ID	Material Description / Location
PJ87706-9A	12" VFT & Mastic - White/Grey Oatmeal Building A - Professional Development Center, 04 - Room 1, East Center
PJ87706-9B	12" VFT & Mastic - White/Grey Oatmeal Building A - Professional Development Center, 07 - Staff Room, NW Corner
PJ87706-10A	4" Baseboard & Mastic - Blue Building A - Professional Development Center, 04 - Room 1, South Center
PJ87706-10B	4" Baseboard & Mastic - Blue Building A - Professional Development Center, 07 - Staff Room, SW Corner
PJ87706-11A	2x4 FCP - Pinhole Fissure Building A - Professional Development Center, 07 - Staff Room, West Center
PJ87706-11B	2x4 FCP - Pinhole Fissure Building A - Professional Development Center, 07 - Staff Room, South Center
PJ87706-11C	2x4 FCP - Pinhole Fissure Building A - Professional Development Center, 07 - Staff Room, North Center
PJ87706-12A	12" VFT & Mastic - Beige Streaks Building A - Professional Development Center, 09 - Center Office, North Center
PJ87706-12B	12" VFT & Mastic - Beige Streaks Building A - Professional Development Center, 11 - North Staff Room, South Center
PJ87706-13A	4" Baseboard & Mastic - Brown Building A - Professional Development Center, 09 - Center Office, South Center
PJ87706-13B	4" Baseboard & Mastic - Brown Building A - Professional Development Center, 11 - North Staff Room, North Center
PJ87706-14A	Concrete Building A - Professional Development Center, 13 - Custodian Office, South Center
PJ87706-14B	Concrete Building A - Professional Development Center, 13 - Custodian Office, East Center

Submitted By: _____ **Date Submitted:** 7/30/25 **Submitted Via:** _____

Received By: Kyle Stanley **Date Received:** 7/31/25 9:30am **Received Via:** FX

Date Printed: 7/30/2025

Final Report

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

FACS - Modesto
Chris Chipponeri
313 Banner Court
Suite B
Modesto, CA 95356

Client ID: MOD08
Report Number: B374551
Date Received: 07/31/25
Date Analyzed: 08/07/25
Date Printed: 08/07/25
First Reported: 08/07/25

Job ID/Site: PJ87706; Merced City School District 1730 East Brookdale Drive Merced CA

SGSFL Job ID: MOD08
Total Samples Submitted: 31
Total Samples Analyzed: 31

Date(s) Collected: 07/30/2025

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PJ87706-1A	12819377						
Layer: Multicolored Carpet			**ND**				
Layer: Grey Backing			**ND**				
Layer: Tan Mastic			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Synthetic (75 %)							
PJ87706-1B	12819378						
Layer: Multicolored Carpet			**ND**				
Layer: Grey Backing			**ND**				
Layer: Clear Mastic			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Synthetic (60 %)							
PJ87706-2A	12819379						
Layer: Grey Non-Fibrous Material			**ND**				
Layer: Tan Mastic			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-2B	12819380						
Layer: Grey Non-Fibrous Material			**ND**				
Layer: Beige Mastic			**ND**				
Layer: White Non-Fibrous Material			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-3A	12819381						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (95 %)							
PJ87706-3B	12819382						
Layer: Tan Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (95 %)							

19743 Cabot Blvd., Hayward, CA 94545 | Phone: 510.887.8828 | https://www.sgs-ehsusa.com/

Report Number: B374551

Client Name: FACS - Modesto **Date Printed:** 08/07/25

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PJ87706-3C	12819383						
Layer: White Drywall			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (20 %)							
PJ87706-4A	12819384						
Layer: Grey Fibrous Material			**ND**				
Layer: Paint			**ND**				
Layer: White Drywall			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (35 %) Fibrous Glass (15 %)							
PJ87706-4B	12819385						
Layer: Grey Fibrous Material			**ND**				
Layer: Paint			**ND**				
Layer: White Drywall			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (35 %) Fibrous Glass (15 %)							
PJ87706-6A	12819386						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %) Comment: Bulk core complex sample.							
PJ87706-6B	12819387						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %) Comment: Bulk core complex sample.							
PJ87706-6C	12819388						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %) Comment: Bulk core complex sample.							
PJ87706-6D	12819389						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %) Comment: Bulk core complex sample.							

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Report Number: B374551

Client Name: FACS - Modesto **Date Printed:** 08/07/25

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PJ87706-6E	12819390						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (20 %) Fibrous Glass (10 %) Comment: Bulk core complex sample.							
PJ87706-7A	12819391						
Layer: Brown Ceramic Tile			**ND**				
Layer: Brown Grout			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-7B	12819392						
Layer: Brown Ceramic Tile			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-8A	12819393						
Layer: White Ceramic Tile			**ND**				
Layer: Brown Grout			**ND**				
Layer: Brown Non-Fibrous Material			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-8B	12819394						
Layer: White Ceramic Tile			**ND**				
Layer: Brown Grout			**ND**				
Layer: Brown Non-Fibrous Material			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-9A	12819395						
Layer: White Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-9B	12819396						
Layer: White Tile			**ND**				
Layer: Yellow Mastic			**ND**				
Layer: Black Mastic		Chrysotile	**Trace**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace) Comment: Black mastic insufficient for further analysis							

19743 Cabot Blvd., Hayward, CA 94545 | Phone: 510.887.8828 | https://www.sgs-ehsusa.com/

Report Number: B374551

Client Name: FACS - Modesto **Date Printed:** 08/07/25

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PJ87706-10A	12819397						
Layer: Blue Non-Fibrous Material			**ND**				
Layer: Brown Mastic			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-10B	12819398						
Layer: Blue Non-Fibrous Material			**ND**				
Layer: Beige Mastic			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-11A	12819399						
Layer: Grey Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (35 %) Fibrous Glass (45 %)							
PJ87706-11B	12819400						
Layer: Grey Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (35 %) Fibrous Glass (45 %)							
PJ87706-11C	12819401						
Layer: Grey Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (35 %) Fibrous Glass (45 %)							
PJ87706-12A	12819402						
Layer: Beige Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-12B	12819403						
Layer: Beige Tile			**ND**				
Layer: Black Mastic			**ND**				
Layer: Tan Mastic			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-13A	12819404						
Layer: Brown Non-Fibrous Material			**ND**				
Layer: Brown Mastic			**ND**				
Layer: White Non-Fibrous Material			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							

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Report Number: B374551

Client Name: FACS - Modesto **Date Printed:** 08/07/25

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PJ87706-13B	12819405						
Layer: Brown Non-Fibrous Material			**ND**				
Layer: Brown Mastic			**ND**				
Layer: White Non-Fibrous Material			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-14A	12819406						
Layer: Grey Cementitious Material			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
PJ87706-14B	12819407						
Layer: Grey Cementitious Material			**ND**				
Total Percentage Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							



Maria Cosper, Laboratory Supervisor, Hayward Laboratory

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

Inhomogeneous samples are separated into homogenous subsamples and analyzed individually. Analytical results and reports are generated by SGS 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 SGS 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 SGS. The client is solely responsible for the use and interpretation of test results and reports requested from SGS. This report must not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. Government. SGS is not able to assess the degree of hazard resulting from materials analyzed. SGS 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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Appendix B

Lead Paint Chip Summary, Sample Chain-of-Custody, Laboratory Results Report, XRF Testing Data and CDPH 8552 Form

Lead Paint Chip Summary (Lab Report #M271065) Merced City School District – Sierra ES / Professional Development Center – HBM Survey Survey Date: July 30, 2025					
Sample Number	**Component Location**	**Component**	**Color**	**Substrate**	**Analytical Results (weight percent of lead)**
Pb01	Staff Room – NE Corner	Door	White	Wood	< 0.007
Pb02	Room 1 – North Side East End	Wall	White	Drywall	< 0.007
Pb03	Staff Room – South Side West End	Wall	Blue	Drywall	< 0.006
Pb04	Women's Restroom	Floor	Brown	Ceramic Tile	< 0.007

Forensic Analytical
ENVIRONMENTAL HEALTH CONSULTANTS

BULK SAMPLE REQUEST FORM

Client:	**FACS Modesto**	Sampled by: **Trevor Leitz** PM: **Chris Chipponeri** Date: **7-30-25**	
Contact:	**Chris Chipponeri** Phone: **(209) 484-4648**	Special Instructions: **Please email results to Chris.C@facs.com & Trevor.L@facs.com**	
Site:	**MCSD – Sierra ES / Professional Development Center**	Turnaround Time:	1-Day ☐ / 2-Day ☐ / 3-Day ☐ / 5-Day ☒ / Other ☐ — Due Date and Time:
Client No.:	**MOD08** **FACS Job #: PJ87706**	Analysis:	☐ PLM Standard / ☐ Point Count / ☒ Flame AA (Pb) / ☐ Other:

Sample Number	Material Description	Sample Location	Friable	Cond.	Quantity
PJ87706 – Pb01	White Paint on Wood Door	Staff Room – NE Corner			
PJ87706 – Pb02	White Paint on Drywall Wall	Room 1 – North Side East End			
PJ87706 – Pb03	Blue Paint on Drywall Wall	Staff Room – South Side West End			
PJ87706 – Pb04	2" Ceramic Tile & Grout – Brown	Women's Restroom – NE Corner			

WB – Wallboard JC - Joint Compound FT - Floor Tile FTM - Floor Tile Mastic BBM - Baseboard Mastic
RSF - Resilient Sheet Flooring CT - Ceiling Tile SAAM - Spray-Applied Acoustical Material WT - Wall Texture

Friable Yes / No Good / Fair / Poor

Shipped via: ☒ Fed Ex ☐ Airborne ☐ UPS ☐ US Mail ☐ Courier ☐ Drop Off ☐ Other:

Relinquished by:	*Date & Time:* 7-30-25	*Received by:* Kyle Statley	*Date & Time:* 7/31/25 9:20a.m. Fx Condition Acceptable ☐ Yes ☐ No
Relinquished by:	*Date & Time:*	*Received by:*	*Date & Time:* Condition Acceptable ☐ Yes ☐ No

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101762)

FACS - Modesto
Chris Chipponeri
313 Banner Court
Suite B
Modesto, CA 95356

Client ID: MOD08
Report Number: M271065
Date Received: 07/31/25
Date Analyzed: 08/06/25
Date Printed: 08/07/25
First Reported: 08/07/25

Job ID / Site: PJ87706; Merced City School District 1730 East Brookdale Drive Merced CA
Date(s) Collected: 7/30/25

SGSFL Job ID: MOD08
Total Samples Submitted: 4
Total Samples Analyzed: 4

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
PJ87706-PB01	30958897	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
PJ87706-PB02	30958898	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
PJ87706-PB03	30958899	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PJ87706-PB04	30958900	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Kevin Poon

Kevin Poon, Laboratory Supervisor, Hayward Laboratory

Analytical results and reports are generated by SGS 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 SGS 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 SGS. The client is solely responsible for the use and interpretation of test results and reports requested from SGS. SGS is not able to assess the degree of hazard resulting from materials analyzed. SGS 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. Any modifications that have been made to referenced test methods are documented in SGS Standard Operating Procedures Manual. Sample results have not been blank corrected. Quality control and sample receipt condition were acceptable unless otherwise noted.
Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

FACS 35
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SURVEY FOR LEAD BASED PAINT

Site Name:	Sierra Elementary School / Professional Development Center								**Date:**	7-30-25
Address:	1730 East Brookdale Drive, Merced, CA 95340								**FACS Job #:**	PJ87706
Start Time:	0840	**Calibration:**	**1.03 =**	1.02	**1.03 =**	1.04	**1.03 =**	1.03	**Technician:**	Trevor Leitz
End Time:	0920	**Calibration:**	**1.03 =**	1.01	**1.03 =**	1.03	**1.03 =**	1.02	**Inspector/Assessor:**	Chris Chipponeri
SciAps X-550Pb		**Results in red are lead-based paint or coating.**							**Condition Codes: I = Intact, F = Fair, P = Poor**	

No.	Sample Location	Color	Substrate	Component	Condition	XRF Result (mg/cm^2)
1.	Common Area	Blue	Drywall	Wall	I	0.00
2.	Common Area Restroom	White	Wood	Door Frame	I	0.00
3.	Common Area Restroom	White	Ceramic Tile	Wall	I	0.02
4.	Common Area Restroom	White	Ceramic Tile	Floor	I	0.00
5.	Common Area	White	Drywall	Wall	I	0.00
6.	Room 1	White	Porcelain	Sink	I	0.05
7.	Room 1	White	Drywall	Wall	I	0.00
8.	Room 2	White	Drywall	Wall	I	0.00
9.	Room 2	White	Porcelain	Sink	I	0.03
10.	Room 3	White	Drywall	Wall	I	0.00
11.	Room 3	White	Porcelain	Sink	I	0.05
12.	Staff Room	Blue	Drywall	Wall	I	0.00
13.	Staff Restroom	White	Drywall	Wall	I	0.00
14.	Staff Restroom	White	Wood	Door Frame	I	0.00
15.	North Office	Blue	Drywall	Wall	I	0.00
16.	Center Office	White	Drywall	Wall	I	0.00

LEAD HAZARD EVALUATION REPORT

Section 1 — Date of Lead Hazard Evaluation July 30, 2025

Section 2 — Type of Lead Hazard Evaluation (Check one box only)

☑ Lead Inspection ☐ Risk assessment ☐ Clearance Inspection ☐ Other (specify) _____

Section 3 — Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)]	City	County	Zip Code
1730 East Brookdale Drive	Merced	Merced	95340

Construction date (year) of structure	Type of structure	Children living in structure?
Uknown	☐ Multi-unit building ☑ School or daycare ☐ Single family dwelling ☐ Other_____	☐ Yes ☑ No ☐ Don't Know

Section 4 — Owner of Structure (if business/agency, list contact person)

Name	Telephone number
Merced City School District / Bryan Behn	209-385-6332

Address [number, street, apartment (if applicable)]	City	State	Zip Code
2105 Wardrobe Avenue	Merced	CA	95340

Section 5 — Results of Lead Hazard Evaluation (check all that apply)

☑ No lead-based paint detected ☐ Intact lead-based paint detected ☐ Deteriorated lead-based paint detected

☑ No lead hazards detected ☐ Lead-contaminated dust found ☐ Lead-contaminated soil found ☐ Other_____

Section 6 — Individual Conducting Lead Hazard Evaluation

Name	Telephone number
Chris Chipponeri	209-551-2000

Address [number, street, apartment (if applicable)]	City	State	Zip Code
313 Banner Court, Suite B	Modesto	CA	95356

CDPH certification number	Signature	Date
LRC-00000782		08/14/25

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

Trevor Leitz LRC-00003432

Section 7 — Attachments

A. A foundation diagram or sketch of the structure indicating the specifc locations of each lead hazard or presence of lead-based paint;
B. Each testing method, device, and sampling procedure used;
C. All data collected, including quality control data, laboratory results, including laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed or faxed to:

California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804-6403
Fax: (510) 620-5656

Appendix C

Site Photos and Sample Location Drawing



Carpet & Mastic – Blue/Purple Multi



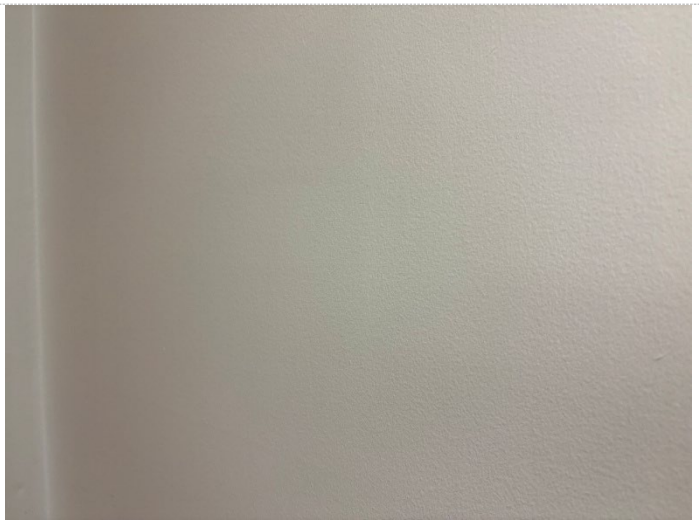
4” Baseboard & Mastic – Grey



Tackboard over Drywall



12” ACT – Pinhole Fissure



Drywall – Orange Peel



2” Ceramic Tile & Grout – Brown



4” Ceramic Tile & Grout – White/Grey



12” VFT & Mastic – White/Grey Oatmeal



4” Baseboard & Mastic – Blue



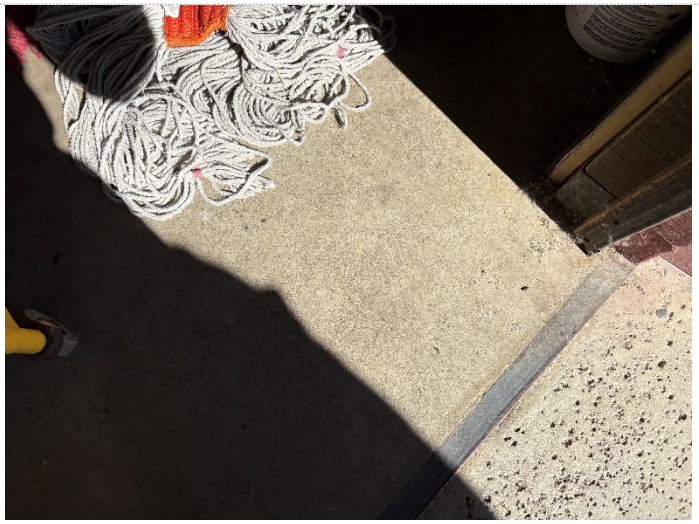
2x4 FCP – Pinhole Fissure



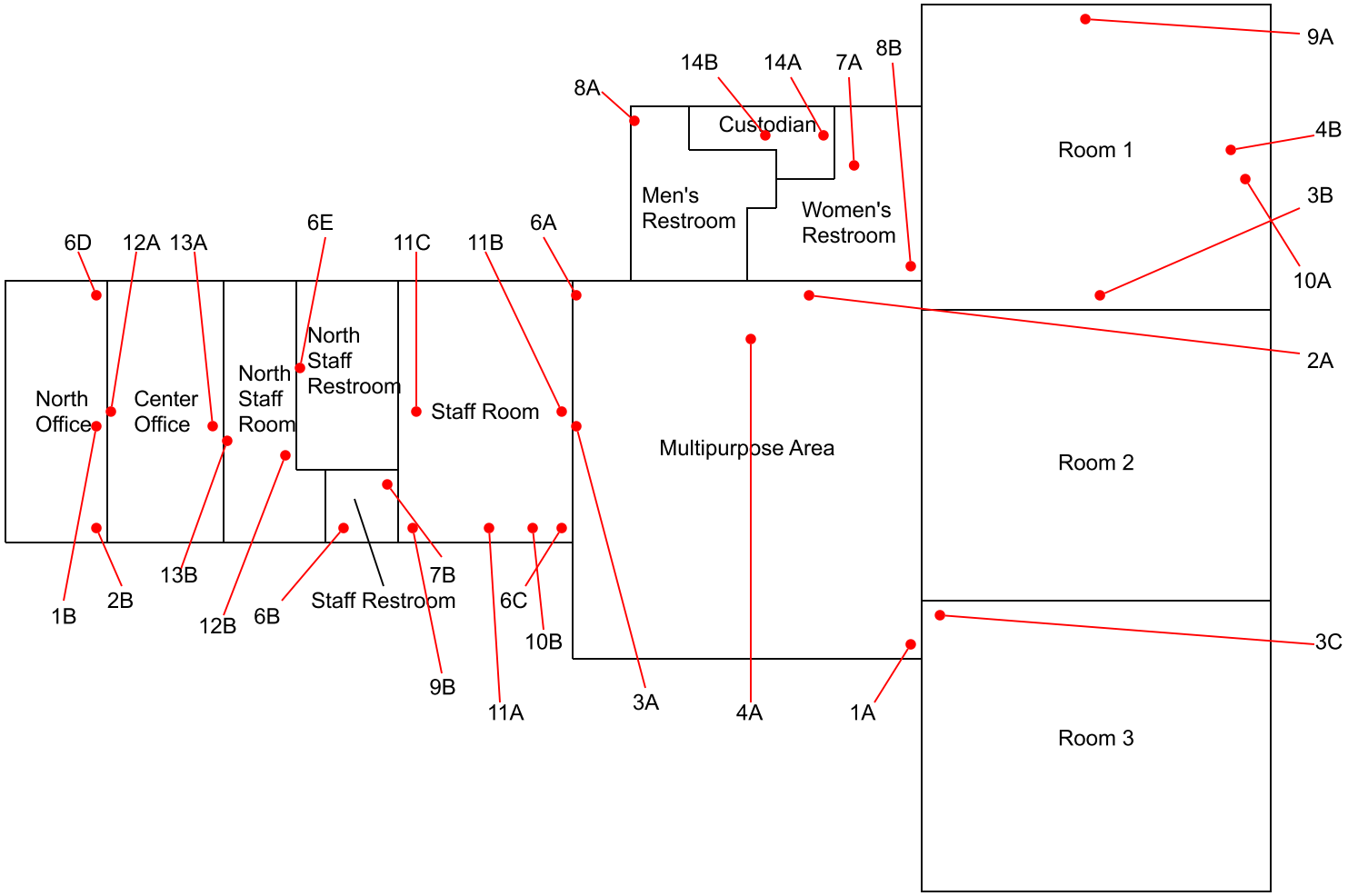
12” VFT & Mastic – Beige Streaks



4” Baseboard & Mastic – Brown



Concrete



FACS 35 Forensic Analytical Consulting Services
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313 Banner Court, Suite B
Modesto, CA 95356

N

Sample Location

Merced City School District
2105 Wardrobe Avenue
Merced, CA 95340

Sierra Elementary School / Professional Development Center

LOCATION:
1730 E Brookdale Drive
Merced, CA 95340

DRAWN BY:
Trevor Leitz

FACS PROJECT No.:
PJ87706

This ia a design drawing and is the property of Forensic Analytical Consulting Services, Inc. It is not intended to replace required architectural or engineering plans.

Appendix D
Certifications of Personnel and Laboratories

STATE OF CALIFORNIA Gavin Newsom, Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health-Asbestos & Carcinogen Unit
1750 Howe Avenue, Suite 460
Sacramento, CA 95825
(916) 574-2993 Office http://www.dir.ca.gov/dosh/asbestos.html actu@dir.ca.gov

910116682T **453**

Forensic Analytical Consulting Services
Trevor T Leitz
313 Banner Court, Suite B
Modesto CA 95356

January 17, 2025

Dear Certified Asbestos Consultant or Technician:

Enclosed is your certification card. **To maintain your certification, you must abide by the rules printed on the back of the certification card.**

Your certification is valid for a period of one year. If you wish to renew your certification, you must apply for renewal at least 60 days before the expiration date shown on your card. [8 CCR 341.15(h)(1)].

Please hold and do not send copies of your required AHERA refresher renewal certificates to our office until you apply for renewal of your certification.

Certificates must be kept current if you are actively working as a CAC or CSST. The grace period is only for those who are not actively working as an asbestos consultant or site surveillance technician.

Please contact our office at the above address or email w any changes in your contact/mailing information within 15 days of the change.

Sincerely,

Dean Mochrie, CAC
Senior Safety Engineer

Attachment: Certification Card

cc: File


State of California
Division of Occupational Safety and Health
Certified Site Surveillance Technician
Trevor T Leitz
Name
Certification No. **19-6682**
Expires on **12/18/2025**
This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq of the Business and Professions Code.

Renewal – Card Attached (08/24)

Forensic Analytical Consulting Services, Inc.

This is to confirm that

Trevor Leitz

Has attended the Four hour

AHERA Refresher Course for Asbestos Inspectors

And has completed the requisite training for asbestos accreditation under TSCA Title II

Course Date: 09-05-2024 to 09-05-2024

Certificate Number: PETBIR20240097
Valid Until: September 05, 2025

Cal/OSHA Approval Number:CA-025-06

FACS
Forensic Analytical Consulting Services

Fred J. Vinciguerra, Chief Executive Officer
Forensic Analytical Consulting Services, Inc.
21228 Cabot Blvd, Hayward, CA 94545
(800) 677-1483

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
 **Trevor Leitz**	Lead Sampling Technician	LRC-00003432	10/14/2025

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD

STATE OF CALIFORNIA Gavin Newsom, Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health-Asbestos & Carcinogen Unit
1750 Howe Avenue, Suite 460
Sacramento, CA 95825
(916) 574-2993 Office http://www.dir.ca.gov/dosh/asbestos.html actu@dir.ca.gov

005174633C 339

May 06, 2025

Christopher J Chipponeri
1401 Louise Avenue
Modesto CA 95350

Dear Certified Asbestos Consultant or Technician:

Enclosed is your certification card. **To maintain your certification, you must abide by the rules printed on the back of the certification card.**

Your certification is valid for a period of one year. If you wish to renew your certification, you must apply for renewal at least 60 days before the expiration date shown on your card. [8 CCR 341.15(h)(1)].

Please hold and do not send copies of your required AHERA refresher renewal certificates to our office until you apply for renewal of your certification.

Certificates must be kept current if you are actively working as a CAC or CSST. The grace period is only for those who are not actively working as an asbestos consultant or site surveillance technician.

Please contact our office at the above address or email w any changes in your contact/mailing information within 15 days of the change.

Sincerely,

Dean Mochrie, CAC
Senior Safety Engineer

Attachment: Certification Card

cc: File



Renewal – Card Attached (08/24)

Forensic Analytical Consulting Services, Inc.

This is to confirm that

Chris Chipponeri

Has attended the Four hour

AHERA Refresher Course for Asbestos Inspectors

And has completed the requisite training for asbestos accreditation under TSCA Title II

Course Date: 09-05-2024 to 09-05-2024

Certificate Number: PETBIR20240099
Valid Until: September 05, 2025

Cal/OSHA Approval Number:CA-025-06

FACS
Forensic Analytical Consulting Services

Fred J. Vinciguerra, Chief Executive Officer
Forensic Analytical Consulting Services, Inc.
21228 Cabot Blvd, Hayward, CA 94545
(800) 677-1483

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
 **Chris Chipponeri**	Lead Inspector/Assessor	LRC-00000782	6/20/2026

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 101459-0

SGS Forensic Laboratories

Hayward, CA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Asbestos Fiber Analysis

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique on ISO/IEC 17025).

2025-07-01 through 2026-06-30

Effective Dates

For the National Voluntary Laboratory Accreditation Program

National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

SGS Forensic Laboratories
19743 Cabot Blvd.
Hayward, CA 94545
Ryan Sutliffe
Phone: 702-332-1937
Email: ryan.sutliffe@sgs.com
www.falaboratories.com

ASBESTOS FIBER ANALYSIS **NVLAP LAB CODE 101459-0**

Bulk Asbestos Analysis

Code	*Description*
18/A01	EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples
18/A03	EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

Airborne Asbestos Analysis

Code	*Description*
18/A02	U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.



For the National Voluntary Laboratory Accreditation Program

AIHA Laboratory Accreditation Programs, LLC

acknowledges that

SGS North America

19743 Cabot Blvd. Hayward, CA 94545

Laboratory ID: LAP-101762

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs, LLC (AIHA LAP) accreditation to the ISO/IEC 17025:2017 international standard, General Requirements for the Competence of Testing and Calibration Laboratories in the following:

LABORATORY ACCREDITATION PROGRAMS

☑	**INDUSTRIAL HYGIENE**	Accreditation Expires: October 01, 2025
☑	**ENVIRONMENTAL LEAD**	Accreditation Expires: October 01, 2025
☑	**ENVIRONMENTAL MICROBIOLOGY**	Accreditation Expires: October 01, 2025
☐	**FOOD**	Accreditation Expires:
☐	**UNIQUE SCOPES**	Accreditation Expires:
☐	**BE FIELD/MOBILE**	Accreditation Expires:

Specific Field(s) of Testing/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached Scope of Accreditation. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2017 and AIHA LAP requirements. This certificate is not valid without the attached Scope of Accreditation. Please review the AIHA LAP website (www.aihaaccreditedlabs.org) for the most current Scope.

Cheryl O Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Revision21: 10/24/2023

Date Issued: 06/30/2025

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APPENDIX B

Project: Community Day School ***Darden Project # 2533***
Client: Merced City Unified School District
Location: Merced, CA

APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
MODULAR CASEWORK			
Plastic Laminate			
Countertop/Splash	Wilsonart	D431-60	Alabaster
Base Cabinet	Wilsonart	7971K-12	Uptown Walnut
Wall Cabinet	Wilsonart	7971K-12	Uptown Walnut
Tall Cabinet	Wilsonart	7971K-12	Uptown Walnut
Door	Wilsonart	7971K-12	Uptown Walnut
Drawer	Wilsonart	7971K-12	Uptown Walnut
Face Panel	Wilsonart	7971K-12	Uptown Walnut
End Panel	Wilsonart	7971K-12	Uptown Walnut
Back Panel	Wilsonart	7971K-12	Uptown Walnut
Shelves	Wilsonart	7971K-12	Uptown Walnut
Edge Banding	Wilsonart	7971K-12	Uptown Walnut
Solid Surface	Corian	-	Linen
RESILIENT BASE AND ACCESSORIES			
Rubber Base			
Color 1	Mannington	217	Charcoal
Unless Otherwise Noted			
RESILIENT SHEET			
Sheet Vinyl			
Color 1	Tarkett	0855	Medium Blue
Unless Otherwise Noted. Weld Rod color to match.			
RESILIENT TILE			
Luxury Vinyl Tile			
Color 1	Tarkett	7537	English Walnut
Unless Otherwise Noted			
CARPET			
Carpet (Broadloom (BL-1))			
Color 1	Tarkett	03023-23512	Aftermath II, Tapestry
Refer to A/A801			
Walk Off	Tarkett	19100	Abrasive Action II, Charcoal
WALL COVERINGS			
Fiberglass Reinforced Panels	Nudo	-	White
Vinyl Covered Tackboard	Chatfield Clarke	-	White Cap

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APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
Custom Vinyl Graphic	Koroseal	-	Architect to provide graphic file
PAINT			
Gypsum Board (New and Existing)			
Color 1	PPG to match		District Standard Swiss Coffee
Unless otherwise noted.			
Color 2	PPG to match		Existing adjacent color
To occur at 109 Custodian Only			
Metal Doors/Frames			
Metal Doors	PPG to match		Match to existing site "Blue"
Metal Frames	PPG to match		Match to existing site "Blue"
Unless Otherwise Noted			
Wood Doors	PPG to match		District Standard Swiss Coffee
Steel and Fabrications	PPG	-	Match to existing adjacent
Mechanical	PPG	-	Match to existing adjacent
Rakks Brackets	PPG to match		District Standard Swiss Coffee
TOILET PARTITIONS			
Solid Plastic Partition	Bobrick	-	Desert Biege
WALL PROTECTION			
High Impact Wall Covering	Inpro	-	TBD Upon Submittal

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APPENDIX "B": INTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION

NOTES:

1. The intent of this schedule is to clarify and detail the color and patterns of finishes. All information regarding construction conditions, casework, framing and ceiling details, etc. shall be per Architectural plans, unless otherwise noted.
2. Interior Color Schedule to be used in conjunction with Architectural plans and Specifications.
3. Paint colors listed on Interior Color Schedule are for color reference only. Refer to Architectural Specifications and Finish Schedules for information regarding paint systems.
4. Change of paint color to occur on an inside corner, unless otherwise noted.
5. All Gypsum Board surfaces to be painted Color 1, unless otherwise noted.
6. All vision light frames in hollow metal doors to match door color.
7. All interior Wall Louver Assemblies receiving a field finish to be painted to match color of adjacent surface.
8. All access doors and frames to be painted to match color of adjacent surface.
9. All miscellaneous exposed to view metal and mechanical equipment receiving a field finish to be painted to match color of adjacent surface. If adjacent material is vinyl covered tackboard, paint to be Color 1.
10. All accent paint, changes in paint color and extent of paint and accent paint to be verified by Darden Architects at job site prior to commencement of work.
11. All finishes to extend inside accessible base cabinets.
12. All modular casework edgebanding to match adjacent plastic laminate.
13. All paints and stains are to be submitted in the form of brushouts to Darden Architects for approval prior to commencement of work.
14. Louvers located in doors shall match door color.

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APPENDIX C

APPENDIX "C": EXTERIOR COLOR SCHEDULE

MATERIAL	MANUFACTURER	REF #	DESCRIPTION
CAST-IN-PLACE			
Concrete Color	-	-	Natural
CONCRETE MASONRY			
Concrete Masonry Units			
CB-1	Basalite	-	To be determined upon submittal
PAINT			
Cement Plaster (New and Existing)			
PC-1	PPG	-	Match District Standard Beige
Steel and Fabrications			
Exposed Structural Steel: ***Unless Otherwise Noted***	PPG	-	Match to adjacent
Existing Column			
MC-1	PPG	-	Match District Standard Beige
Steel Gate			
MC-2	PPG	-	Match to existing site "Blue"
Sheet Metal			
Existing Sheet Metal			
MC-2	PPG	-	Match to existing site "Blue"
Existing Parapet Caps	PPG	-	Match to existing site "Blue"
Fascia Panels			
MC-2	PPG	-	Match to existing site "Blue"
Metal Doors / Frames			
Metal Doors/Frames:			
MC-2	PPG	-	Match to existing site "Blue"
Louvers	PPG	-	Match to adjacent
ORNAMENTAL METAL			
Fence	-	-	Powdercoated Black

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APPENDIX "C": EXTERIOR COLOR SCHEDULE

GENERAL NOTES:

1. Paint colors listed on Exterior Color Schedule are for color reference only. Refer to Architectural Specifications and Finish Schedules for type.
2. Change of color is to occur at control joints or an inside corner, unless otherwise noted.
3. Cement plaster accessories shall match primary color of adjacent material, unless otherwise noted. Cement plaster vents to remain unfinished.
4. Mechanical grille/louvers with factory baked enamel finish shall match primary color of adjacent hollow metal door frame. Louvers located in doors shall match door color.
5. All miscellaneous visual architectural sheet metal and steel fabrications including, but not limited to, mechanical/ plumbing/ electrical equipment shall match color of adjacent material, unless otherwise noted.
6. Soffits shall match color of outer face wall, unless otherwise noted.
7. All access doors and frames to be painted to match color of adjacent surface.
8. Existing "Site Blue" to match existing parapet cap blue, not door blue.

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