PROJECT MANUAL

for

Rosamond High School – Cafeteria Building

2925 West Rosamond Blvd.
Rosamond, CA 93560

SOUTHERN KERN UNIFIED SCHOOL DISTRICT
2601 Rosamond Blvd.
Rosamond, CA 93560

PREPARED BY:

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Project No. 2990

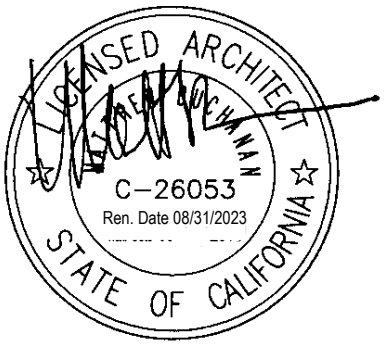
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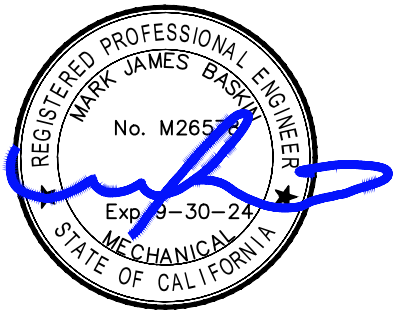
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APP: 03-122536 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 03/24/2023

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SECTION 011100
SUMMARY OF WORK

1.00 GENERAL

1.01 SUMMARY

A. The Project consists of design and construction of the following items:

1. Fully sprinklered cafeteria building that includes a dining area, serving area, main kitchen, kitchen staff office, (2) snack bars, storage and equipment rooms. A non-sprinklered covered outdoor dining area.

2. Fully sprinklered pre-fabricated storage unit area, cooler and freezer units with a total floor area of 873 s.f.

3. Service yard area that includes a trash enclosure, electrical room, can wash area and equipment area.

4. Site and utility improvements around location of new cafeteria building.

5. Outdoor landscape and irrigation area.

6. Retention basin.

7. Fire lane and new fire access driveway approach.

8. Upgrade path of travel from public right of way, existing accessible parking to main entrance of existing school site.

1.02 PHASING/CONTRACTOR'S USE OF PREMISES

A. Move stored products, which interfere with operations of District or other contractors.

B. Obtain and pay for use of additional storage, work areas or parking needed for operations or Contractor's employees.

C. Use of site: Limit to areas directed by the District.

1. Allow District access to maintain and operate other existing facilities.

2. Permit unimpeded access by firefighting, law enforcement agencies and rescue equipment.

3. Access to and egress from construction site shall be in strict conformance to prearranged routes approved by the District, with the understanding that curtailment of traffic or revision of access routes may be required on short notice if the District's operations mandate such changes because of excessive noise, or problems with safety, service, or supply.

D. Partial District's occupancy: The District reserves the right to place and install equipment in areas of the Project prior to Substantial Completion provided it doesn't interfere with normal completion of Work. This partial occupancy shall not constitute acceptance of the Work.

1.03 WORK NOT IN CONTRACT

A. The following will be provided by the District under separate contracts.

1. Encapsulation, removal and disposal of asbestos, toxic substances and other hazardous materials.

2. Tests and inspections specified to be provided by the District in the Contract Documents.

3. Items noted NIC (Not In Contract) on the Drawings or in the Specifications.

4. Items noted OFCI (Owner Furnished Contractor Installed) on the drawings or the specifications shall identify those items that will be purchased and delivered to project by the Owner but for which the Contractor(s) shall be responsible for all labor and materials necessary to fully and properly install the supplied items.

B. When work of this Contract requires the Contractor to make allowance for the above in his work, and to provide supports, power, conduits, stub-outs and other services to these items, the drawings, manufacturer's data and other information necessary for Contractor's work will be provided by the District upon request.

1.04 DEFINITIONS

A. In addition to other definitions included in these Specifications, the following applies to the Work:

1. Approved, approved equal, or equal, mean as approved and accepted by the Architect and District.

2. As necessary means essential to completion of Work.

3. As required means as required by Contract Documents.

4. As selected, as approved, as directed or words of similar import mean as selected by, as approved by, or as accepted by the Architect. No implied meaning shall be interpreted to extend Architect's responsibility into the Contractor's area of Contractor's supervision.

5. As shown, as detailed, as indicated and words of similar import mean as indicated on the Drawings.

6. Building Department and Authorities Having Jurisdiction: All agencies, individually or collectively, charged by statute with administration/enforcement of requirements of the Building Code at Project location.

7. Concealed means embedded in masonry, concrete or other construction, installed within furred spaces, within a wall/partitions or above suspended ceilings, in trenches, in crawl spaces, or in enclosures.

8. Equipment means a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

9. Exposed means not installed underground or concealed as defined above.

10. Fabricated means items specifically assembled or made out of selected materials to meet individual design requirements for the Project.

11. Furnish (materials) means to supply and deliver to the Project ready for installation and in operable condition.

12. Include/including means include/including, without limitation.

13. Install (services or labor) means to place in final position, complete, anchored, connected, and in operable condition.

14. Interior means a space completely enclosed by walls, solid door(s), floor and ceiling.

15. Exterior means a space which does not meet the definition for "interior" above.

16. Manufactured applies to standard units usually mass-produced.

17. Manufacturer's directions, instructions, recommendations, specifications means manufacturer's written directions, instruction, recommendations, specifications.

18. Materials are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form part of Work.

19. Named products are items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature current as of the date of the Contract Documents.

20. Owner furnished/Contractor installed (OFCI) means that some equipment may be Owner furnished and delivered to site by District and installed on site by Contractor under this Agreement.

21. Owner provided (OP) means items or equipment that shall be furnished and installed under separate contract by Owner/District.Product(s) means materials, systems, and equipment, and terms of similar intent.

22. Product(s) means materials, systems, and equipment, and terms of similar intent.

23. Provide means to supply, fabricate, deliver, place, and connect, complete in-place, ready for operation and use. When neither furnish, install nor provide is stated, provide is implied.

24. Division means Division of these Specifications except where the obvious intent is the act or process of dividing. Divisions are groups of related Sections.

25. Section means Section of these Specifications, except where the obvious intent is one of several components, a piece. Section is usually a basic unit of Work.

26. Shall is mandatory.

27. Submit, submittal, submission mean submit to Architect for review, unless otherwise stated.

1.05 TITLING AND ARRANGEMENT

A. Article, Paragraph and subparagraph titles and other identifications of subject matter in Specifications are intended as an aid in locating and recognizing various requirements in beginning words of a sentence or where title establishes subject, titles are subordinate to and do not define, limit, or otherwise restrict Specification text.

B. Underlining, bolding or capitalizing of words in the text does not signify or mean that such words convey special or unusual meaning.

C. Specification text governs over titling and shall be understood to be and interpreted as a whole.

D. The order of articles, paragraphs, subparagraphs, and sub-subparagraphs in the Specifications text is defined by the sequence of indentations.

1.06 INTERPRETATION

A. Unless otherwise stated in the Contract Documents, technical words and abbreviation contained in the Contract Documents are used in accordance with commonly understood construction industry meanings; and non-technical words and abbreviations are used in accordance with their commonly understood meanings.

B. Contract Documents may omit modifying words such as "all" and "any," and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement. Use of the word "including," when following any general statement, shall not be construed to limit such statement to specific items or matters, whether or not non-limiting language (such as "without limitation," "but not limited to," or words of similar import) is used with reference thereto, but rather shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such general statement.

C. Whenever context so requires, use of the singular number shall be deemed to include the plural and vice versa.

1. Each gender shall be deemed to include any other gender, and each shall include corporation, partnership, trust, or other legal entity whenever context so requires.

2. Captions and headings of various subdivisions of Contract Documents are intended only as a matter of reference and convenience and in no way define, limit, or prescribe the scope or intent of Contract Documents or any subdivision thereof.

END OF SECTION

SECTION 013216
CONSTRUCTION SCHEDULE

1.00 GENERAL

1.01 SECTION INCLUDES

A. Construction Schedule procedures, preparation, submittal, updates, and revisions.

1.02 RELATED SECTIONS

A. Section 013323: Submittals.

B. Section 017720: Project Record Documents.

1.03 SCHEDULE

A. The construction of this project will be planned and recorded with a conventional Critical Path Method (CPM) schedule. The schedule shall be used for coordination, monitoring, and payment of all work under the contract including all activity of subcontractors, vendors, suppliers, and for all submittals.

B. Contractor is responsible for preparing the schedule. All costs incurred by Contractor in preparing the schedule shall be borne by Contractor as a part of its responsibility under this contract.

1.04 PROCEDURES

A. Baseline Construction Schedule

1. Before proceeding with any work on site, Contractor shall prepare, submit, and receive District's approval of a Baseline Construction Schedule. This schedule shall provide a detailed breakdown of activities scheduled for the first 90 days of the project and shall include mobilization, submittals, procurement, and construction.

2. No contact work may be pursued at the site without an approved Baseline Construction Schedule or an approved CPM schedule.

B. Within forty-five (45) calendar days after date of Notice to Proceed, Contractor shall submit, for review, a Detailed Project Schedule setting forth all requirements for complete execution of work.

C. Preparation of Detailed Project Schedule

1. The construction time, for the entire project or any milestone, shall not exceed the specified contract time. In the event that any milestone date or contract completion date is exceeded in the schedule, logic and/or time estimates will be revised.

2. Following the District's review, if revisions to the proposed schedule are required, the Contractor shall do so promptly. The schedule must be finalized within 60 days of the Notice to Proceed. Failure to finalize the schedule by that date will result in withholding all contract payments until the schedule is finalized.

D. Simultaneously with each submittal of Progress Payment Request, Contractor shall deliver to the District an updated Detailed Project Schedule reflecting work progress as of end of previous reporting period. Each such Schedule shall indicate actual progress to date in execution of work, together with a projected schedule for completion of work.

E. All Schedule submittals are subject to review and acceptance by the District. The District shall withhold progress payments until Contractor submits a Detailed Project Schedule acceptable to the District.

F. Concurrent with the District's acceptance of Contractor's submitted Detailed Project Schedule, shall be Contractor's signature of acceptance.

1.05 PREPARATION GUIDELINES

A. Work of this Contract shall be scheduled and progress monitored using a bar chart, although any of the CPM network type scheduling systems, including precedence diagramming or arrow are acceptable. Scheduling system shall show the sequence and interdependence of all activities required for complete performance of all items of work under this contract, including all approvals, shop drawings and other submittals and approvals, and fabrication and delivery activities. Scheduling system shall indicate all inter-relationships between trades and suppliers.

B. Level of detail indicated in schedule shall be equal to or greater than that provided by Table of Contents of Contract Technical Specifications, including any addenda. Duration and events indicated on schedule shall conform to phasing set forth in the Contract and shall show any area or building within a particular phase. Schedule shall indicate any and all Contract "milestone events" and other milestones agreed to by the District, but no other manually-imposed dates will be accepted unless approved.

C. Detailed Project Schedule shall represent a practical plan to complete work within time requirements of the Contract.

1. The Contractor may submit a Detailed Project Schedule depicting completion of the Work in a duration shorter than the Contract Time; provided that such Detailed Project Schedule shall not be a basis for adjustment to the Contract Price in the event that completion of the Work shall occur after the time depicted therein, nor shall such Detailed Project Schedule be the basis for any extension of the Contract Time.

2. A schedule found unacceptable by the District shall be revised by Contractor and resubmitted.

D. Detailed Project schedule shall clearly indicate sequence of construction activities, grouped by applicable phase and sorted by areas, buildings, or facilities within phase, and shall specifically indicate:

1. Start and completion of all items of work, their major components, and interim milestone completion dates, as determined by Contractor and the District.

2. Activities for procurement, delivery, installation of equipment, materials, and other supplies, including:

a. Time for submittals, re-submittals, and reviews. Include decision dates for selection of finishes, if applicable.

b. Time for fabrication, and delivery of, manufactured products for work.

c. Interdependence of procurement and construction activities.

d. As applicable, dates for testing, balancing equipment, and final inspection.

E. Schedule shall be in sufficient detail to assure adequate planning and execution of work.

1. Each activity shall range in duration no longer than two (2) weeks and shall be total of actual days required for completion, and shall include consideration of normal weather impact on completion of that activity.

2. The activities are to be described so that the work is readily identifiable and the progress of each activity can be readily measured. For each activity, Contractor shall identify the trade or subcontractor performing the work, the duration of the activity in work days, the manpower involved by trade, the equipment involved, the location of the work, and a dollar value of the activity. The dollar value assigned to each activity is to be reasonable and based on the amount of labor, materials, and equipment involved. When added together, the dollar value of all activities are to equal the contract price.

3. Schedule shall be suitable, in judgement of the Architect, to allow monitoring and evaluation of progress in performance of work; it shall be calendar time-scaled and, at a minimum, in a Bar Chart format.

4. Activities shall include:

   a. Description; what is to be accomplished and where.

   b. Workday duration.

   c. Scheduled activities shall indicate continuous flow, from left to right.

5. Identify days per week and shifts per day worked; also, non-work days and holidays.

6. For all schedules submitted, Contractor shall provide the following:

   a. Computerized sorts by:

      (1) Total Float
      (2) Early Start
      (3) Area Sort
      (4) Trade responsibility

   b. 60-day look ahead bar charts by early start.

   c. A narrative explaining progress to date on the project, work required in the succeeding update period, a description of the critical path, and comments concerning potential problem areas.

   d. Contract will submit four copies of each of the above.

F. Failure to include any element of work required for performance of this Contract shall not excuse Contractor from completing work required to comply with the Contract Documents, notwithstanding acceptance of Construction Schedule.

G. Submittal of Construction Schedule shall be understood to be Contractor's confirmation that the schedule meets requirements of the Contract Documents, and that work will be executed in sequence indicated in schedule.

1.06 REVIEWS, UPDATES, AND REVISIONS

A. The District will review and return Contractor's Detailed Project Schedule, with summary comments, within Seventeen (17) calendar days. If revisions are required, Contractor shall resubmit Schedule within fourteen (14) calendar days following receipt of the District's comments.

B. After Contractor and the District agree to a final schedule, it will become the Project Construction Schedule and considered part of the Contract Documents. No changes to Schedule will be allowed unless mutually agreed upon with the District.

C. Contractor shall analyze and update the Detailed Project Schedule:

1. As part of monthly payment application, Contractor shall submit to and participate with the District in a schedule review to include:

    a. Actual completion dates for work items completed during report period.

    b. Actual start dates for work items started during report period.

    c. Estimated remaining duration for work items in progress, which will not exceed original duration for activity.

    d. Estimated start dates for work items scheduled to start during month following report period, if applicable.

    e. Changes in duration of work items.

    f. A summary bar chart schedule, organized first by work segment plan, and then by area (building number or other appropriate subdivision) shall show construction progress in each area. The previous schedule shall be included in this report to compute the current performance with the original planned sequence of work.

2. In case of a change to Contractor's planned sequence of work, Contractor shall include a narrative report with updated progress schedule which shall include, but not be limited to, a description of problem areas, current and anticipated delaying factors, and any proposed revisions for a recover plan.

3. All change orders affecting this schedule shall be clearly identified as a separate and new activity.

4. Review of Detailed Project Schedule will not relieve Contractor of responsibility for accomplishing all work in accordance with the Contract Documents.

D. Updates: The Contractor shall submit to the District, with each payment application, an up-to-date Detailed Project Schedule to include following:

1. Work Item Report: Detailing work items and dependencies as indicated on Bar Chart.

2. Separate listing of activities completed during reporting period.

3. Separate listing of activities which are currently in progress, indicating their remaining duration and percentages completed.

4. Separate listing of activities which are causing delay in work progress.

5. Narrative report to define problem areas, anticipated delays, and impact on Detailed Project Schedule. Report corrective action taken, or proposed, and its effect, including effect of changes on schedules of separate contractors.

6. Resolution of conflict between actual work progress and schedule logic: when out-of-sequence activities develop in the Schedule because of actual construction progress, Contractor shall submit a revised schedule to conform to current job sequence and direction.

E. If, according to current updated Detailed Project Schedule, the District determines Contractor is behind the Contract completion date or any interim milestone completion dates, considering all time extensions to which Contractor is entitled, Contractor shall submit a revised schedule, showing a workable plan and a narrative description to complete project on time. In accordance with Article 1.06, Paragraph C-2.

1. The District shall withhold progress payments until a revised schedule, acceptable to the District, is submitted by Contractor.

F. Scheduling of change or extra work orders is responsibility of Contractor.

1. Contractor shall revise Detailed Project Schedule to incorporate all activities involved in completing change orders or extra work orders and submit it to the District for review.

G. If the District finds Contractor is entitled to extension of any completion date, under provisions of the Contract, the District's determination of total number of days extension will be based upon current analysis of Construction Schedule, and upon data relevant to extension.

H. Contractor acknowledges and agrees that delays to non-critical activities will not be considered a basis for a time extension unless activities become critical. Non-critical activities are those activities which, when delayed, do not affect an interim or final Contract completion date.

I. Any claim for extension of time shall be made in writing to the Architect not more than seven (7) days after commencement of delay; otherwise, it shall be deemed finally waived for all purposes. Contractor shall provide an estimate of probable effect of such delay on progress of work as part of claim.

1.07 CONTRACTOR'S RESPONSIBILITY

A. Nothing in these requirements shall be deemed to be a usurpation of Contractor's authority and responsibility to plan and schedule work as Contractor sees fit, subject to all other requirements of Contract Documents.

B. Contractor shall provide at all times sufficient competent labor, materials, and equipment to properly carry on work and to insure completion of each part in accordance with Construction Schedule and within time agreed.

C. Contractor shall be responsible for ensuring that all submittals to the District are accurate and consistent. Damages, including extra time and cost, caused by inaccuracies from Contractor will be compensated by Contractor.

1.08 SUSPENSION OF PAYMENTS

A. Initial Submittal: The District has the right to withhold progress payments until Detailed Project Schedule is accepted by the District.

B. Update Submittals: The District has the right to withhold progress payments if Contractor fails to update and submit Detailed Project Schedule and reports as required by the District.

1.09 RECORD COPY

A. At completion of work items, submit Detailed Project Schedule reflecting "as-built" sequence.

1.10 FORM OF SUBMITTAL

A. All Detailed Project Schedule submittals shall be transmitted with a Letter of Transmittal and shall include three (3) hard copies and one (1) electronic copy.

2.00 PRODUCTS

Not used.

3.00 EXECUTION

Not used.

END OF SECTION

SECTION 013323
SHOP DRAWINGS AND SAMPLES

1.00 GENERAL

1.01 SUMMARY

A. This Section establishes general requirements for shop drawings and samples, and supplements similar provisions found elsewhere in the Contract Documents.

1.02 GENERAL REQUIREMENTS

A. Prior to submission to Architect, Contractor to check all shop drawings, brochures, and other such construction data for quantity, size, and dimensions. Architect will answer questions raised by Contractor, and will make determination regarding quality of material and equipment, design and arrangement decisions, and color selections, but will not be responsible for quantity, size, or dimensional errors on shop drawings. In cases of omission and obvious error, and in cases of conflict, either between details on Contract Drawings or Specifications, such questions shall be brought to the Architect's attention, and Architect will give prompt answers to such questions.

1. Colors and textures to be selected will be selected from all available colors and textures, regardless of price ranges. For instance, where the first manufacturer listed has 20 colors or color ways available, that is the minimum number that shall be available for selection. Products of other manufacturers may be submitted, but the cost of colors considered special shall be included in the Contract Sum if their number is less than 20. When colors or textures are custom from any manufacturer, they will be so identified.

B. Carefully review subcontractors' submittals for completeness and correctness and stamp and acknowledge such review on submittals, prior to transmitting them to Architect.

C. Close adherence to these requirements is necessary to avoid delay in processing of shop drawings by the Architect. Deviation from these requirements may result in rejection of the submittal. Contractor will be held responsible for delays resulting from tardy and improper submittals.

D. Obtain approvals from required agencies, prior to submittal to the Architect, for all revisions, substitutions of materials or design, including all structural deviation from the design as shown and specified.

1.03 SUBMITTALS

A. Shop drawings, data, specifications, etc. (District may request more):

1. PDF by email.

B. Samples, brochures, etc. (District may request more):

1. 3 hard copies.

1.04 SUBMITTAL PROCEDURES

A. Identify submittals with job name, location, and Architect's job number. They shall be reviewed, stamped with an approximately 3 in. x 1/2 in. identification stamp, and have the signed approval of Contractor, prior to submission to Architect. Each sheet of drawings, both prints and transparencies, shall be so identified and signed.

B. Bound sets of brochures, catalog sheets, specifications and materials lists shall include an index sheet, completely identifying the entire content of the submittal in sequential order. At his option, the Contractor may identify, stamp and sign only this index sheet.

C. In lieu of signing each brochure, Contractor may indicate on Letter of transmittal that he has reviewed and approved all material included. This does not eliminate requirements for identification stamp information.

D. Architect will return to the Contractor one copy of the vellum transparency of drawings and 1 brochure, stamped and signed with corrections, if any. If the Contractor desires additional copies returned, then he must so request and submit the extra copies.

E. Handle re-submittals the same as the original submittals, but identify as such and use the Architect's original shop drawing number.

F. Accompany each submittal by a letter of transmittal containing a complete itemized and numbered list of the submitted material together with the subcontractor's name. A separate Letter of transmittal shall accompany each submittal from different subcontractors and different categories (trade and building units).

G. Segregate and submit shop drawing submittals separately for each building unit comprising entire Project. Submittals shall be made as though each building unit and the site are separate projects.

1.05 SAMPLES

A. Labeling: Identify each sample with at least a 3 in. by 4 in. label with the following information.

1. Complete identification stamp information in accordance with submittals procedure in paragraph 1.04, A.

2. Name, finish, and composition of the material.

3. Location or intended use on the Project.

B. Size of samples: Of sufficient size to show all salient features of material or item, and which are truly representative of the extremes of variation in color, texture, finish, and construction to be expected in installed work. Samples of framed materials shall include a corner joint. Allow space for 5 in. by 3 in. Architect's review stamp.

C. Mock-ups: Specifications may require mock-ups of proposed construction elements, using actual materials and full-size components. Such mock-ups shall be included in the Contract Sum.

D. Review of samples: After review, samples will be stamped or labeled to indicate their review, and one sample will be returned to the Contractor.

1. Samples retained by the Architect will constitute the standard of quality and appearance of all materials of the type represented by the sample.

2. When samples are rejected, Contractor will be given reasons for rejection and shall resubmit samples until, in the opinion of the Architect, they comply with Contract requirements.

E. At the option of the District or Architect, samples may be subject to testing. In such event, additional samples as may be required shall be supplied by the Contractor at no additional cost.

END OF SECTION

SECTION 013513
SPECIAL PROJECT PROCEDURES

1.00 GENERAL

1.01 SUMMARY

A. General: Buildings will not be occupied while the work of this Contract is performed.

B. Existing conditions:

1. Contractor shall accept the site in the condition in which they exist at the time he is given access to begin work.

2. Before starting work, make a detailed survey of existing conditions, verify governing dimensions at the premises against the Drawings, and examine adjoining work on which the work of this Contract is dependent.

3. No "Extra" or additional compensation will be allowed on account of differences between actual measurements and dimensions shown.

4. Submit differences discovered during Work to Architect for interpretation before proceeding with associated work.

C. Protection:

1. While work of this Contract is in progress, protect adjacent areas, facilities, grounds, and contents, whether private or public, from damage or harm due to the work of this Contract.

2. Cover and protect all surfaces of areas turned over to Contractor for the Work as required to prevent soiling or damage by dust, dirt, water, fumes or otherwise, and protect other areas where Work is performed in the same manner, all as deemed adequate by the District. Prior to District's re-occupancy of any such area, clean all surfaces according to cleaning instructions as may be specified in other Sections or issued by the District.

3. Conform to following requirements where welding is performed in or on the buildings.

a. Protection during welding: Conform to CAC. Further protect occupants and the public with portable solid vision barricades around locations where welding is performed plus sign warning against looking at welding without proper eye protection, or equivalent.

b. Fire extinguishers: Maintain a fully charged UL labeled, minimum 10 lbs. ABC fire extinguisher at each location where welding is performed.

c. Welding smoke control: Verify locations of existing smoke detectors. Perform welding operations by methods that produce the minimum feasible smoke and fumes. Furnish portable type smoke collection and ventilating equipment as required to prevent smoke and fume nuisances. Notify the District at least 48 hours in advance if temporary deactivation of smoke detector is required to prevent false alarms from welding. District will permit deactivation of detectors only for the time welding is actually in progress.

4. Fire prevention:

a. Ensure that flammable solvents are not being used in the area. Maintain a safe distance between place of welding and source of flammable solvents.

b. In addition, examine existing construction and backing for all combustible materials and finishes and for conditions where heat conduction in metals may bring adjoining materials to ignition temperature.

c. Use positive fire prevention measures including, without limitation, removal and reinstallation of combustible materials, installation of temporary shields and/or heat sinks, and all other necessary measures.

5. No utility services, such as water, gas, sewers, electricity, telephone, communication, and fire protection system serving the Buildings or parts thereof, shall be interrupted without prior written approval of the District, and other authorities having jurisdiction.

6. Damage caused by the Contractor to existing structures, grounds, pavements, utilities or flora, or work done by others, shall be repaired by the Contractor at his expense and left in as good condition as existed before the damaging, except where such existing work is shown to be removed, or replaced by new work.

D. Access:

1. During the life of the Contract, maintain access to site, and within the site to the buildings for fire-fighting equipment, ambulance and police vehicles.

2. Required accessways and other accessways not required but so designated by the District or Contract Documents shall not be blocked so as not to interfere with access to adjacent areas, facilities or new work area and cause least possible interference with activities of other contractors, District's personnel or the public.

1.02 SURVEY AND RE-SURVEY OF EXISTING CONDITIONS

A. Intent of Drawings is to show existing site and buildings conditions with information developed from original construction documents, field surveys, and District's records, and to generally show the extent and type of demolition required to complete the Work.

1. Information shown on the Drawings is not a guarantee of existing conditions.

2. Contractor/Bidder is invited to survey the site of the work after making arrangements to do so with the District.

B. After award of Contract and before starting work, the Contractor, the District's representative, and the Architect shall together make a thorough survey of the existing facilities, and areas to be used for staging, storage or accessways to or from the Work.

1. Contractor shall list, and photograph if he/she desires, existing conditions not requiring alterations, shall note discrepancies between Drawings and existing conditions, and shall designate areas of storage and routes of access agreed upon by the District.

2. Where necessary, Architect will issue clarifications and instructions.

3. Do not proceed where such conflicts or discrepancies occur prior to receipt of Architect's instructions.

C. At a mutually agreed upon time before completion of Work, the Contractor, the District and Architect shall re-survey the same areas.

1. Contractor shall furnish a report on conditions then existing compared with conditions as first noted.

2. The report of re-survey shall be signed by the Architect, and forwarded by the Contractor to the District.

3. Damage indicated in the report that was caused by the Contractor, or anyone employed by or under contract to the Contractor, shall be repaired by the Contractor at his expense and left in as good condition as existed before the damaging.

1.03 RESTRICTIONS

A. Noise control: Exercise caution to prevent generation of unnecessary noise and keep work-generated noise levels to minimum possible. Do not exceed CAL/OSHA standards at any time. Discontinue noise producing operations, when requested by the District, and reschedule at a mutually acceptable time.

1. Equip internal combustion engines with suitable mufflers. Do not use internal combustion engines in enclosed spaces, including the buildings, without the District's written approval.

2. Mount rolling equipment on pneumatic tires.

B. Dust control:

1. Control dust by methods acceptable to the District and the C. M.

2. Provide dust-tight partitions to prevent dust escaping into other parts of the building where work is not in progress.

3. Assume liability for claims related to flying dust and debris.

C. Water control:

1. Control the use of water to prevent damage to the existing facilities and site improvements to remain. Provide wet vacuum equipment where water, such as waste cooling water from concrete sawing, is used in and adjacent to existing buildings.

2. Provide impermeable floor coverings and suitable dams to prevent damage by water, and immediately clean-up and remove all surplus water, and water spilled in non-working areas.

D. Security: Coordinate security with the District.

1. Take all necessary precautions to keep trespassers out of work and demolition areas.

2. Properly secure work and demolition areas from entry when work is not in progress but do not block required exitways.

END OF SECTION

SECTION 013600
CUTTING AND PATCHING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section establishes general requirements pertaining to cutting (including excavating), fitting, and patching of the Work required to:

1. Make the several parts fit properly;

2. Uncover work to provide for installing, inspecting, or both, of ill-timed work;

3. Remove and replace work not conforming to requirements of the Contract Documents; and

4. Remove and replace defective work.

B. Related work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

2. In addition to other requirements specified, upon the District's request uncover work to provide for inspection by the District of covered work, and remove samples of installed materials for testing.

3. Do not cut or alter work performed under separate contracts without the District's written permission.

1.2 SUBMITTALS

A. Request for District's consent:

1. Prior to cutting which affects structural safety, submit written request to the Project Manager for permission to proceed with cutting.

2. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, so notify the Project Manager and secure his written permission and the required Change Order prior to proceeding.

B. Notices to the Project Manager:

1. Prior to cutting and patching performed pursuant to the District's instructions, submit cost estimate to the Project Manager. Secure the Project Manager's approval of cost estimates and type of reimbursement before proceeding with cutting and patching.

2. Submit written notice to the Project Manager designating the time the Work will be uncovered, to provide for the District's observation.

1.3 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.

PART 2 – PRODUCTS

2.1 MATERIALS

A. For replacement of items removed, use materials complying with pertinent Sections of these Specifications.

2.2 PAYMENT FOR COSTS

A. The Owner will reimburse the Contractor for cutting and patching performed pursuant to a written Change Order, after claim for such reimbursement is submitted by the Contractor. Perform other cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.

2. After uncovering the work, inspect conditions affecting installation of new work.

B. Discrepancies:

1. If uncovered conditions are not as anticipated, immediately notify the Architect and secure needed directions.

2. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION PRIOR TO CUTTING

A. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

3.3 PERFORMANCE

A. Perform required excavating and backfilling as required under pertinent other Sections of these Specifications and OSHA standards for such work.

1. Perform cutting and demolition by methods which will prevent damage to other portions of the Work and provide proper surfaces to receive installation of repair and new work.

2. Perform fitting and adjusting of products to provide finished installation complying with the specified tolerances and finishes.

3. Typically chip back existing adjoining plaster surfaces to expose the lath and building paper to permit proper lapping on new infill materials.

END OF SECTION

SECTION 014000
QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.

2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:

1. Divisions 2 through 33 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.

1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.

2. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.

2. Project title and number.

3. Name, address, and telephone number of testing agency.

4. Dates and locations of samples and tests or inspections.

5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.

7. Identification of product and Specification Section.

8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.

10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.

11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.

12. Name and signature of laboratory inspector.

13. Recommendations on retesting and re-inspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.

2. Statement on condition of substrates and their acceptability for installation of product.

3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

4. Results of operational and other tests and a statement of whether observed performance complies with requirements.

5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.

b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

c. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.

2. Notify Architect seven days in advance of dates and times when mockups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Demolish and remove mockups when directed, unless otherwise indicated.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.

2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.

3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.

6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.

2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.

4. Facilities for storage and field curing of test samples.

5. Delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.

7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency and/or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.

2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.

3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.

4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.

6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 1.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014529
TESTING AND INSPECTION REQUIREMENTS

1.01 SUMMARY

A. Section Includes: Cooperate with the Owner's selected testing agency, the Project Inspector, and others responsible for testing and inspecting the Work, and assist the Owner by coordinating such testing and inspecting services as specified in this Section and/or elsewhere in the Contract Documents including the attached Division of State Architect Structural Tests and Inspections sheet (enclosed).

B. Related Work Specified Elsewhere:

1. Requirements for testing may be required in other Sections of these Specifications.

2. Where no testing requirements are specified or required by reference standards or authorities having jurisdiction, the Owner may require such testing to be performed under current pertinent standards for testing. Payment for such testing will be made as described herein.

C. Work Not Included:

1. The Owner will select a pre-qualified independent testing laboratory and Inspector as approved by the Division of the State Architect, Office of Regulation Services.

2. The Owner will pay for initial services of the testing laboratory as further described hereinafter.

1.02 QUALITY ASSURANCE

A. The Owner will select an independent testing laboratory to conduct the tests. Selection of the material required to be tested shall be by the laboratory or the Owner's representative and not by the Contractor.

B. Qualifications of Testing Laboratory: A DSA accepted testing laboratory directly employed by the district (owner) shall conduct all the required tests and inspections for the project.

C. Codes and Standards: Testing, when required, will be in accordance with pertinent codes and regulations and with selected standards of the American Society for Testing and Materials and other organizations or agencies which publish recognized codes, standards, or tests. Refer to Article 3.04 – Required Testing of this Section.

D. The project specifications shall be in accordance with the provisions of the Standard Specifications for Public Works Construction (SSPWC) 2012 Edition.

1.03 TEST REPORT DISTRIBUTION

A. Promptly process and distribute required copies of test reports and related instructions to ensure necessary retesting and/or replacement of materials with the least possible delay in progress of the Work.

B. One copy of test reports shall be forwarded to the Division of the State Architect by the testing agency. Such reports shall include tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of Title 24 and with the approved specifications. Test reports shall show the specified design strength. They shall also state definitely whether or not the material or materials tested comply with requirements.

C. Each testing agency shall submit to the Division of the State Architect a verified report in duplicate covering tests which are required to be made by that agency during the progress of the project. Such report shall be furnished each time that work on the project is suspended, including tests up to that time, and at the completion of the project.

1.04 PAYMENT FOR TESTING SERVICES

A. Initial Services: The Owner will pay for initial testing and inspection except as specifically modified herein-after or as specified otherwise in technical sections. Provided the results of inspection indicating compliance with the Contract Documents.

B. Retesting: When initial tests or inspection indicate noncompliance with the Contract Documents, subsequent retesting or re-inspection occasioned by the noncompliance shall be performed by the same testing laboratory or Inspector and the costs thereof will be deducted by the Owner from the Contract Sum. Retesting and re-inspection will continue until test or inspection results indicate compliance.

C. Code Compliance Testing: Inspections and tests required by codes or ordinances, or by authorities having jurisdiction and made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Owner, but back charged to the Contractor in case of retesting due to noncompliance.

D. Specified Inspections and Tests: Tests and inspections specified in the Specifications, directly or by reference, shall be coordinated by the Contractor at his expense and paid for by the Owner. Corrections of noncompliance and test failures shall be paid for by the Owner, but shall be back charged to the Contractor. Re-inspection and retesting shall be in accordance with paragraph 1.04-B.

E. Contractor's Convenience Testing: Inspecting or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of and at the expense of the Contractor.

1.05 INSPECTION BY THE OWNER

A. The Owner and his representatives will have access, for the purpose of inspection, to parts of the work and to the shops wherein the work is in preparation, and the Contractor shall maintain proper facilities and provide safe access for such inspection.

B. The Owner shall have the right to reject materials and workmanship which are defective, and to require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises without charge to the Owner. If the Contractor does not correct such rejected within a reasonable time, fixed by written notice, the Owner may correct rejected work and charge the expense to the Contractor.

C. Should it be considered necessary or advisable by the Owner at any time before final acceptance of the entire work to make an examination of work already completed by removing or tearing out the same, the Contractor shall on request promptly furnish necessary facilities, labor and materials. If such work is found to be defective in respect due to fault of the Contractor or his subcontractor, he shall defray expenses of such examinations and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, the additional cost of labor and material necessarily involved in the examination and replacement will be allowed the Contractor.

1.06 PROJECT INSPECTOR

A. A "DSA Certified" Project Inspector employed by the District (owner) and approved by the DSA shall provide continuous inspection of the work. The duties of the inspector are defined in section 4-342, Part 1, Title 24, CCR.

42. Duties of the Project Inspector.

(A) General: The Project Inspector shall act under the direction of the A/E/Engineer.

(B) Duties: The general duties of the Project Inspector in fulfilling his or her responsibilities are as follows:

(1) Inspection: He or she must have actual personal knowledge, obtained by his personal inspection of the work of construction in stages of its progress, that the requirements of the approved plans and specifications are being completely executed.

Inspection means complete inspection of every part of the work. Work, such as concrete work or brick work which can be inspected only as it is placed, shall require the constant presence of the Project Inspector. Other types of work which can be completely inspected after the work is installed may be carried on while the Inspector is not present. In any case, the Project Inspector must personally inspect every part of the work. In no case shall the Project Inspector have or assume duties which will prevent him or her from providing inspection.

The Project Inspector may obtain personal knowledge of the work of construction, either on-site or off-site, performed under the inspection of a Special Inspector or Assistant Inspector from the reporting of others on testing or inspection of materials and workmanship for compliance with the plans, specifications and applicable standards. The exercise of reasonable diligence to obtain the facts shall be required.

(2) Relations with A/E/Engineer: The Project Inspector shall work under the general direction of the A/E/Engineer. Inconsistencies or seeming errors in the A/E/Engineer for his interpretation and instructions. In no case, however, shall the instruction of the A/E/Engineer be construed to cause work to be done which is not in conformity with the approved plans, specifications, and change orders.

(3) Job File: The Project Inspector shall keep a file of approved plans and specifications (including approved addenda or change orders) on the job, and shall immediately return unapproved documents to the A/E for proper action. The Project Inspector, as a condition of his employment, shall have and maintain on the job, codes and documents referred to in the plans and specifications.

(4) Project Inspector's Semi-Monthly Reports: The Project Inspector shall keep the A/E/Engineer thoroughly informed as to the progress of the work by making semi-monthly reports in writing as required in Section 37.

(5) Not Used.

(6) Construction Procedure Records: The Project Inspector shall keep a record of certain phases of construction procedure.

All such records of construction procedure shall be kept on the job until the completion of the work. These records shall be made a part of the permanent school records.

(7) Deviations: The Project Inspector shall notify the Contractor, in writing, of deviations from the approved plans and specifications which are not immediately corrected by the Contractor when brought to his or her attention. Copies of such notice shall be forwarded immediately to the A/E/Engineer.

Failure on the part of the Project Inspector to notify the Contractor of deviations from the approved plans and specifications shall in no way relieve the Contractor of responsibility to complete the work covered by his or her contract in accordance with the approved plans and specifications and laws and regulations.

(8) Verified Reports: The Project and Special Inspectors shall each make and submit to the Division of the State Architect verified reports.

The Project Inspector shall prepare and deliver to the Division of the State Architect detailed statements of fact regarding materials, operations, etc., when requested.

(c) Violations: Failure, refusal, or neglect on the part of the Inspector to notify the Contractor of work which does not comply with the requirements of the approved plans and specifications, or failure, refusal, or neglect to report immediately, in writing, such violation to the A/E/Engineer, to the School Board, and to the Division of the State Architect shall constitute a violation of the act and shall be cause for the Division of the State Architect to take action.

Note: Authority cited: Section 39152 and 81142, Education Code. Reference: Sections 39151, 39153, 81141 and 81143, Education Code."

B. The work of construction in stages of progress shall be subject to the personal continuous observation of the Project Inspector as continuous observation is defined by Title 24. He shall have free access to all parts of the work at any time. The Contractor shall furnish the Project Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from obligation to fulfill this Contract.

1.07 OWNER'S OTHER PERSONNEL

A. From time to time, other personnel in the employ of the Owner may inspect the Work when the Work is in progress but shall have no authority to direct the Contractor or request changes in the Work except as may be provided elsewhere in the Contract Documents.

1.08 REPRESENTATIVE OF THE DIVISION OF THE STATE ARCHITECT

A. Architect shall have access to the site in accordance with Title 24, Part 1, 4-333.

B. Field Engineers and Inspectors from D.S.A. Structural Safety Section, Fire & Life Safety Review and Access Compliance shall have access to the site in accordance with Title 24, Part 1, 4-334.

PART 2 - PRODUCTS

(Not Applicable)

PART 3 - EXECUTION

3.01 COOPERATION WITH TESTING LABORATORY AND INSPECTORS

A. Inspectors and representatives of the testing laboratory shall have access to the work. Provide facilities for such access in order that the testing, inspection, and the obtaining of samples may be done properly.

B. Contractor shall deliver material specimens to the Owner's testing lab, which must by terms of the Contract be tested prior to inclusion in the Project, at least 45 days prior to scheduled delivery to the job site.

C. Material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required shall not be incorporated in the job.

3.02 TAKING SPECIMENS

A. Field specimens and samples for testing, unless otherwise provided in these Contract Documents, shall be selected and taken by the Testing Laboratory or Project Inspector and not the Contractor. Sampling equipment and personnel will be provided by the testing laboratory. Deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory. Soil samples for approval of import fill shall be picked-up by the Testing Laboratory.

3.03 SCHEDULES FOR TESTING

A. Establishing Schedule:

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.

2. Provide required time within the construction schedule.

B. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate such changes of schedule with the testing laboratory as required.

C. Adherence to Schedule: When the testing laboratory is ready to test according to the determined schedules, but is prevented from testing or taking specimens due to incompleteness of the work, extra charges for testing attributable to the delay may be back-charged to the Contractor and will be deducted by the Owner from the Contract Sum.

3.04 REQUIRED TESTING

Tests and inspections for the following items, where applicable, will be required in accordance with referenced Sections/Chapters of California Building Code, 2019 Edition, Title 24, Part 2:

A. FOUNDATIONS:

1. INSPECTION:

a. Inspection of Cast-In-Place Deep Foundation 1705A.8

B. CONCRETE (Chapter 19A)

1. MATERIALS:

a.	Portland Cement	1704A; 1910A.1
b.	Concrete Aggregates	1704A; 1908A.3
c.	Not Used	
d.	Reinforcing Bars	1704A; 1910A.2

2. QUALITY:

a.	Proportions of Concrete	1901A
b.	Strength Tests of Concrete	1905A.1.15
c.	Shotcrete Proportions	1908A.2
d.	Shotcrete Cores	1908A.10
e.	Composite Construction Cores	1910A.4
f.	Gypsum Concrete Strength Tests	2514A

3. INSPECTION:

a.	Job Site	1704A
b.	Batch Plant	1705.A..3.3
c.	Waiver of Batch Plant	1705.A..3.3.1
d.	Pre-stressed Concrete	1705A..3.4
e.	Shotcrete	1705A.19; 1908A
f.	Reinforcing Bar Welding	1903A.8; Table 1705A.3
g.	Post-Installed Anchors in Concrete	1705A..3.8; 1910A.5; 1909.2.7

C. LIGHT WEIGHT METALS

1. MATERIALS

a.	Alloys	2002.1
b.	Identification	2002.1

2. INSPECTION

a.	Welding	2003.1

D. STRUCTURAL STEEL

1. MATERIALS

a.	Structural Steel	2205A.1
b.	Cold Form Steel	2210A.1
c.	Identification	2202A.1

2. QUALITY

a.	Tests of Structural and Cold Form Steel	2210A
b.	Tests of End Welded Studs	1705A.2.5; 2213A.2; 2212.6.2
c.	Steel Joists	2207A; 1704A; 1705A
d.	Non-Destructive Weld Tests	AISC 360: N5.5

3. INSPECTION

a.	Shop Fabrication	1704A.2.5
b.	Welding	1704A
c.	Nelson Stud Welding	1704A

E. WOOD

1. MATERIALS:

a.	Lumber and plywood	2303.1

END OF SECTION

SECTION 015000
TEMPORARY FACILITIES

PART 1 – GENERAL

1.01 SUMMARY

A. Provide all temporary facilities and controls required for the performance of the Work.

B. Supervise the use of all temporary facilities and controls. Enforce compliance with applicable standards. Prevent abuses of services.

1.02 SAFETY

A. Guard machinery, equipment, and all hazards in accordance with the safety provisions of the latest edition of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable law.

1. Protect all hazards with adequately constructed guard rails or barricades and provide lanterns, warning lights, and the like, as necessary. Eliminate all attractive nuisance from the work and the room site.

2. To this end, dispose, store, guard, and protect the premises and all work materials, equipment and both permanent and temporary construction so as to preclude the unauthorized use thereof by children or others and particularly to eliminate possible consequent injury to all persons.

B. Structural design of all items used in the construction of the building and not a permanent part thereof, including, shoring for concrete and masonry work, the temporary bracing for structural steel, and the shoring of cut earth banks, its the sole responsibility of the Contractor.

1.03 SCAFFOLDING AND HOISTS

A. Furnish and maintain hoists, staging, rigging, scaffolding, and runways required in the prosecution of the work. Erect, equip and maintain such temporary work in accordance with statutes, laws, ordinances, rules or regulations of the State of California and other authorities and Insurance Companies having jurisdiction.

1.04 DUST CONTROL

A. During the life of the Contract, provide effective means of dust control both within the structure and on the surrounding site.

B. Obtain the Architect's approval before use of any means except water.

C. Water all active construction areas as often as needed to control dust.

D. Cover all trucks hauling soil, sand and other loose materials or require all trucks to maintain at least 2 feet of freeboard.

E. Apply water 3 times daily, or apply non-toxic soil stabilizers on all unpaved access roads, parking areas and staging areas at construction site.

F. Sweep daily with water sweeper, all paved access roads, parking areas and staging areas at construction site.

G. Sweep streets daily with water sweeper, if visible soil material is carried onto adjacent public streets.

H. Hydroseed or apply non-toxic stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more).

I. Enclose, cover water twice daily or apply non-toxic soil binders to exposed stockpiles of dirt, sand and other loose materials.

J. Limit traffic speed on unpaved roads to 15 mph.

K. Install sandbags or other erosion control measures to prevent silt runoff to public roadways.

L. Replant vegetation in disturbed areas as quickly as possible.

1.05 MAINTENANCE OF TRAFFIC

A. Maintain traffic on all streets adjacent to or leading to the site.

B. Where construction operations interfere with the free movement of traffic, provide traffic controls, flagmen or similar devices to efficiently control traffic movement.

C. Provide a traffic control permit from the local authorities if required.

D. Schedule delivery of materials and construction activities so that they do not interfere with student/public traffic at drop-off and pick-up.

1.06 DEWATERING

A. Furnish and maintain all pumps or other dewatering devices required by this Work.

1.07 PROJECT OFFICE

A. Provide and maintain, for the duration of the Contract, a project office, complete with heat, light, ventilation and convenience outlets. The office shall be of sufficient size for the Contractor's personnel and operators and shall provide desk space for use by the Architect and for inspection personnel.

1.08 TELEPHONE

A. Provide and pay for all necessary temporary telephone service.

B. Maintain telephone(s) in continuous service on the project site during the course of the Work and make available at all times, free and unrestricted, to the Architect's and District's representatives for calls in direct connection with the Work.

1.09 TEMPORARY TOILETS

A. Provide temporary toilet facilities for all personnel employed on the Project. Maintain toilets in a clean and sanitary condition at all times. Remove at Project completion.

1.10 CONSTRUCTION WATER AND POWER

A. Make arrangements for all water and power required for the Project. Provide all temporary lines and arrange for billing to go directly to District. Remove temporary facilities at Project completion.

1.11 FENCES AND BARRICADES/SECURITY

A. Around the construction site, erect fences and barricades with gates, as required by local governing authorities, for security and to prevent unauthorized entry to the Work site. Maintain in good condition until completion of the Project.

1.12 SIGNS

A. Furnish and erect a ¾ in. x 48 in. x 96 in. job sign painted and lettered to identify the Project, the Architect and the Contractor. Mount on post and brace as indicated by the Architect. Sign shall be lettered by a professional sign painter, and the layout shall be as indicated by the Architect.

B. Keep the premises free from all other posters, signs, and miscellaneous decorations, except those required by Code and to indicate unsafe conditions.

1.13 COPIES OF STANDARDS AND CODES

A. Copies of applicable referenced standards are not bound in this Project manual.

B. Copies of standards and California Building Code, Title 24, Parts I and II and shall be kept and available at the Project Site, available to the Contractor's personnel, Sub-contractors, District, Inspectors and Architect.

END OF SECTION

SECTION 016600
PRODUCT HANDLING

1.00 GENERAL

1.01 SUMMARY

A. Section includes:

1. This Section establishes general requirements for product handling and storage, whether on or off site, and supplements similar provisions found elsewhere in the Contract Documents.

1.02 HANDLING

A. General: Transport, deliver, handle, and store all materials and equipment used on the Project to prevent the intrusions of foreign matter, moisture, and to prevent damage. In all cases comply with the following.

1. Material and equipment manufacturer's printed instructions regarding temperature limitations.

2. Other environmental conditions which are required to maintain original quality of materials and equipment.

B. Packaging:

1. Provide packaged materials in their manufacturer's original containers with seals unbroken and labels intact until incorporating into the Work.

2. Wrapped or bundled materials shall clearly bear the manufacturer's name and trade mark.

C. Damaged materials: Remove damaged or otherwise unsuitable material and equipment promptly from the site. Do not install damaged materials.

1.03 STORAGE

A. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.

B. Store products at the site to facilitate inspection and measurement of quantity or counting of units.

C. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.

1. Do not subject slabs-on-grade to excessive loading by shoring, storage of materials or operation of construction equipment unless adequately protected by heavy planking. Maintenance of slabs in good condition is the responsibility of the Contractor who shall remove damaged areas of such slabs and replace them with new work, to the Architect's satisfaction, at no cost to the Owner.

D. Store products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

E. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

F. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

G. Locate storage piles, stacks or bins to avoid being disturbed, and protect from damage of any sort.

H. Store materials and equipment in accord with their manufacturer's instructions, above grade, and properly protected from weather and construction activities.

I. Payment may be withheld for improperly packaged and stored materials.

1.04 PROTECTION

A. Protect all finished surfaces, including floors, jambs, and soffits of all openings used as passageways or through which materials and equipment must travel.

B. Carts, hand trucks, wheelbarrows and similar wheeled conveyances used on or in any portion of the buildings shall be equipped with pneumatic tires, unless otherwise authorized by the Architect.

C. Keep finished surfaces clean and unmarred until the date of acceptance.

D. Refer to individual Specification Sections for additional specific product handling and protection requirements.

2.00 PRODUCTS

Not used.

3.00 EXECUTION

Not used.

END OF SECTION

SECTION 017400
CLEANING

1.00 GENERAL

1.01 DESCRIPTION

A. Principal work in this Section:

1. Keep premises, and adjacent private and public properties free from accumulations of waste, debris and rubbish caused by construction operations.

2. At completion of Work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces. Remove remaining mock-ups and sample panels.

3. Leave Project clean and ready for occupancy.

1.02 SAFETY REQUIREMENTS

A. Standards: Maintain Project in accord with State and local safety and insurance standards.

B. Hazard control:

1. Store volatile wastes in covered metal containers, and remove from premises daily.

2. Prevent accumulation of wastes which create hazardous conditions.

3. Provide adequate ventilation during use of volatile or noxious substances.

C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on Project site.

2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains. Store in containers with tight-fitting lids and remove to legal dump site or to recycling center.

2.00 PRODUCTS

Not used.

3.00 EXECUTION

3.01 DURING CONSTRUCTION

A. Keep premises, and adjacent private and public properties free from accumulations of waste materials and rubbish. Remove debris and dirt from public property promptly; sweep sidewalks and adjacent streets daily when soiled by work performed under this Contract.

B. Wet down materials and rubbish to lay dust and prevent it from blowing.

C. At least once a week, or more often if required, clean site and dispose of waste materials, debris and rubbish off the site in a legal manner. Remove combustible materials such as paper and cardboard daily.

D. Provide on-site containers for collection of waste materials, debris and rubbish. Provide a collection can at each location used as an eating area. Pick-up all garbage daily.

E. Remove waste materials, debris and rubbish from site and legally dispose of at legal public or private dumping areas or recycling center off District's property.

F. Do not allow debris and combustible materials to accumulate in, voids, cavities, and plenums created by wall, partition, and ceiling construction. These areas must be thoroughly cleaned out before being sealed or closed off by installation of finish materials.

G. Do not allow debris to clog drains. Clean roof drains, scuppers, floor drains and area drains free of debris. Verify that they drain properly. Keep drains clean of debris at all times.

H. Vacuum clean interior areas when ready to be painted. Refer to Section 09900 for other provisions on preparation of surfaces to be painted.

I. Handle materials in a controlled manner with as few handling as possible; do not drop or throw materials from heights.

J. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.02 FINAL CLEANING

A. Employ experienced workers, or professional cleaners, for final cleaning.

B. In preparation for Substantial Completion or Occupancy conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.

C. Remove labels that are not permanent labels.

D. Clean transparent materials, including mirrors and glass in doors and windows. Remove misplaced glazing compound and other substances. Replace chipped or broken glass and other damaged transparent materials.

E. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

F. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

G. Clean the site, including landscaped areas, of rubbish, litter and other foreign substances.

1. Contaminated earth:

a. Final clean-up operation includes the removal and disposal of earth contaminated or unsuitable for support of plant life in planting areas, and filling of resulting excavations with suitable soil.

b. Contaminated areas include those used for disposal of waste concrete, mortar, plaster, masonry, and similar materials, areas in which washing out of concrete and plaster mixers or washing of tools and like cleaning operations have been performed, and areas that have been oiled, paved, or chemically-treated.

c. Do not dispose of waste oil, solvents, paints, solutions, or like penetrating material by depositing or burying on District's property.

2. Sweep paved areas broom clean; remove stains, spills and other foreign deposits.

3. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

H. Keep Project clean until it is occupied by District.

END OF SECTION

SECTION 017720
PROJECT RECORD DOCUMENTS

1.00 GENERAL

1.01 SUMMARY

A. Section includes: General requirements for preparation, maintenance and delivery of record documents.

1.02 SUBMITTALS

A. Deliver record documents and transparencies to Architect at completion of Project.

B. Accompany submittal with transmittal letter, in duplicate, containing date, Project title and number, Contractor's name and address, title and number of each record document, certification that each document as submitted is complete and accurate, and signature of Contractor or its authorized representative.

2.00 PRODUCTS

Not Used.

3.00 EXECUTION

3.01 DOCUMENT MAINTENANCE

A. Maintain one copy of the following in Contractor's field office at the site:

1. Contract Drawings, including the DSA stamped set.

2. Specifications and Addenda.

3. Reviewed shop drawings.

4. Bulletins and change orders, field change authorization and notice of clarification, and other modifications to Contract.

5. Field test records.

B. File record documents apart from constructions documents and maintain in clean, dry, legible condition. Make record documents available for review by the Owner and Architect during regular business hours.

C. Do not use record documents for construction purpose.

D. Record documents will be subject to a monthly review by the Architect prior to approval of each progress payment.

3.02 RECORDING

A. Clearly label each document "PROJECT RECORD".

B. Keep record documents current.

C. Record and properly dimension deviations on the record drawings within 24 hours after work in affected area is completed. Dimensions shall be accurate to within 1 in.

1. Use a fine felt or nylon tip pen with waterproof colored ink for marking.

2. Legibly mark to record actual construction of the following:

a. Depths of various elements of foundation in relation to first floor level.

b. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements. Cut-off points and point of connections of utilities.

c. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.

d. Field changes of dimension and detail.

e. Changes made by Change Order, Field Change Authorization and Notice of Clarification.

f. Details not on original Contract Drawings.

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

D. Legibly mark-up each Section of the Specifications to record the following.

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment installed.

2. Changes made by change order, field change authorization and notice of clarification.

3. Other matters not originally specified.

E. Maintain shop drawings as record documents. Legibly annotate to record changes made after approval.

END OF SECTION

SECTION 017823
OPERATING AND MAINTENANCE DATA

1.00 GENERAL

1.01 SUMMARY

A. Prepare all maintenance manuals and operating instructions required by the Specifications.

B. Bind manuals and instructions in durable plastic binders as follows:

1. Identify the front cover and binding edge of the manual with the name of the Project and
"**OPERATING AND MAINTENANCE DATA.**"

2. Provide typewritten table of contents near the front of manual with page numbers to quickly locate the information.

3. Provide complete instructions regarding operation and maintenance of all equipment involved, including but not limited to, start-up and shut-down procedures, and safety precautions.

4. Provide complete nomenclature of all replaceable parts, their part numbers, current cost, and name and address of nearest vendor of parts.

5. Provide copy of guarantees and warranties issued by the equipment manufacturers.

6. Provide copy of the approved shop drawings, as applicable to the content of the manual, with all data concerning changes made during construction.

7. Use 8-1/2 in. by 11 in. sheets, except that larger sheets may be used when folded to this size and used as a pull-out.

C. Where content of manuals include manufacturers' catalog pages, clearly indicate the precise items included in this installation and delete, or otherwise clearly indicate all manufacturers' data with which this installation is not concerned.

D. Unless otherwise specified, provide one copy of each manual.

END OF SECTION

SECTION 021110
PRE-CONSTRUCTION SURVEY

1.00 GENERAL

1.01 SUMMARY

A. Prior to commencing operations on the site, the Contractor shall provide a topographic survey which also indicates the project boundary. The contractor shall compare the survey with the design plans and notify the Architect of any areas where the existing conditions vary from those indicated on the design plans. Copies of this survey shall be delivered to the Architect as described below.

1.02 SURVEY

A. The Contractor shall hire a California licensed land surveyor to prepare an as-built survey of the site conditions as they exist prior to construction.

B. The survey shall be prepared at a scale of 1”=30’ or 1”=20’ on 30 inch by 42 inch sheets and shall be provided in AutoCAD Release 2002 or later version along with two plots of same.

C. The survey shall indicate the basis of bearings and bench mark, and the surveyor shall set two on-site temporary bench marks at the same datum. The datum shall match the datum used by the Developer who graded the site.

D. The survey shall indicate top and toe of all slopes, grade breaks, flow lines, swales, ridges, etc. It shall also indicate elevations along the property lines, back of walk, street curb, driveways, etc.

E. The survey shall indicate street utility services and evidence of any utilities passing through the site.

F. Elevations shall be indicated a 50-foot grid maximum spacing across the entire site and one foot contours shall be indicated.

G. Any overhead lines shall be indicated.

H. Changes in material type shall be indicated with elevations.

1.03 SUBMITTALS

A. Contractor shall deliver two copies of the electronic AutoCAD drawing on CDs, and two plotted copies of same. The plotted survey shall be dated, signed and sealed by the licensed land surveyor.

B. The Architect will review the survey prior to approval to verify that the above requirements have been met.

END OF SECTION

SECTION 023100
TRENCHING AND BACKFILLING FOR UTILITIES

1.00 GENERAL

1.01 SUMMARY

A. Section includes:

1. Trenching, backfilling and compacting for utilities.

2. Bedding material for pipes.

B. Related work:

1. All other trenching, shoring and bracing, backfilling, and compacting: Section 023100.

2. Installation and tests of utilities: Division 33.

1.02 QUALITY ASSURANCE

A. Obtain District's Geotechnical Engineer's approval of backfill materials, method of placement, and of the completed work of this Section.

B. Reference data: Maps, soil investigation reports, and similar reference data are made available to Contractor for information only. District and Architect assume no responsibility for conclusions the Contractor may draw there from.

C. Reference standard:

2. Perform all work in compliance with applicable provisions of "Standard Specifications for Public Works Construction" (SSPWC). Mention herein of section numbers refers to sections of the reference standard.

3. Where reference standard refers to "Agency," substitute the word "District." Where reference standard is in conflict with these Specifications, these Specifications govern.

1.03 SOIL INVESTIGATION REPORT

A. Refer to the General Conditions.

1.04 WARRANTY

A. Any settling of backfill in trenches which may occur during the one-year period after Substantial Completion shall be repaired to District's satisfaction by Contractor without expense to District, including complete restoration of damaged paving, walks, and other materials or installations of every kind.

2.00 PRODUCTS

2.01 IMPORTED MATERIAL

Not used.

2.02 ON-SITE MATERIALS

A. Materials from cuts or excavations, approved by the Geotechnical Engineer, free of debris and without soft, spongy, organic and other deleterious materials.

1. Do not use cobbles or boulders larger than 4 in. in largest dimensions at any depth.

2. Do not use rocks greater than 2-1/2 in. in largest dimension in backfill within 12 in. of the top of pipe or structure, and within 12 in. of the top of pavement subgrade.

3. Where rocks are included in backfill, mix with suitable materials to eliminate voids.

2.03 BEDDING MATERIALS

A. Complying with section 306.1.2.1, Bedding, of the reference standard.

3.00 EXECUTION

3.01 INSPECTION

A. Verify conditions and measurements affecting the work of this Section at site. Make sure that detrimental conditions are corrected before proceeding with installation.

3.02 PROTECTIVE MEASURES

A. Utilities: Protect existing utility lines.

B. Settlement:

1. In areas where compacted backfill has been placed, additional consolidation will occur after completion due to changes in moisture content and surcharge.

2. Install utility connections crossing this backfill to the building, and improvements adjoining the building at the backfill line, to take into account this additional consolidation, or schedule sufficient time between backfilling operations and such improvements to allow this consolidation to take place.

3.03 COMPACTION CONTROL

A. Notification: Notify the Geotechnical Engineer whenever trench backfill work is being performed as part of this Section.

B. Replacement: Geotechnical Engineer will determine if work performed without inspection meets the requirements of these Specifications. Where directed by Geotechnical Engineer, uncover and replace work performed without inspection at no additional cost to the District.

3.04 TRENCH EXCAVATION

A. Before opening any new excavations, uncover all intersecting existing utility lines located between the ground surface and one foot below the bottom of the new trench line.

1. General:

a. Where unidentified existing utilities are encountered, determine whether these are active or abandoned.

b. Remove interfering portions of abandoned utilities and cap or plug open ends of pipe to remain.

c. The cap or plug must seal the opening in such a manner that would permit remaining portion of the utility to be reactivated.

d. Notify Architect for instructions on utilities which are determined to be active. Any relocation work performed on an active utility without obtaining prior approval of Architect will be done at the Contractor's risk and expense.

e. Do not proceed without instructions, except to correct an immediate hazard or emergency condition.

2. Trench width:

a. Maximum width of trench shall be 20 in. more than greatest diameter of pipe up to a point 6 in. above top of the pipe, except that it may be widened enough to place sheeting.

b. Make trenches at least 12 in. wider than greatest exterior diameter of pipe or conduit except that trenches for concrete-encased ducts may be the same width as duct encasement.

3. Dimensional tolerance:

a. Maintain accuracy of gravity utility lines designated for gradients less than 1% to 1/8 in. at any point and cumulative within 1/2 in./100 ft.

b. For all gravity lines, check each section of pipe for proper gravity slope direction with a string line set over the pipe by a surveyor.

c. Non-gravity utility line subgrades shall be accurate within +2 in.

3.05 PIPE BEDDING

A. Where bedding is required, provide a minimum of 4 in. of bedding material in the bottom of the trench, in addition to the requirements of section 306-1.2.1 of the reference standard, before installing pipes or conduits.

B. Do not allow water to accumulate in the trench.

3.06 DEWATERING

A. At no time shall water be allowed to back up into pipe in place. Securely plug terminal ends of pipe before work is abandoned at end of day or when laying is interrupted.

3.07 TRENCH BACKFILL

A. Backfilling of utility trenches shall not be undertaken (1) for 24 hours after Geotechnical Engineer has been notified of same, (2) until required tests and inspections have been completed, and (3) until "as-built" location notes have been recorded.

B. Place backfill material in compliance with section 306-1.3.2 of the reference standard, and to achieve at least 90% of the maximum density in compliance with ASTM D 1557. The top 12 in. of backfill in the building and under paved areas shall be compacted to 95% of maximum density.

C. Compaction by jetting, ponding or flooding is not permitted.

D. Remove surplus earth left after backfilling, and grade top of trench to match adjacent grades.

E. Backfill voids left by removal of sheeting, piles, and similar sheeting supports immediately with clean sand to assure dense and complete filling of voids.

END OF SECTION

SECTION 024119
SITE DEMOLITION AND CLEARING

1.00 STANDARDS

1.01 SUMMARY

A. Section includes:

1. Demolition and removal from Owner’s property concrete and asphalt pavement and curbs.

2. Demolition and removal from Owner’s property landscaping, trees designated to be removed and irrigation piping and related items.

3. Demolition and removal from Owner’s property underground utilities where shown on drawings and as required to complete project.

4. Abandon facilities and utilities.

5. Backfilling voids created by removing demolished items.

6. Contacting contaminated soils.

7. Disposal of demolished/removed items.

8. Dust control.

9. Erosion control.

10. Tree protection.

1.02 REQUIREMENTS

A. Geotechnical Engineering Report has been prepared by Earth Systems for the Rosamond High School Cafeteria Building project. Copies of this report and any addenda are available for review at the office of the Owner's Representative.

B. Construction materials and methods shall be in accordance with the site-specific recommendations and standard specifications contained in the Geotechnical Engineering Report.

C. A Geotechnical Engineer employed by the Owner to perform observation, testing and reporting during construction in accordance with the contract documents (hereinafter referred to as the Construction-Phase Geotechnical Engineer).

D. Observation

1. Refer to Section 014529, Testing Laboratory and Inspection Services, for additional requirements.

2. Clearing and grubbing operations shall be observed by the Construction Phase Geotechnical Engineer.

3. Demolition operations requiring excavation more than 12 inches below existing ground surface shall be continuously observed by the Construction-Phase Geotechnical Engineer.

4. All plugging of pipelines or conduits allowed to be abandoned in place outside of building and pavement areas shall be observed by the Construction-Phase Geotechnical Engineer.

5. Contractor shall notify the Construction-Phase Geotechnical Engineer and the Owner's Representative at least five (5) working days prior to commencement of clearing operations.

6. The cost of observation by the Construction-Phase Geotechnical Engineer shall be borne by the Owner.

7. The Construction-Phase Geotechnical Engineer shall certify that site demolition was properly completed in conformance with the Drawings and Specifications. Certification shall be in the form of a report to the Owner's Representative.

2.00 MATERIALS (Not Used)

3.00 EXECUTION

3.01 LOCATING AND MARKING FACILITIES

A. Before beginning clearing or other excavation, determine the location of all existing buried conduits and structures which are to remain within the work area and mark these locations at the site with paint and/or flags.

3.02 CLEARING AND GRUBBING

A. Prior to commencing grading operations, clear the existing ground surface of areas to be graded of all organic material vegetation (except trees indicated on the Drawings to remain), whether living or dead, including large roots, as well as all trash and debris, as determined by the Construction Phase Geotechnical Engineer.

B. Prior to commencing grading operations, excavate and remove from areas to be graded all existing non-complying fill and soil containing debris, organics, pavement and other unsuitable material as determined by the Construction Phase Geotechnical Engineer.

3.03 DEMOLITION

A. Where demolition areas are indicated on the Drawings and/or called for in the Specifications, clear old pavements, old foundations, slabs, curbs, gutters, abandoned pipelines and conduits, and soils contaminated during demolition operations as determined by the Construction Phase Geotechnical Engineer, EXCEPT WHERE SUCH CLEARING OPERATIONS MAY JEOPARDIZE EXISTING TREES OR STRUCTURES TO REMAIN ("jeopardize" with respect to a tree shall mean excavation within the drip line and "jeopardize" with respect to a structure shall mean excavation below a line projected downward at a 2 horizontal to 1 vertical slope from a point 1 foot above the bottom of the foundation); in such case, request direction form the Owner's Representative before proceeding with the work.

1. In addition to demolition, which may be indicated on the Drawings, make a thorough search for abandoned facilities such as septic systems, wells, fuel or water storage tanks, and pipelines or conduits. Remove any such abandoned facilities encountered, EXCEPT WHERE SUCH REMOVAL OPERATIONS MAY JEOPARDIZE EXISTING TREES OR STRUCTURES TO REMAIN ("jeopardize" with respect to a tree shall mean excavation within the drip line and "jeopardize" with respect to a structure shall mean excavation below a line projected downward at a 2 horizontal to 1 vertical slope from a point 1 foot above the bottom of the foundation); in such case, request direction from the Owner's Representative before proceeding with the work.

B. Abandoned facilities shall not remain in place within building and pavement areas. Building area is defined as that area within, and extending a minimum of 5 feet outside of, the perimeter of the building and the perimeter of steps, landings, patios, walkways and the like which are contiguous with the building. Pavement area is defined as that area within, and extending a minimum of 3 feet outside of, the limits of asphalt or concrete pavement and the limits of curb, gutter, and sidewalk contiguous with the pavement.

C. If pipelines or conduits are allowed to be abandoned in place outside of building and pavement areas, plug all exposed openings with stiff concrete placed within the pipeline/conduit to a minimum of five (5) lineal feet beyond the opening and rodded to remove voids. All such plugging operations shall be observed by the Construction-Phase Geotechnical Engineer.

3.04 BACKFILLING VOIDS

A. Immediately replace voids or disturbed areas created during clearing and demolition operations, and which extend below the recommended over-excavation depth, with native fill compacted to at least 90 percent relative compaction as determined by the latest approved edition of ASTM D1557. Do not place any fill until the underlying soil has been observed by the Construction-Phase Geotechnical Engineer. All fill and backfill shall be observed, tested and approved by the Construction-Phase Geotechnical Engineer.

3.05 CONTAMINATED SOIL

A. If abandoned septic tanks or fuel tanks or other potential sources of contamination or hazardous waste are encountered or if soil, which appears to be contaminated, is encountered, immediately notify the Owner's Representative.

3.06 DISPOSAL

A. Remove from the work area, transport to a suitable location, and legally dispose of all unsuitable soil materials, rubbish, and debris resulting from clearing, demolition, and grading operations.

B. Burning is not permitted.

3.07 DUST CONTROL

A. Employ all labor, equipment and methods required to prevent construction operations from producing dust in amounts damaging to persons, property, vegetation and animals or causing a nuisance to persons occupying buildings in the vicinity of the job site. Continue dust abatement measures until relief is granted by the Owner's Representative.

1. Contractor shall be responsible for any damage caused by dust resulting from his operations.

3.08 EROSION CONTROL

A. Develop and implement an erosion control plan to provide for containment of siltation resulting from storm and other water runoff to prevent damage to the environment and adjacent property.

3.09 TREE PROTECTION

A. All clearing and grading operations within the drip line of trees to remain shall be approved in advance and observed by Landscape Architect or Arborist employed by the Owner.

B. Comply with tree protection requirements, see specification section 02812.

4.00 SUBMITTALS (Not Used)

END OF SECTION

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

A. Design Mixtures: For each concrete mixture.

B. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1.4 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.5 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301.

1. Do not pour concrete when the temperature exceeds 90˚F or 80 ˚F when the wind exceeds 12 mph.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301

2. ACI 117

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed for bar No. 4 and larger, ASTM A 615, Grade 40, deformed for No. 3 and smaller.

1. At grade beams and concrete frames, all reinforcement shall conform to ASTM A 706 rebar.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed.

C. Where corrosion-resistant reinforcement is specified, use MMFX2 rebar ASTM A 1035 Grade 690 and 830.

2.3 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150

2. Fly Ash: ASTM C 618

3. Slag Cement: ASTM C 989

4. Blended Hydraulic Cement: ASTM C 595, excluding Type IS ($\underline{\geq}$ 70) and Type IT (S $\underline{\geq}$ 70)

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Footings: 1” Max.

2. Slab-on-grade, grade beams: ¾” Max.

3. Elevated Struct. Slabs, Beams, Framed Columns: 3/8” Max.

4. Remainder: ¾” Max.

5. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C 330

1. Footings: 1” Max.

2. Slab-on-grade, grade beams: ¾” Max.

3. Elevated Struct. Slabs, Beams, Framed Columns: 3/8” Max.

4. Remainder: ¾” Max.

5. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260 where specified on plan.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.

2. Retarding Admixture: ASTM C 494, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

F. Water: ASTM C 1602.

2.4 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.5 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Provide concrete with the following minimum compressive strength (f'c) at 28 days unless noted otherwise:

   a. Slabs on grade: 3000 psi (Hardrock)

   b. Spread footing: 3000 psi (Hardrock)

   c. Continuous Footings: 3000 psi (Hardrock)

2. Maximum W/C Ratio: 0.5

3. Slump Limit: 4 inches +/- 1" for footings, slab on grade, and mass concrete, and 5 inches +/- 1" for other concrete. Slump may be increased when chemical admixtures are used, provided that admixture-treated concrete has the same or lower water:cement material ratio (ACI 211 Table 6.3.1).

4. Where air entrained concrete is specified, the volume of air in the mortar fraction of concrete mix shall be 9% +/- 1%.

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EMBEDDED ITEM INSTALLATION

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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.2 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.3 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

3.4 WATERSTOP INSTALLATION

A. Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

3.6 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.7 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.8 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION

SECTION 042200
CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.

2. Steel reinforcing bars.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

A. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.

2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product. For masonry units, include data on material properties, material test reports substantiating compliance with requirements.

1.5 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi.

2. Density Classification: Medium weight, unless otherwise indicated.

2.3 CONCRETE LINTELS

A. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Low alkali, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Aggregate for Mortar: ASTM C 144.

1. White-Mortar Aggregates: Natural white sand or crushed white stone.

2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

C. Aggregate for Grout: ASTM C 404.

D. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

E. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A 615 or ASTM A 706, Grade 60.

2.6 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. Use portland cement-lime mortar unless otherwise indicated.

3. For exterior masonry, use portland cement-lime mortar.

4. For reinforced masonry, use portland cement-lime mortar.

5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion and Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type M or Type S.

2. For reinforced masonry, use Type S or Type M.

3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type M or S.

4. For interior nonload-bearing partitions, Type O may be used instead of Type N.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.

2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.

3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.

2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.

3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.

5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.

2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.

3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

3.4 MORTAR BEDDING AND JOINTING

A. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.

2. Anchor masonry with anchors embedded in masonry joints and attached to structure.

3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.6 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

2. Limit height of vertical grout pours to not more than 12 ft when the masonry has cured for 4 hours, the grout slump is maintained between 10 and 11 inches and no intermediate reinforced bond beams are placed between the tip ad the bottom of the pour height. Otherwise, place grout in lifts not exceeding 60 inches.

3.7 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at seven days and at 28 days.

3.8 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.

2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

END OF SECTION

SECTION 051200
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.

2. Grout.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site

1.4 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication of structural-steel components.

1.5 INFORMATIONAL SUBMITTALS

A. Mill test reports for structural steel, including chemical and physical properties.

B. Field quality-control and special inspection reports.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD**,** or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172), or is certified by the City of Los Angeles.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE, or is certified by the City of Los Angeles.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.

2. AISC 360.

3. RCSC's "Specification for Structural Joints Using ASTM F 3125 or F 3125 Bolts."

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. Per plan.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. Per plan.

2.3 GROUT

A. Per plan.

2.4 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

2.5 SHOP CONNECTIONS

A. Weld Connections: Comply with AWS D1.1 and AWS D1.8 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.6 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1 and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.

2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.

3. Ultrasonic Inspection: ASTM E 164.

4. Radiographic Inspection: ASTM E 94.

C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM High-Strength Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Pretensioned, Slip critical.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.

3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.

2. Verify weld materials and inspect welds.

3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using High-Strength Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1 and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.

c. Ultrasonic Inspection: ASTM E 164.

d. Radiographic Inspection: ASTM E 94.

END OF SECTION

SECTION 051213
ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes architecturally exposed structural-steel (AESS).

1. Requirements in Section 051200 "Structural Steel Framing" also apply to AESS.

1.2 DEFINITIONS

A. AESS: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication of AESS components.[**Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.**]

1. 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.**]

2. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.[**Indicate orientation of bolt heads.**]

B. Samples: Submit Samples of AESS to set quality standards for exposed welds.

1. Two steel plates, 3/8 by 8 by 4 inches (9.5 by 200 by 100 mm), with long edges joined by a groove weld[**and with weld ground smooth**].

2. Steel plate, 3/8 by 8 by 8 inches (9.5 by 200 by 200 mm), with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches (100 by 150 by 9.5 mm), welded to plate with a continuous fillet weld[**and with weld ground smooth and blended**].

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, [**Category ACSE**] [**Category CSE**].

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint [**Endorsement P1**] [**Endorsement P2**] [**Endorsement P3**] or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.6 FIELD CONDITIONS

A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 BOLTS, CONNECTORS, AND ANCHORS

A. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: [**Plain**] [**Mechanically deposited zinc coating**].

B. Corrosion-Resisting (Weathering Steel), Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 3, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

2.2 FILLER

A. Filler: Polyester filler intended for use in repairing dents in automobile bodies.

2.3 PRIMER

A. Primer: Comply with Section 099000 " Painting".

B. Etching Cleaner for Galvanized Metal: MPI#25.

C. Galvanizing Repair Paint: [**MPI#18, MPI#19, or SSPC-Paint 20**] [**ASTM A 780/A 780M**].

2.4 FABRICATION

A. In addition to special care used to handle and fabricate AESS, comply with the following:

1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.

2. Grind sheared, punched, and flame-cut edges of AESS to provide smooth surfaces and edges.

3. Fabricate AESS with exposed surfaces free of mill marks.

4. Fabricate AESS with exposed surfaces free of seams to maximum extent possible.

5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.

6. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.

7. Fabricate AESS to the tolerances specified in AISC 303 for steel that [**is**] [**is not**] designated AESS.

8. Seal-weld open ends of hollow structural sections with 3/8-inch (9.5-mm) closure plates.

B. Curved Members: Fabricate indicated members to curved shape by rolling to final shape in fabrication shop.

1. Distortion of webs, stems, outstanding flanges, and legs of angles shall not be visible from a distance of 20 feet (6 m) under any lighting conditions.

2. Tolerances for walls of hollow steel sections after rolling shall be approximately 1/2 inch (13 mm).

C. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch (3.2 mm) with a tolerance of 1/32 inch (0.8 mm).

D. Bolt Holes: Cut, drill, [**mechanically thermal cut,] or** punch standard bolt holes perpendicular to metal surfaces.

E. Cleaning Corrosion-Resisting Structural Steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. [**Do not thermally cut bolt holes or enlarge holes by burning.**]

2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.

3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.5 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: [**Snug tightened**] [**Pretensioned**] [**Slip critical**].

B. Weld Connections: Comply with AWS D1.1/D1.1M[**and AWS D1.8/D1.8M**] for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.

2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.

3. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.

4. Provide continuous welds of uniform size and profile where AESS is welded.

5. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch (plus 1.5 mm, minus zero mm).

6. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus zero inch (plus 1.5 mm, minus zero mm). Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.

7. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.

8. At locations where welding on the far side of an exposed connection of AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.

9. Make fillet welds oversize and grind to uniform profile with smooth face and transition.

10. Make fillet welds of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

2.6 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.

2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

3. Galvanize [**lintels**] <**Insert description**> attached to structural-steel frame and located in exterior walls.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).

2. Surfaces to be field welded.

3. Surfaces to be high-strength bolted with slip-critical connections.

4. Surfaces to receive sprayed fire-resistive materials.

5. Galvanized surfaces.

B. Surface Preparation[**for Nongalvanized Steel**]:

1. SSPC-SP 3, "Power Tool Cleaning."

2. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning".

3. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning".

4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal".

5. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning".

6. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning".

C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

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 AESS secure, plumb, and in alignment.

1. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.

3.3 ERECTION

A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

1. Erect AESS to the tolerances specified in AISC 303 for steel that [**is**] [**is not**] designated AESS.

B. Do not use thermal cutting during erection[**unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M**].

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: [**Snug tightened**] [**Pretensioned**] [**Slip critical**].

2. Orient bolt heads [**as indicated on Drawings**] [**in same direction for each connection and to maximum extent possible in same direction for similar connections**].

B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.

1. Remove backing bars or runoff tabs; back-gouge and grind steel smooth.

2. Remove erection bolts, fill holes, and grind smooth.

3. Fill weld access holes and grind smooth.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.

B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

3.6 REPAIRS AND PROTECTION

A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION

SECTION 054000
COLD-FORMED METAL FRAMING

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. Roof joist framing.

2. Exterior wall framing.

3. Interior bearing and non-bearing wall framing.

4. Ceiling joist framing.

1.3 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Research/Evaluation Reports: For cold-formed metal framing.

1.4 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel".

B. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions".

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: ST50H for 16-gage (54 mils) and heavier. ST33H for 18-gage (43 mils) and lighter.

2. Coating: G60.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 50, Class 1 or 2.

2. Coating: G90.

2.2 NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 20-Gage (33 mils) minimum, unless otherwise indicated.

2. Flange Width: 1-5/8 inches, unless otherwise indicated.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 20-Gage (33 mils) minimum, unless otherwise indicated.

2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; un-punched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 20-Gage (33 mils) minimum, unless otherwise indicated.

2. Flange Width: 2-1/2 inches minimum, unless otherwise indicated.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; un-punched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:

a. Minimum Base-Metal Thickness: 20-Gage (33 mils) minimum, unless otherwise indicated.

b. Flange Width: 2-1/2 inches minimum, unless otherwise indicated.

2. Inner Track: Of web depth indicated, and as follows:

a. Minimum Base-Metal Thickness: 20-Gage (33 mils) minimum, unless otherwise indicated.

b. Flange Width: 2-1/2 inches minimum, unless otherwise indicated.

2.3 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 20-Gage (33 mils) minimum, unless otherwise indicated.

2. Flange Width: 1-5/8 inches, unless otherwise indicated.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Stud kickers, knee braces, and girts.
8. End closures.
9. Hole reinforcing plates.
10. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.

B. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

B. Sealer Gaskets: Closed-cell neoprene foam, 1/4-inch-thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.

2. Cut framing members by sawing or shearing; do not torch cut.

3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.

B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support by one of the following methods:

1. Install single-leg deflection tracks and anchor to building structure.

2. Install double deep-leg deflection tracks and anchor outer track to building structure.

3. Connect vertical deflection clips to bypassing studs and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.4 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches from abutting walls, and as follows:

1. Joist Spacing: 16 inches, unless otherwise indicated.

D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.

E. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.5 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 055000
METAL FABRICATIONS

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. Provide metal work complete, including the following principal items:

1. Miscellaneous metal fabrications as indicated.

2. Brackets, supports and reinforcements fabricated of steel shapes and plates as indicated or as required for completion of work.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for metal fabrications.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel".

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel".

2. AWS D1.2, "Structural Welding Code - Aluminum".

3. AWS D1.6, "Structural Welding Code - Stainless Steel".

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.6 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.

B. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

C. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36or ASTM A 283, Grade C or D.

D. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

E. Steel Tubing: ASTM A 500, cold-formed steel tubing.

F. Steel Pipe: ASTM A 53, standard weight (Schedule 40) unless otherwise indicated.

2.3 NONFERROUS METALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632, Alloy 6061-T6.

C. Aluminum Castings: ASTM B 26, Alloy 443.0-F.

2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls.

1. Provide stainless-steel fasteners for fastening aluminum.

2. Provide stainless-steel fasteners for fastening stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Eyebolts: ASTM A 489.

E. Machine Screws: ASME B18.6.3.

F. Lag Screws: ASME B18.2.1.

G. Wood Screws: Flat head, ASME B18.6.1.

H. Plain Washers: Round, ASME B18.22.1.

I. Lock Washers: Helical, spring type, ASME B18.21.1.

J. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

K. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

B. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

C. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.7 MISCELLANEOUS FRAMING

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.8 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing.

B. Galvanize shelf angles located in exterior walls.

2.9 METAL LADDERS

A. General:

1. Comply with ANSI A14.3 unless otherwise indicated.

2. For elevator pit ladders, comply with ASME A17.1.

B. Steel Ladders:

1. Space siderails 18 inches apart unless otherwise indicated.

2. Space siderails of elevator pit ladders 12 inches apart.

3. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.

4. Rungs: 3/4-inch- diameter steel bars.

5. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.

6. Provide nonslip abrasive surfaces on top of each rung.

7. Galvanize exterior ladders, including brackets and fasteners.

C. Aluminum Ladders:

1. Space siderails 18 inches apart unless otherwise indicated.

2. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4-inch-wide, and 1/8 inch thick.

3. Rungs: Extruded-aluminum tubes, not less than 3/4-inch-deep and not less than 1/8-inch-thick, with ribbed tread surfaces.

4. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.

5. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted aluminum brackets.

2.10 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

C. Galvanize exterior miscellaneous steel trim.

2.11 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe, unless otherwise noted.

1. Cap bollards with 1/4-inch- thick steel plate.

B. Fabricate bollards with 3/8-inch- thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts, unless otherwise noted.

C. Where noted on Drawings, fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- thick steel plate welded to bottom of sleeve.

D. Prime bollards with zinc-rich primer.

2.12 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.13 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Galvanize loose steel lintels located in exterior walls.

C. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.14 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.15 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.16 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

B. Anchor bollards to existing construction with expansion anchors, chemical anchors or anchor bolts. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.

C. Where noted on Drawings, anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with non-shrink, nonmetallic grout.

D. Where noted on Drawings, anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

E. Fill bollards solidly with concrete, mounding top surface to shed water.

3.3 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

C. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 055100
ALUMINUM LADDERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Vertical ladders.

B. Ship's ladders.

C. Utility line bridges.

1.2 SUBMITTALS

A. Submit under provisions of Section 013323.

B. Product Data: Manufacturer's data sheets indicating materials of construction.

C. Shop Drawings: Drawings prepared for this project, showing relationship of ladders to other construction and methods of anchorage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Royalite Manufacturing, Inc; 1055 Terminal Way, San Carlos CA 94070. ASD. Tel: (650) 637-1440 or (800) 875-9548. Fax: (650) 637-9770. www.royalite-mfg.com.

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with Construction Services Agreement as noted on Southern Kern Unified School District Project Binder.

2.2 COMPONENTS

A. Ladders: Provide assembled ladders that comply with OSHA and local building codes, with all edges rounded, clean, smooth, and burr free; dimensions as indicated on drawings.

B. Ladder Treads: Extruded aluminum, 6063-T5 alloy, with self-cleaning serrated top surface and rounded front and back edges; fastened to handrails with concealed stainless steel screws; capable of withstanding 1200 pounds (3179kg) load per tread without damage.

1. Cross Section for Vertical Ladders: Minimum 2 inches (50.8 mm) horizontal, nominal 1 inch (25 mm) vertical.

2. Cross Section for Ship's Ladders: Minimum 4 inches (101 mm) horizontal, nominal 1 inch (25 mm) vertical.

3. Width: 24 inches (610 mm).

4. Width: 18 inches (457 mm).

5. Spacing: 12 inches (305 mm) vertically.

6. Landings: Made up fort tread members mounted side-by-side.

C. Vertical Ladder Rails Supporting Treads: Extruded aluminum, 6063-T5 alloy, with rounded corners, approximately 4 inches (100 mm) deep; mounted so that centerline of tread is minimum of 7 inches (178 mm) from face of wall.

1. Wall Brackets: Bent aluminum plate, 2 inches (50 mm) wide by 3/16 inch (5 mm) thick.

2. Base Brackets: Aluminum angle floor bracket, 2 by 2 by 2 by 1/8 inch (50 by 50 by 50 by 3 mm).

3. Base Brackets: Wall bracket with additional angle brace; supporting foot of rail at least 4 inches (100 mm) above floor or grade.

D. Ship's Ladder Rails Supporting Treads: Extruded aluminum channel stringers, 6 by 2 by 1/8 inch (150 by 50 by 3 mm).

1. Base Brackets: Aluminum angle floor bracket, 2 by 2 by 2 by 1/8 inch (50 by 50 by 50 by 3 mm).

E. Ship's Ladder Handrails: Extruded aluminum pipe, 1-1/2 inches (38 mm) outside diameter, Schedule 40 wall thickness; formed with radiused elbows, welded to stringers.

F. Extended Rails: 0.875 inch (22 mm) diameter aluminum tubing; formed with two parallel tubes for each length of rail, with radiused corners, assembled by welding or with stainless steel fasteners.

1. Lift-Up Rail Extensions for Hatch Ladders: 6063-T5 aluminum, .77 inch (19.56) x 3.646 inches (92.608 mm) extrusion inside the standard side rail, manually raised, lowered by means of releasing gravity latches; and extending a minimum of 42 inches (1067 mm) above top ladder tread.

2. At Top of Ladders Leading to Roofs or Landings: Extending minimum of 42 inches (1067 mm) vertically above top of parapet or landing and extending minimum if 10 inches (254 mm) past edge of roof or landing; with free walk-through onto roof/landing.

G. Cages: Hoops and verticals of aluminum, 2 inches (50.8 mm) wide by 0.187 inch (4.75 mm) thick; assembled with stainless steel fasteners.

1. Bottom Hoop: 18 inch (457 mm) radius with overall extension from wall of 40-3/4 inches (1035 mm).

2. Intermediate and Top Hoops: 14 inch (355 mm) radius.

3. Rest Platforms: Ladder tread landing, 24 by 36 inches (610 by 915 mm), with 1-1/2 inch (38 mm) outside diameter aluminum pipe railing enclosing both runs of ladder.

H. Utility Line Bridges: 6063-T5 extruded aluminum, supports, ladder tread landing, and 1/4 inch (6 mm) thick aluminum checker plate base plates; all joints mitered and welded; for loose placement on roof surface.

I. Security Door for Vertical Ladder Without Cage: Sheet aluminum enclosure from 6 inches (150 mm) to 102 inches (2590 mm) above floor or grade; hinged for access to ladder with full height stainless steel piano hinge; secured with adjustable staple and plate for padlock.

J. Security Door for Cage Ladder: Aluminum grid door of same construction as cage, mounted on bottom of cage, hinged down, with adjustable staple plate and hasp for padlock.

K. Fall Arrestor: North Safety Products “Saf-T-Climb” System.

1. Installed by ladder manufacturer.

2. Rails: Stainless steel, Type 304 or Type 316L.

3. Rails: Extruded aluminum.

4. Rails: Fiberglass reinforced plastic.

L. Anchor Bolts: Hot-dipped galvanized or stainless steel bolts; diameter as specified by ladder manufacturer; length as required to provide adequate anchorage into substrate.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Anchor securely using fasteners specified by manufacturer or others of equivalent or greater strength and corrosion resistance.

END OF SECTION

SECTION 061000
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Shear wall panels.
4. Rooftop equipment bases and support curbs.
5. Wood blocking, cants, and nailers.
6. Wood furring and grounds.
7. Wood sleepers.
8. Plywood backing panels.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.

2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.

3. Dress lumber, S4S, unless otherwise indicated.

B. All 2x6 and smaller, and all 4x, shall be dry to 19% max, and plywood 15% max moisture content at time of wrapping except for blocking. Lumber that is architecturally exposed and sensitive to warping, sap, and splitting shall be kiln dry.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates except for interior dry environments.

B. 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.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. 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, stripping, 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.

5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

A. All framing lumber shall be coast region Douglas Fir-Larch & shall conform to the following grades as established by the W.C.L.I.B. sawn lumber, machine stress-rated or machine-evaluated lumber, shall be identified by the grade mark of lumber grading or inspection agency that has been approved by an accreditation body that complies with doc ps 20 or equivalent.

1. Studs: (Except as noted on drawings)
   a. 2”-4” thick, 2”-4” wide, interior, non-load-bearing partitions, standard grade.
   b. 2”-4” thick, No. 2 or better DF.

2. Joists and Rafters: (Except as noted on drawings)
   a. 2”-4” thick, 2”-4” wide, No. 2
   b. 2”-4” thick, 5” and wider, No. 2

3. Beams and headers: (Except as noted on drawings)
   a. 2”-4” thick, 5” and wider, No. 1
   b. 5” and thicker, No. 1

4. Posts: all posts No. 1

5. Top Plates: 2x4 No. 1; 2x6 No. 2 or better

6. Blocking: standard grade

7. Sill Plates:
   a. Exterior and shear walls 2x or 3x No. 2 pressure treated
   b. Interior partitions 2x4 standard grade or better.

B. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

1. Species and Grade: As indicated above for load-bearing construction of same type.

2.4 ENGINEERED WOOD PRODUCTS

A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.

1. Extreme Fiber Stress in Bending, Edgewise: 2445 psi for Grade 1.8E and 2750 psi for Grade 2.0E LVL’s.

2. Modulus of Elasticity, Edgewise: 1,800,000 psi for Grade 1.8E LVL and 2,000,000 psi for Grade 2.0E LVL’s.

B. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D 5055.

1. Web Material: Either OSB or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1.

2. Structural Properties: Depths and design values not less than those indicated.

3. Comply with APA PRI-400. Factory mark I-joists with APA-EWS trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA-EWS standard.

C. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.

1. Manufacturer: Provide products by same manufacturer as I-joists.

2. Comply with APA PRR-401, rim board grade. Factory mark rim boards with APA-EWS trademark indicating thickness, grade, and compliance with APA-EWS standard.

2.5 SHEAR WALL PANELS

A. Wood-Framed Shear Wall Panels: Prefabricated assembly consisting of wood perimeter framing, tie downs, and Exposure I, Structural I OSB sheathing.

B. Steel-Framed Shear Wall Panels: Prefabricated assembly consisting of cold-formed galvanized-steel panel, steel top and bottom plates, and wood studs.

C. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.6 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153 or Type 304 stainless steel.

2.7 METAL FRAMING ANCHORS

A. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

D. Install shear wall panels to comply with manufacturer's written instructions.

E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

F. Do not splice structural members between supports unless otherwise indicated.

G. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code (IBC).

2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3. ICC-ES evaluation report for fastener.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 072000
BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as necessary to complete the Contract, including, but not limited to, these major items:

1. Insulation below roof deck.

2. Wall insulation.

1.2 RELATED WORK SPECIFIED ELSEWHERE AS REQUIRED

A. Acoustical treatment.

B. Insulation of pipe and ducts.

C. Partition framing.

D. Roof framing.

1.3 GENERAL REQUIREMENT

A. Insulating materials, including facing such as vapor retarders and vapor permeable membranes, and similar coverings, installed under this work shall have flame spread rating not to exceed 25 and smoke density not to exceed 450 when tested in accordance with ASTM E84 or VL723, under installed conditions.

B. Thermal Performance R shall be tested per ASTM C 518.

1.4 CERTIFICATION

A. The Contractor shall certify that the insulation conforms to the requirements of the State Energy Code.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wall and Roof Insulation: ASTM C665, Type III, FRK or FSK foil faced, with flame spread - 25, smoke developed - 50; perms -0.02 maximum. Manufacturer: CertainTeed Corp., Owens-Corning, Manville or approved equal. Unless otherwise shown on the drawings, thermal values shall be R-30 where used at roofs and R-19 where used at walls.

B. Sound Insulation: Unfaced, friction fit conforming to ASTM C665 Type I. Flame spread 25. Manufacturer: CertainTeed Corp., Owens-Corning, Manville or approved equal.

C. Staples: Conform to Fed. Spec. FF-N-105, "Nails, Wire and Staples", Amendment No. 2, except the staple dimensions shall be outside dimensions. Form from galvanized steel wire having a tensile strength range of 80,000 to 110,000 psi. Galvanize coating shall be Type I. Size: 16 gauge x 3/4" crown x 7/8" leg.

PART 3 - EXECUTION

3.1 INSTALLATION - ROOF

A. Install in conformance with the manufacturers' written instructions. There shall be a one inch air space at the roof sheathing and roofing framing shall be covered with the foil tensioning flange. Insulation shall completely fill the cavity. Thermal performance as shown on the drawings.

3.2 INSTALLATION - WALLS

A. Install wall insulation between the wood or metal framing in conformance with the manufacturers' written instructions. Friction fit between the metal framing and stapled at wood framing. Insulation shall completely fill the cavity but not compressed. Thermal performance as shown on the drawings. Where concrete unit masonry walls are scheduled to be covered with gypsum drywall install in conformance with the manufacturers' written instructions.

END OF SECTION

SECTION 072200
ROOF DECK AND INSULATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the Conditions of the Contract and Division 01 Specification Sections apply to this section.

1.2 SUMMARY

A. Section includes roof insulation over the properly prepared deck substrate.

B. Related Sections:
1. Section 07 05 00 – Common Work Procedures for Thermal and Moisture Protection.
2. Section 07 62 00 – Sheet Metal Flashing and Trim.

1.3 REFERENCES

A. American Society for Testing and materials (ASTM):

1. ASTM A167 Standard Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet and Strip.

2. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.

3. ASTM B29 Standard Specification for Refined Lead.

4. ASTM B32 Standard Specification for Solder Metal.

5. ASTM C165 Standard Test Method for Measuring Compressive Properties of Thermal Insulation.

6. ASTM C208 Standard Specification for Cellulosic Fiber Insulation Board.

7. ASTM C209 Standard Test Method for Cellulosic Fiber Insulating Board.

8. ASTM C272 Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.

9. ASTM C1396 Standard Specification for Gypsum Wallboard.

10. ASTM C518 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

11. ASTM C578 Standard Specification for Perlite Thermal Insulation Board.

12. ASTM C728 Standard Test Methods for Fire Test of Roof Coverings.

13. ASTM C1289 Standard Specification for Faced Rigid Polyisocyanurate Thermal Insulation.

14. ASTM D5 Standard Test Method for Penetration of Bituminous Materials.

15. ASTM D36 Standard Test Method for Softening Point of Bitumen (Ring and Ball Apparatus).

16. ASTM D312 Standard Specification for Asphalt Used in Roofing.

17. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

18. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

19. ASTM D1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics.

20. ASTM D1863 Standard Specification for Mineral Aggregate Used on Built-Up Roofs.

21. ASTM D2126 Standard Test Method for Response off Rigid Cellular Plastics to Thermal Humid Aging.

22. ASTM D2178 Standard Specification for Asphalt Glass Felts used in Roofing and Waterproofing.

23. ASTM D4601 Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.

24. ASTM D5147 Standard Sampling and Testing Modified Bituminous Sheet Material.

B. Cast Iron Soil Pipe Institute, Washington, D.C. (CISPI)

C. Factory Mutual Research (FM):

1. Roof Assembly Classifications.

D. National Roofing Contractors Association (NRCA):

1. Roofing and Waterproofing Manual.

E. Underwriters Laboratories, Inc. (UL):

1. Fire Hazard Classifications.

F. Warnock Hersey (WH):

1. Fire Hazard Classifications.

G. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

H. Steel Deck Institute, St. Louis, Missouri (SDI)

I. Southern Pine Inspection Bureau, Pensacola, Florida (SPIB)

J. Insulation Board, Polyisocyanurate (FS HH-I-1972)

K. Insulation Board, Thermal (Fiberboard) (FS LLL-1-535B)

1.4 SUBMITTALS

A. Product Data: Provide manufacturer's specification data sheets for each product in accordance with Division 01 Section Submittal Procedures. 01300.

B. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.

C. Provide a sample of each insulation type.

D. Shop Drawings

1. Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.

2. Shop drawing shall include: Outline of roof, location of drains, complete board layout of tapered insulation components, thickness and the average "R" value for the completed insulation system.

E. Certification

1. Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.

2. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

1.5 QUALITY ASSURANCE

A. Fire Classification, ASTM E-108.

B. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class [A or B or C] for external fire and meets local or nationally recognized building codes.

C. Manufacturer's Certificate: Certify that the roof system is adhered properly to meet or exceed the requirements of FM [1-90].

D. Pre-installation meeting: Refer to Division 07 roofing specifications for pre-installation meeting requirements.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.

B. Store all insulation materials in a manner to protect them from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the project site.

C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).

D. Store materials off the ground. Any warped, broken or wet insulation boards shall be removed from the site.

PART 2 – PRODUCTS

2.1 PRODUCTS, GENERAL

A. Refer to Division 01 Section "Common Product Requirements."

B. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.

C. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance with Bidding Requirements and Division 01 provisions.

1. Proposals shall be accompanied by a copy of the manufacturer's standard specification section. That specification section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.

2. Include a list of three (3) projects of similar type and extent, located within a one hundred mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by the Architect, Owner or Owner's Representative.

3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.

4. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.2 INSULATION MATERIALS

A. Thermal Insulation Properties and Approved Insulation Boards.

1. Tapered Polyisocyanurate Roof Insulation; ASTM C1289:

a. Qualities: Factory Tapered, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.

b. Thickness: Minimum [0]

c. Average R-Value: Minimum [45.12]

d. Tapered Slope: [1/2:12]

e. Compliances: UL, WH or FM listed under Roofing Systems Federal Specification HH-I-1972, Class 1

f. Acceptable Products:

1) ENRGY 3; Johns Manville
2) EnergyGuard; GAF
3) Approved Equivalent

2. Dens-Deck Prime Roof Board

a. Qualities: Nonstructural glass mat faced, noncombustible, water-resistant treated gypsum core panel.

b. Board Size: Four feet by four feet (4'x4').

c. Thickness: One half (1/2) inch.

d. R-Value: .56

e. Compliances: UL, WH or FM listed under Roofing Systems.

2.3 RELATED MATERIALS

A. Fiber Cant and Tapered Edge Strips: Performed rigid insulation units of sizes/shapes indicated, matching insulation board or of perlite or organic fiberboard, as per the approved manufacturer.

1. Acceptable Manufacturers:

a. The Garland Company, Inc.

b. Approved Equivalent

B. Protection Board: Pre-molded semi-rigid asphalt composition board one half (1/2) inch.

C. Roof Board Joint Tape: Six (6) inches wide glass fiber mat with adhesive compatible with insulation board facers.

D. Asphalt: ASTM D312, Type III Steep Asphalt.

E. Roof Deck Insulation Adhesive: Insul-Lock HR - Dual-component, high rise foam adhesive as recommended by insulation manufacturer and approved by FM indicated ratings.

1. Tensile Strength (ASTM D412)……250 psi

2. Density (ASTM D1875)……..8.5 lbs./gal.

3. Viscosity (ASTM D2556)……22,000 to 60,000 cP.

4. 2 `Peel Strength (ASTM D903)…..17 lb/in.

5. 3 `Flexibility (ASTM D816)……Pass @ -70°F

F. Roof Deck Insulation Adhesive: Insul-Lock E HR - Dual-component, high rise foam adhesive with 45% rapidly renewable material content as recommended by insulation manufacturer and approved by FM indicated ratings.

1. Tensile Strength (ASTM D412)……250 psi

2. Density (ASTM D1875)……..8.5 lbs./gal.

3. Viscosity (ASTM D2556)……22,000 to 60,000 cP.

4. 2 `Peel Strength (ASTM D903)…..17 lb/in.

5. 3 `Flexibility (ASTM D816)……Pass @ -70°F

G. Fasteners: Corrosion resistant screw fastener as recommended by roof membrane manufacturer.

1. Factory Mutual Tested and Approved with three (3) inches coated disc for I-90 rating, length required to penetrate metal deck one inch.

PART 3 – EXECUTION

3.1 EXECUTION, GENERAL

A. Comply with requirements of Division 01 Section “Common Execution Requirements”.

3.2 INSPECTOR OF SURFACES

A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.

1. Verify that work which penetrates roof deck has been completed.

2. Verify that wood nailers are properly and securely installed.

3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.

4. Do not proceed until defects are corrected.

5. Do not apply insulation until substrate is sufficiently dry.

6. Broom clean substrate immediately prior to application.

7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.

8. Verify that temporary roof has been completed.

3.3 INSTALLATION

A. Attachment with Bitumen on Concrete Deck

1. Over the entire deck surface, prime concrete surfaces with asphalt primer at the rate of 1 (one) gallon per one hundred (100) square feet.

2. Embed one layer of rigid insulation board in solid moppings of hot asphalt at the rate and temperature recommended by insulation manufacturer. Stagger end joints of boards so all open joints will be eliminated. Walk in each piece of insulation and leave boards completely adhered to deck. Each insulation board shall be butt firmly against adjoining panels. All open joints shall be eliminated.

3. Embed second layer of insulation board in solid moppings of hot asphalt after first layer has been attached as recommended by insulation manufacturer. Stagger end joints of boards so all open joints will be eliminated. Walk in each piece of insulation and leave boards completely adhered to base felt or deck. Each insulation board shall be butt firmly against adjoining panels. All open joints shall be eliminated.

4. Approved insulation shall be tapered around roof drains and scuppers. Tapered insulation sump shall start with a thickness of one-half at drain bowl to the specified dimension of three feet from the center line of the drain. Install tapered insulation sump in such a way to provide proper slope for runoff. Shape insulation with tool as required so completed surface is smooth and flush with ring of drain. Under no circumstances will the membrane be left unsupported in an area greater that one quarter (1/4) inch. Install recovery board over tapered insulation sump as required.

5. Approved recovery board one half (1/2) inch thickness shall be installed over base tapered insulation using hot asphalt at the rate of approximately thirty three (33) pounds per square.

6. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of one quarter (1/4) inch away from the vertical surface.

7. Install no more insulation at one time than can be roofed on the same day.

8. Install temporary water cut-offs at completion of each day's work and remove upon resumption of work.

9. Cant Strips/Tapered Edge Strips: Install preformed forty five (45) degree cant strip at junctures of vertical surfaces. Provide preformed, tapered edge strips at perimeter of edges of roof that do not terminate at vertical surfaces and/or indicated on the drawings.

10. Tape joints of insulation as per manufacturer's requirements.

B. Attachment with Mechanical Fasteners

1. Approved insulation board shall be fully attached to the deck with an approved mechanical fastening system. As a minimum, the amount of fasteners shall be in accordance with manufacturer's recommendation for FM I-90 system. Otherwise, a minimum of one fastener per two square feet shall be installed.

2. Filler pieces of insulation require at least two fasteners per piece if size of insulation is less than four square feet.

3. Spacing pattern of fasteners shall be as per manufacturer's recommendations to meet the FM requirements. Placement of any fastener from edge of insulation board shall be a minimum of three inches, and a maximum of six (6) inches.

4. Minimum penetration into deck shall be as recommended by the fastener manufacturer. There is a one (1) inch minimum for metal, wood and structural concrete decks where not specified by the manufacturer. For gypsum and cement-wood fiber decks, penetration shall be determined from pull-out test results with a minimum penetration of one and one-half (1 ½) inches.

5. Gypsum and cementitious wood fiber decks: Where the roof deck is visible from the building interior, the contractor shall ensure no penetration of fasteners through underside of the deck. Any holes or spalling caused by fastener installation shall be repaired by the roofing contractor. Where the new roof system thickness exceeds an amount so that a minimum of 1 ½ of penetration cannot be achieved with an Olympic TB Fastener, or approved equivalent, then (and only then) toggle bolts may be used to secure installation to the deck.

6. Tape joints of insulation as per manufacturer's requirements.

C. Attachment with Insulation Adhesive Approved by Factory Mutual (FM).

1. Ensure all surfaces are clean, dry, free of dirt, debris, oils, loose ore embedded gravel, unadhered coatings, deteriorated membrane and other contaminants that may inhibit adhesion.

2. Apply insulation adhesive directly to the substrate using a ribbon pattern with one quarter to one half (1/4-1/2) inch wide beads 12 inches o.c., using either the manual applicator or an automatic applicator, at a rate of one (1) gallon per one hundred (150) square feet per cartridge.

3. Immediately place insulation boards into wet adhesive. Do not slide boards into place. Do not allow the adhesive to skin over before installing insulation boards.

4. Briefly step each board into place to ensure contact with the adhesive. Substrates with irregular surfaces may prevent the insulation board from making positive contact with the adhesive. Relief cuts or temporary weights may be required to ensure proper contact.

5. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of one quarter (1/4) inch away from the vertical surface.

6. Tape joints of insulation as per manufacturer's requirements.

3.4 CLEANING

A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane.

3.5 CONSTRUCTION WASTE MANAGEMENT

A. Remove and properly dispose of waste products generated during installation. Comply with requirements of authorities having jurisdiction.

END OF SECTION

SECTION 074100
METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Standing seam metal roofing system.

B. Metal roofing accessories.

1.2 RELATED SECTIONS

A. Section 054000 - Cold-Formed Metal Framing: Structural framing supporting metal roofing

B. Section 075200 - Modified Bituminous Membrane Roofing

C. Section 079200 - Joint Sealants

1.3 REFERENCES

A. ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

B. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy- Coated by the Hot-Dip Process.

D. ASTM A 875 - Standard Specification for Steel Sheet, Zinc-5 % Aluminum Alloy-Coated by the Hot-Dip Process

E. ASTM B 101 - Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction.

F. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

G. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction.

H. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

I. ASTM D 1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

J. ASTM D 2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

K. ASTM D 3575 - Standard Test Methods for Flexible Cellular Materials made from Olefin Polymers.

L. ASTM E 84 - Standard Test for Surface Burning Characteristics of Building Materials.

M. ASTM E 283 - Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

N. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

O. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

P. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

Q. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

R. ASTM E 2140 - Standard Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head.

S. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.

T. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

U. FM 4470 Approval Standard for Class 1 Panel Roofs.

V. FM 4471 - Class 1 Panel Roof; Factory Mutual Research Corporation.

W. UL 263 - Fire Tests of Building Constructions and Materials.

X. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies.

Y. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.

Z. UL 1897 - Uplift Test for Roof Covering Systems.

AA. ICC-ES AC166 - Test Procedure for Wind Driven Rain Resistance of Metal Roof Coverings. BB. SMACNA - Architectural Sheet Metal Manual.

BB. National Coil Coating Association (NCCA)

CC. NRCA - The NRCA Roofing and Waterproofing Manual.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Standing Seam Roofing System: R-Mer Span

1. Thermal Expansion and Contraction:

a. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

b. Design temperature differential shall be not less then 200 degrees F.

c. Interface between panel and clip shall provide for unlimited thermal movement in each direction along the longitudinal direction.

d. Location of metal roofing rigid connector shall be at roof ridge unless otherwise approved by the Project Architect. Metal ridge connector may require design as per job conditions by specified manufacturer.

2. Uniform Wind Load Capacity:

a. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.

1) Design Code: ASCE 7, Method 2 for Components and Cladding.

2) Safety Factor: 1.67 after any load reduction or material stress increase.

3) Category IV Building with an Importance Factor of 1.

4) Wind Speed: 106 mph.

5) Ultimate Pullout Value: 375 pounds per each of the two fasteners holding the panel anchor to the roof decking or framing system.

6) Exposure Category: C.

7) Design Roof Height: 19 feet.

8) Minimum Building Width: 70 feet.

9) Roof Pitch: 2 inches per foot.

10) Roof Area Design Uplift Pressure:

a) Zone 1 - Field of roof 21.6 psf.

b) Zone 2 - Eaves, ridges, hips, and rakes 24.2 psf.

c) Zone 3 - Corners 30.8 psf.

b. ASTM E 1592: Capacity shall be determined using pleated airbag method in accordance with ASTM E 1592, testing of sheet metal roof panels. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.

c. Underwriters' Laboratories, Inc., (UL), wind uplift resistance classification: Roof assembly shall be classified as Class 1-90, as defined by UL 580

d. FM 4471: Submit test report for negative wind uplift pressures no less than that specified. Roof system must have approval over the substrate specified.

3. Uniform Positive Load Capacity.

a. Installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 20 psf; Roof Snow Load of psf.

b. Dead Load: Loading of the roof structure, due to tear off of existing, and/or installation of new roofing materials shall not exceed the present loading due to weight of the existing roofing system.

c. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.

4. Underwriters' Laboratories, Inc., (UL):

a. Underwriters' Laboratories, Inc., (UL) fire resistance P ratings for roof assemblies: If applicable, panel system shall be approved for use in an appropriate Construction Assembly, as defined by UL 263.

b. Underwriters' Laboratories, Inc., (UL) Class A fire rating per UL 790.

5. ASTM E 283: Static pressure air infiltration (doors, windows, curtain walls):

a. Pressure Leakage Rate

1) 1.57 PSF 0.0007 cfm/sq.ft.

2) 6.24 PSF 0.0002 cfm/sq.ft.

3) 20.0 PSF 0.0036 cfm/sq.ft.

6. ASTM E 331: Static pressure water infiltration (doors, windows, curtain walls):

a. Pressure Result:

1) 5 Gal. /Hr. per S.F. and Static No Leakage

2) Pressure of 20.0 Psf. for 15 minutes

7. ASTM E 1646: Static pressure water infiltration (roof panels):

a. Pressure Result:

1) 5 Gal. /Hr. per S.F. and Static No Leakage

2) Pressure of 20.0 Psf for 15 minutes

8. Capacities for gauge, span or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolations for conditions outside test range are not acceptable.

9. Water penetration (dynamic pressure): No water penetration, other than condensation, when exposed to dynamic rain and 70 mph wind velocities for not less than five minutes duration, when tested in accord with principles of AAMA 501.1.

10. Wind and wind driven rain resistance: No water penetration or panel movement when exposed to 110 mph wind velocities when tested in accordance with TAS 100.

11. Installed roof system assembly shall show that it can resist the calculated roof pressure in accordance with the test results of TAS 125.

12. Water penetration in low slope applications: No water penetration or panel movement when subject to 6 inch head of water for 6 hours when tested in accordance with the ASTM E 2140 and when subject to 6 inch head of water for 7 days when tested in accordance with the TAS 114 appendix G.

13. Submit third party validation of environmental claims, prepared UL Environment, for all metal roof panels containing recycled content and/or bio based content.

1.5 SUBMITTALS

A. Submit under provisions of Section 013323.

B. Product Data: Submit product data, test reports, and certifications in accordance with quality assurance and performance requirements specified herein.

C. Design Loads: Submit manufacturer's minimum design load calculations according to ASCE 7, Method 2 for Components and Cladding. In no case shall the design loads be taken to be less than those specified herein.

D. Dead Load Evaluation: Provide documentation from a licensed structural engineer of a structural evaluation of the roof structure and it's suitability for the new imposed roofing loads.

E. Shop Drawings: Prepared specifically for this project; showing dimensions of metal roofing and accessories, fastening details and connections and interface with other products.

F. LEED Submittals: Provide documentation of how the requirements of Credit will be met:

1. List of proposed materials with recycled content. Indicate post-consumer recycled content and pre-consumer recycled content for each product having recycled content.

2. Product data and certification letter indicating percentages by weight of post- consumer and pre-consumer recycled content for products having recycled content.

G. Selection Samples: For each finish product specified, two complete sets of samples representing manufacturer's full range of available colors and textures.

H. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and textures.

I. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

J. Closeout Submittals:

1. Provide manufacturer's maintenance instructions that include recommendations for periodic checking and maintenance of installed roof system.

2. Provide executed copy of manufacturer's warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001 approval.

B. Installer Qualifications: Certified and approved installer of the sheet metal roofing manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

1.7 PRE-INSTALLATION CONFERENCE

A. Convene a pre-roofing conference approximately two weeks before scheduled commencement of roofing system installation and associated work.

B. Require attendance of installers of deck or substrate construction to receive roofing, installers of rooftop units and other work in and around roofing which must precede or follow roofing work including mechanical work, Architect, Owner, roofing system manufacturer's representative.

C. Objectives include:

1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.

2. Tour representative areas of roofing substrates, inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work.

3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.

4. Review roofing system requirements, Drawings, Specifications and other Contract Documents.

5. Review and finalize schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.

6. Review required inspection, testing, certifying procedures.

7. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing.

8. Record conference including decisions and agreements reached. Furnish a copy of records to each party attending.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1. Store materials above ground, on skids.

2. Protect material with waterproof covering and allow sufficient ventilation to prevent condensation buildup or moisture entrapment on the materials.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. Warranty:

1. 30 year, no dollar limit, warranty.

2. Provide installers 2-year warranty covering roofing system installation and water- tightness.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company, Inc. (The) Which is the District Standard, which is located at: 3800 E. 91st St.; Cleveland, OH 44105; Toll Free Tel: 800-321-9336; Tel: 216-641-7500; Fax: 216-641-0633; Email:request info (ebuczek@garlandind.com); Web:http://www.garlandco.com, Local representative – Sean Gavin (661) 343-3337

B. Requests for substitutions will be considered in accordance with provisions of Section 016600.

2.2 STANDING SEAM METAL ROOFING

A. R-Mer Span:

1. Width of Standing T-Seam Panel: 1 inch T-seam.

a. 16 inches.

2. Standing Seam: 2-3/8 inch tall mechanically seamed with factory installed hot melt sealant in-seam cap. Panel/Cap is configured with a total of 4 layers of metal surrounding anchor clip.

3. Panel Profile: Provided with minimum 1-1/2 inches wide elevated mesa's every 2 inches on center continuous throughout panel.

a. Slope: Open Purlins or Solid Substrate down to 1/4:12.

4. Panel material:

a. Galvanized steel 22 gauge, G90, smooth as per ASTM A 653.

5. Flashing and flat stock material: Fabricate in profiles indicated on Drawings of same material, thickness, and finish as roof system, unless indicated otherwise.

6. Coated Finish:

   a. Exposed surfaces for coated panels:

      1) Coating system shall provide nominal 1.0 mil dry film thickness, consisting of primer and color coat.

   b. Unexposed surfaces for coated panels shall be baked-on polyester coating with .20 to .30 dry film thickness (TDF).

7. Accessory Components:

   a. Anchor Clips:

      1) Concealed Standard Anchor Clips: Clips 16 gauge galvanized steel, 1 piece clip with projecting legs for additional panel alignment and provision for unlimited thermal movement in each direction along the longitudinal dimension.

   b. Fasteners:

      1) Concealed fasteners: Corrosion resistant steel fasteners (zinc plated, stainless steel or equal) designed to meet structural loading requirements.

      2) Exposed fasteners: Series 410 stainless steel fasteners or 1/8 inch diameter stainless steel waterproof rivets. All exposed fasteners shall be factory painted to match the color of the standing seam panels.

   c. Closures: Factory precut closed cell foam meeting ASTM D 1056 or ASTM D 3575, enclosed in metal channel matching panels when used at hip, ridge, rake, and jamb.

   d. Provide all miscellaneous accessories for complete installation.

2.3 METAL ROOFING ACCESSORIES

A. R-Mer SS Sheet Stock: High gloss, factory painted aluminum

1. Material and Thickness:

   a. 22 gauge steel

2. Color.

2.4 COLOR OPTIONS

A. Standard collection:

1.Colonial Red

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive metal roofing. Notify the Architect in writing of any defective conditions encountered. Starting of work shall constitute acceptance of such conditions.

B. Structural Deck Substrate:

1. Inspect roof deck to verify deck is clean and smooth, free of depressions, waves, or projections, and properly sloped.

2. Verify deck is dry and joints are solidly supported and fastened.

3. Verify wood nailers are installed and correctly located. Do not use pressure-treated wood containing salt-based preservatives or materials corrosive to steel.

C. Structural Framing Substrate:

1. Verify primary and secondary framing members are installed and fastened, properly aligned and sloped.

2. Verify damaged shop coatings are repaired with touch up paint.

D. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets are in place, and nailing strips located.

E. Correct defective conditions before beginning work.

3.2 INSTALLATION

A. Install in conformance with the NRCA Roofing and Waterproofing Manual and Manufacturers installation requirements.

B. Form panel shape as indicated on Drawings, accurate in size, square, and free from distortion or defects.

C. Install underlayment and eave protection sheet underlayment as recommended by the Manufacturer.

D. Coordinate with installation of rigid board insulation as specified in Section 07200.

E. Install all panels continuous from ridge to eave. Transverse seams are not permitted.

F. Panel lengths that exceed maximum shipping lengths shall be field rolled on equipment owned by the panel manufacturer. Seam sealant must be factory applied.

G. Exposed fasteners, screws and/or roof mastic are unacceptable and will be rejected. System configuration only allows for exposed fasteners at panel overlap, if required, and at trim details in accordance with the Manufacturer's requirements.

H. Where not otherwise indicated conform to SMACNA details including flashings and trim.

I. Install sealants where indicated to clean dry surfaces only without skips or voids..

J. Install metal edge treatment in accordance with the manufacturer's instructions and the approved shop drawings.

K. Install metal roofing accessories in accordance with the manufacturer's instructions and the approved shop drawings.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.4 SCHEDULES

N/A

END OF SECTION

SECTION 075200
MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cold Applied 2-Ply Thermoplastic Hybrid Roof System (KEE-Stone FB 60). (2.17)(3.4)

1.2 RELATED SECTIONS

1.3 REFERENCES

A. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

B. ASTM D 312 - Standard Specification for Asphalt used in Roofing.

C. ASTM D 451 - Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.

D. ASTM D 1970 - Specification for Sheet Materials, Self-Adhering Polymer Modified Bituminous, Used as Steep Roofing Underlayment for Ice Dam Protection.

E. ASTM D 1079 Standard Terminology Relating to Roofing, Waterproofing and Bituminous Materials.

F. ASTM D 1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

G. ASTM D 1863 Standard Specification for Mineral Aggregate Used as a Protective Coating for Roofing.

H. ASTM D 2178 Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

I. ASTM D 2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.

J. ASTM D 4586 Standard Specification for Asphalt Roof Cement, Asbestos-Free.

K. ASTM D 4601 Standard Specification for Asphalt Coated Glass Fiber Base Sheet Used in Roofing.

L. ASTM D 5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.

M. ASTM D 6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.

N. ASTM D 6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.

O. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

P. ASTM D 6754 - Standard Specification for Ketone Ethylene Ester (KEE) Sheet Roofing.

Q. ASTM D 6757 - Standard Specification for Underlayment Felt Containing Inorganic Fibers Used in Steep-Slope Roofing.

R. ASTM E 108 - Standard Test Methods for Fire Test of Roof Coverings

S. Factory Mutual Research (FM): Roof Assembly Classifications.

T. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.

U. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

V. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.

W. Warnock Hersey (WH): Fire Hazard Classifications.

X. ANSI-SPRI ES-1 Wind Design Standard for Edge Systems used with Low Slope Roofing Systems.

Y. ASCE 7, Minimum Design Loads for Buildings and Other Structures

Z. UL - Fire Resistance Directory.

AA. FM Approvals - Roof Coverings and/or RoofNav assembly database.

BB. FBC - Florida Building Code.

CC. Miami-Dade Building Code Compliance - N.O.A. (Notice of Acceptance).

DD. California Title 24 Energy Efficient Standards.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Energy Star: Roof System shall comply with the initial and aged reflectivity required by the U.S. Federal Government's Energy Star program.

C. Roof System membranes containing recycled or bio-based materials shall be third party certified through UL Environment.

D. Roof system shall have been tested in compliance with the following codes and test requirements:

1. Cool Roof Rating Council:

a. CRRC Directory CRRC

1.5 SUBMITTALS

A. Submit under provisions of Section 013323 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation instructions.

C. Shop Drawings: Submit shop drawings including installation details of roofing, flashing, fastening, insulation, and vapor barrier, including notation of roof slopes and fastening patterns of insulation and base modified bitumen membrane, prior to job start.

D. Design Pressure Calculations: Submit design pressure calculations for the roof area in accordance with ASCE 7 and local Building Code requirements. Include a roof system attachment analysis report, certifying the system's compliance with applicable wind load requirements before Work begins.

E. Recycled or Bio-Based Materials: Provide third party certification through UL Environment of roof System membranes containing recycled or bio based materials.

F. Verification Samples: For each modified bituminous membrane ply product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

G. Manufacturer's Certificates: Provide to certify products meet or exceed specified requirements.

H. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147. Testing must be performed at 77 deg. F. Tests at 0 deg. F will not be considered.

I. Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic inspection and maintenance of all completed roofing work. Provide product warranty executed by the manufacturer. Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified with documented ISO 9001 certification and minimum of twelve years of documented experience and must not have been in Chapter 11 bankruptcy during the last five years.

C. Installer Qualifications: Company specializing in performing Work of this section with minimum five years documented experience and a certified Pre-Approved Garland Contractor.

D. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress.

E. Product Certification: Provide manufacturer's certification that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.

F. Source Limitations: Obtain all components of roof system from a single manufacturer. Secondary products that are required shall be recommended and approved in writing by the roofing system Manufacturer. Upon request of the Architect or Owner, submit Manufacturer's written approval of secondary components in list form, signed by an authorized agent of the Manufacturer.

1.7 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing Work of this section.

B. Review installation procedures and coordination required with related Work.

C. Inspect and make notes of job conditions prior to installation:

1. Record minutes of the conference and provide copies to all parties present.

2. Identify all outstanding issues in writing designating the responsible party for follow-up action and the timetable for completion.

3. Installation of roofing system shall not begin until all outstanding issues are resolved to the satisfaction of the Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging with labels intact until ready for installation.

B. Store all roofing materials in a dry place, on pallets or raised platforms, out of direct exposure to the elements until time of application. Store materials at least 4 inches above ground level and covered with "breathable" tarpaulins.

C. Stored in accordance with the instructions of the manufacturer prior to their application or installation. Store roll goods on end on a clean flat surface except store KEE-Stone FB 60 rolls flat on a clean flat surface. No wet or damaged materials will be used in the application.

D. Store at room temperature wherever possible, until immediately prior to installing the roll. During winter, store materials in a heated location with a 50 degree F (10 degree C) minimum temperature, removed only as needed for immediate use. Keep materials away from open flame or welding sparks.

E. Avoid stockpiling of materials on roofs without first obtaining acceptance from the Architect/Engineer.

F. Adhesive storage shall be between the range of above 50 degree F (10 degree C) and below 80 degree F (27 degree C). Area of storage shall be constructed for flammable storage.

1.9 COORDINATION

A. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.10 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.11 WARRANTY

A. Upon completion of the work, provide the Manufacturer's written and signed Limited Warranty, warranting that, if a leak develops in the roof during the term of this warranty, due to defective material, the manufacturer shall provide the Owner, at the Manufacturer's expense, with the labor and material necessary to return the defective area to a watertight condition.

1. Warranty Period:

a. 30-years from date of acceptance. Requires mid period inspection.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Garland Company, Inc. (The) which is the District Standard; 3800 E. 91st St., Cleveland, OH 44105. ASD. Toll Free: 800-321-9336. Phone: 216-641-7500. Fax: 216-641-0633. Web Site: www.garlandco.com. Local rep Sean Gavin 661-343-3337.

B. Both steep slope and low slope roofing sections must be from the same manufacturer and covered under one umbrella. Multiple warranties from multiple manufacturers will not be accepted.

C. Requests for substitutions will be considered in accordance with provisions of Section 016600 - Product Requirements.

D. The Products specified are intended and the Standard of Quality for the products required for this project. If other products are proposed the bidder must disclose in the bid the manufacturer and the products that they intend to use on the Project. If no manufacturer and products are listed, the bid may be accepted only with the use of products specified.

1. Bidder will not be allowed to change materials after the bid opening date.

2. If alternate products are included in the bid, the products must be equal to or exceed the products specified. Supporting technical data shall be submitted to the Architect/ Owner for approval prior to acceptance.

3. In making a request for substitution, the Bidder/Roofing Contractor represents that it has:

   a. Personally investigated the proposed product or method, and determined that it is equal or superior in all respects to that specified.

   b. Will provide the same guarantee for substitution as for the product and method specified.

   c. Will coordinate installation of accepted substitution in work, making such changes as may be required for work to be completed in all respects.

   d. Will waive all claims for additional cost related to substitution, which consequently become apparent.

   e. Cost data is complete and includes all related cost under his/her contract or other contracts, which may be affected by the substitution.

   f. Will reimburse the Owner for all redesign cost by the Architect for accommodation of the substitution.

4. Architect/ Owner reserves the right to be the final authority on the acceptance or rejection of any or all bids, proposed alternate roofing systems or materials that has met ALL specified requirement criteria.

5. Failure to submit substitution package, or any portion thereof requested, will result in immediate disqualification and consideration for that particular contractors request for manufacturer substitution.

2.2 COLD APPLIED 2-PLY THERMOPLASTIC HYBRID ROOF SYSTEM - KEE-Stone FB 60

A. Nailable Base Sheet: One ply fastened to the deck per wind uplift calculations.

1. VersiPly 40:

B. Base (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive:

1. FlexBase 80:

C. Thermoplastic Cap (Ply) Sheet: One ply bonded to the prepared substrate with Interply Adhesive (2):

1. KEE-Stone FB 60:

D. Interply Adhesive: (1)

1. Green-Lock Plus Membrane Adhesive.

E. Flashing Base Ply: One ply bonded to the prepared substrate with Flashing Ply Adhesive:

1. FlexBase 80:

F. Flashing Cap (Ply) Sheet: One ply bonded to the prepared substrate with Flashing Ply Adhesive:

1. KEE-Stone FB 60 Flashing.

G. Flashing Ply Adhesive (1):

1. Green-Lock Plus Flashing Adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Inspect and approve the deck condition, slopes and fastener backing if applicable, parapet walls, expansion joints, roof drains, stack vents, vent outlets, nailers and surfaces and elements.

C. Verify that work penetrating the roof deck, or which may otherwise affect the roofing, has been properly completed.

D. If substrate preparation and other conditions are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. General: Clean surfaces thoroughly prior to installation.

1. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

2. Fill substrate surface voids that are greater than 1/4 inch wide with an acceptable fill material.

3. Roof surface to receive roofing system shall be smooth, clean, free from loose gravel, dirt and debris, dry and structurally sound.

4. Wherever necessary, all surfaces to receive roofing materials shall be power broom and vacuumed to remove debris and loose matter prior to starting work.

5. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp, frozen, dirty, or dusty surfaces.

6. Fasteners and plates for fastening components mechanically to the substrate shall provide a minimum pull-out capacity of 300 lbs. (136 k) per fastener. Base or ply sheets attached with cap nails require a minimum pullout capacity of 40 lb. per nail.

7. Prime decks where required, in accordance with requirements and recommendations of the primer and deck manufacturer.

3.3 INSTALLATION - GENERAL

A. Install modified bitumen membranes and flashings in accordance with manufacturer's instructions and with the recommendations provided by the National Roofing Contractors Association's Roofing & Waterproofing Manual, the Asphalt Roofing Manufacturers Association, and applicable codes.

B. General: Avoid installation of modified bitumen membranes at temperatures lower than 40- 45 degrees F. When work at such temperatures unavoidable use the following precautions:

1. Take extra care during cold weather installation and when ambient temperatures are affected by wind or humidity, to ensure adequate bonding is achieved between the surfaces to be joined. Use extra care at material seam welds and where adhesion of the applied product to the appropriately prepared substrate as the substrate can be affected by such temperature constraints as well.

2. Unrolling of cold materials, under low ambient conditions must be avoided to prevent the likelihood of unnecessary stress cracking. Rolls must be at least 40 degrees F at the time of application. If the membrane roll becomes stiff or difficult to install, it must be replaced with roll from a heated storage area.

C. Commence installation of the roofing system at the lowest point of the roof (or roof area), working up the slope toward the highest point. Lap sheets shingle fashion so as to constantly shed water

D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank 1 inch cap nails, or screws and plates at a rate of 1 fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 ft o.c. for slopes less than 3:12 and 4 feet o.c. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install 4 additional fasteners at the upper edge of the membrane when strapping the plies.

3.4 INSTALLATION COLD APPLIED ROOF SYSTEM

A. Base Ply: Cut base ply sheets into 18 foot lengths and allow plies to relax before installing. Install base sheet in Interply Adhesive: applied at the rate required by the manufacturer. Shingle base sheets uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each large area of roofing.

1. Lap ply sheet ends 8 inches. Stagger end laps 12 inches minimum.

2. Solidly bond to the substrate and adjacent ply with specified cold adhesive at the rate of 2 to 2-1/2 gallons per 100 square feet.

3. Roll must push a puddle of adhesive in front of it with adhesive slightly visible at all side laps. Use care to eliminate air entrapment under the membrane.

4. Install subsequent rolls of modified across the roof as above with a minimum of 4 inch side laps and 8 inch staggered end laps. Lay modified membrane in the same direction as the underlayers but the laps shall not coincide with the laps of the base layers.

5. Extend plies 2 inches beyond top edges of cants at wall and projection bases.

6. Install base flashing ply to all perimeter and projection details.

7. Allow the one ply of base sheet to cure at least 30 minutes before installing the modified membrane. However, the modified membrane must be installed the same day as the base plies.

B. Thermoplastic Cap Ply: Allow plies to relax before installing. Install in interplay adhesive applied at the rate required by the manufacturer. Shingle sheets uniformly over the prepared substrate to achieve the number of plies specified. Shingle in proper direction to shed water on each large area of roofing.

1. All field seams exceeding 10 feet in length shall be welded with an approved automatic welder.

2. All field seams must be clean and dry prior to initiating any field welding. Remove foreign materials from the seams (dirt, oils, etc.) with acetone or authorized alternative. Use CLEAN WHITE COTTON cloths and allow approximately five minutes for solvents to dissipate before initiating the automatic welder. Do not use denim or synthetic rags for cleaning.

3. Contaminated areas within a membrane seam will inhibit proper welding and will require a membrane patch or strip.

4. All welding shall be performed only by qualified personnel to ensure the quality and continuity of the weld. The lap or seam area of the membrane may be intermittently tack welded to hold the membrane in place.

5. The back interior edge of the membrane shall be welded first, with a thin, continuous weld to concentrate heat along the exterior edge of the lap during the final welding pass.

6. Follow local code requirements for electric supply, grounding and surge protection. The use of a dedicated, portable generator is highly recommended to ensure a consistent electrical supply, without fluctuations that can interfere with weld consistency.

7. Properly welded seams shall utilize a 1.5 inch wide nozzle, to create a homogeneous weld, a minimum of 1.5 inches in width.

C. Fibrous Cant Strips: Provide non-combustible perlite or glass fiber cant strips at all wall/curb detail treatments where angle changes are greater than 45 degrees. Cant may be set in approved cold adhesives, hot asphalt or mechanically attached with approved plates and fasteners.

D. Wood Blocking, Nailers and Cant Strips: Provide wood blocking, nailers and cant strips as specified in Section 061000 – Rough Carpentry.

1. Provide nailers at all roof perimeters and penetrations for fastening membrane flashings and sheet metal components.

2. Wood nailers should match the height of any insulation, providing a smooth and even transition between flashing and insulation areas.

3. Nailer lengths should be spaced with a minimum 1/8 inch gap for expansion and contraction between each length or change of direction.

4. Nailers and flashings should be fastened in accordance with Factory Mutual "Loss Prevention Data Sheet 1- 49, Perimeter Flashing" and be designed to be capable of resisting a minimum force of 200 lbs/lineal foot in any direction.

E. Metal Work: Provide metal flashings, counter flashings, parapet coping caps and thru-wall flashings as specified in Division 7. Install in accordance with the SMACNA "Architectural Sheet Metal Manual" or the NRCA Roofing Waterproofing manual.

F. Termination Bar: Provide a metal termination bar or approved top edge securement at the terminus of all flashing sheets at walls and curbs. Fasten the bar a minimum of 8 inches (203 mm) o/c to achieve constant compression. Provide suitable, sealant at the top edge if required.

G. Flashing Base Ply: Install flashing sheets by the same application method used for the base ply.

1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.

2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.

3. Adhere to the underlying base ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.

4. Solidly adhere the entire flashing ply to the substrate. Secure the tops of all flashings that are not run up and over curb through termination bar fastened at 6 inches (152 mm) O.C. and sealed at top.

5. Seal all vertical laps of flashing ply with a three-course application of trowel-grade mastic and fiberglass mesh.

6. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.

7. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work.

8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed or nailed 4 inches on center and covered with an acceptable counter flashing.

H. Flashing Cap Ply:

1. Seal curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.

2. Prepare all walls, penetrations, expansion joints and where shown on the Drawings to be flashed with required primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.

3. Adhere to the underlying base flashing ply with specified flashing ply adhesive unless otherwise specified. Nail off at a minimum of 8 inches (203 mm) o.c. from the finished roof at all vertical surfaces.

4. Coordinate counter flashing, cap flashings, expansion joints and similar work with modified bitumen roofing work as specified.

5. Coordinate roof accessories, miscellaneous sheet metal accessory items with the roofing system work.

6. All stripping shall be installed prior to flashing cap sheet installation.

7. Heat and scrape granules when welding or adhering at cut areas and seams to granular surfaces at all flashings.

8. Secure the top edge of the flashing sheet using a termination bar only when the wall surface above is waterproofed or nailed 4 inches on center and covered with an acceptable counter flashing.

I. Roof Walkways: Provide walkways in areas indicated on the Drawings.

3.5 CLEANING

A. Clean-up and remove daily from the site all wrappings, empty containers, paper, loose particles and other debris resulting from these operations.

B. Remove asphalt markings from finished surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION

A. Provide traffic ways, erect barriers, fences, guards, rails, enclosures, chutes and the like to protect personnel, roofs and structures, vehicles, and utilities.

B. Protect exposed surfaces of finished walls with tarps to prevent damage.

C. Plywood for traffic ways required for material movement over existing roofs shall be not less than 5/8 inch (16 mm) thick.

D. In addition to the plywood listed above, an underlayment of minimum 1/2 inch (13 mm) recover board is required on new roofing.

E. Special permission shall be obtained from the Manufacturer before any traffic shall be permitted over new roofing.

3.7 FIELD QUALITY CONTROL

A. Inspection: Provide manufacturer's field observations at start-up and at intervals of approximately 30 percent, 60 percent and 90 percent completion. Provide a final inspection upon completion of the Work.

1. Warranty shall be issued upon manufacturer's acceptance of the installation.

2. Field observations shall be performed by a Sales Representative employed full-time by the manufacturer and whose primary job description is to assist, inspect and approve membrane installations for the manufacturer.

3. Provide observation reports from the Sales Representative indicating procedures followed, weather conditions and any discrepancies found during inspection.

4. Provide a final report from the Sales Representative, certifying that the roofing system has been satisfactorily installed according to the project specifications, approved details and good general roofing practice.

3.8 SCHEDULES

A. Base (Ply) Sheet:

1. FlexBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a dual fiberglass reinforced scrim, performance requirements according to ASTM D 5147.

a. Tensile Strength, ASTM D 5147

1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 225 lbf/in XD 225 lbf/in

2) 50 mm/min. @ 23 +/- 2 deg. C MD 39.0 kN/m XD 39 kN/m

b. Tear Strength, ASTM D 5147

1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf XD 300 lbf

2) 50 mm/min. @ 23 +/- 2 deg. C MD 1335 N XD 1335 N

c. Elongation at Maximum Tensile, ASTM D 5147

1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 7% XD 7%

2) 50 mm/min. @ 23 +/- 2 deg. C MD 7% XD 7%

d. Low Temperature Flexibility, ASTM D 5147, Passes -30 deg. F (-34.4 deg. C)

B. Thermoplastic/Modified Cap (Ply) Sheet:

1. KEE-Stone FB 60: 60 mil thermoplastic, ketone ethylene ester (KEE) roofing membrane with polyester scrim. ASTM D6754

a. Breaking Strength, ASTM D 751, Proc. B, strip 1) 375 lbf. (1,668 N)

b. Tear Strength ASTM D 751 1)120 lbf. min. (534 N)

c. Elongation at Break (%), ASTM D 751, Proc. B, Strip 1) 40.0%

C. Interply Adhesive:

1. Green-Lock Plus Membrane Adhesive: Cold applied solvent free membrane adhesive: zero V.O.C. compliant performance requirements:

a. Non-Volatile Content ASTM D 4586 100%

b. Density ASTM D 1475 12.3 lbs./gal. (1.47 g/cm3)

c. Viscosity Brookfield Spindle T-E at 5 rpm 124,000 cPs.

d. Flash Point ASTM D 93 400 deg. F min. (232 deg. C)

e. Slope: up to 3:12

D. Flashing Base Ply:

1. FlexBase 80: 80 mil SBS (Styrene-Butadiene-Styrene) rubber modified roofing base sheet reinforced with a dual fiberglass reinforced scrim, performance requirements according to ASTM D 5147.

a. Tensile Strength, ASTM D 5147

1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 225 lbf/in XD 225 lbf/in

2) 50 mm/min. @ 23 +/- 2 deg. C MD 39.0 kN/m XD 39 kN/m

b. Tear Strength, ASTM D 5147

1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 300 lbf XD 300 lbf

2) 50 mm/min. @ 23 +/- 2 deg. C MD 1335 N XD 1335 N

c. Elongation at Maximum Tensile, ASTM D 5147

1) 2 in/min. @ 73.4 +/- 3.6 deg. F MD 7% XD 7%

2) 50 mm/min. @ 23 +/- 2 deg. C MD 7% XD 7%

d. Low Temperature Flexibility, ASTM D 5147:

1) Passes -30 deg. F (-34.4 deg. C)

E. Flashing Ply Adhesive:

1. Green-Lock Plus Flashing Adhesive: Cold applied solvent free flashing adhesive: zero V.O.C.

a. Non-Volatile Content ASTM D 4586 100%

b. Density ASTM D 1475 11.8 lbs./gal. (1.17 g/cm3)

c. Viscosity Brookfield 400,000 cPs.

d. Flash Point ASTM D 93 400 deg. F min. (232 deg. C)

F. Surfacing:

1. Flashing Cap (Ply) Sheet:

a. KEE-Stone FB 60 Flashing: 60 mil thermoplastic, ketone ethylene ester (KEE) roofing membrane with polyester scrim. ASTM D 6754.

1) Breaking Strength, ASTM D 751, Proc. B, strip

a) 378 lbf

2) Tear Strength ASTM D 751

a) 120 lbf. minumum.

3) Elongation at Break (%), ASTM D 751, Proc. B, Strip

a) 40.0%

END OF SECTION

SECTION 079200
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Preformed joint sealants.

1.2 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers eight samples of materials that will contact or affect joint sealants. Use ASTM C 1087 or manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each kind and color of joint sealant required.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

D. Product test reports.

E. Preconstruction compatibility and adhesion test reports.

F. Preconstruction field-adhesion test reports.

G. Field-adhesion test reports.

H. Warranties.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

B. Pre-installation Conference: Conduct conference at Project site.

1.5 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.

2. Sealant Primers for Nonporous Substrates: 250 g/L.

3. Sealant Primers for Porous Substrates: 775 g/L.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.

C. Stain-Test-Response Characteristics: Where sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.2 SILICONE JOINT SEALANTS

A. Neutral-Curing Silicone Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.

b. Dow Corning Corporation.

c. GE Advanced Materials - Silicones.

d. Pecora Corporation.

e. Polymeric Systems, Inc.

f. Schnee-Morehead, Inc.

g. Sika Corporation; Construction Products Division.

h. Tremco Incorporated.

2. Type: Single component (S) or multicomponent (M).

3. Grade: Pourable (P) or nonsag (NS).

4. Class: 100/50.

5. Uses Related to Exposure: Traffic (T).

2.3 LATEX JOINT SEALANTS

A. Latex Joint Sealant [LS-<#>]: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Building Systems.

b. Bostik, Inc.

c. Pecora Corporation.

d. Schnee-Morehead, Inc.

e. Tremco Incorporated.

2.4 JOINT SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.5 MISCELLANEOUS MATERIALS

A. 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.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

1. Remove laitance and form-release agents from concrete.

2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer 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.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.

2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

F. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 5 tests for the first 500 feet (300 m)] of joint length for each kind of sealant and joint substrate.

b. Perform 1 test for each 1000 feet (300 m) of joint length thereafter.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.

1. Joint Locations:

a. Isolation and contraction joints in cast-in-place concrete slabs.

b. Tile control and expansion joints.

c. Joints between different materials listed above.

d. Other joints as indicated.

2. Joint Sealant: Silicone.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.

b. Control and expansion joints in unit masonry.

c. Joints between different materials listed above.

d. Perimeter joints between materials listed above and frames of doors, windows and louvers.

e. Control and expansion joints in ceilings and other overhead surfaces.

f. Other joints as indicated.

2. Joint Sealant: Silicone.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.

1. Joint Locations:

a. Isolation joints in cast-in-place concrete slabs.

b. Control and expansion joints in tile flooring.

c. Other joints as indicated.

2. Joint Sealant: Silicone.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors

D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal non-traffic surfaces.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.

b. Perimeter joints of exterior openings where indicated.

c. Tile control and expansion joints.

d. Vertical joints on exposed surfaces of interior unit masonry, concrete, walls and partitions.

e. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.

f. Other joints as indicated.

2. Joint Sealant: Latex.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal non-traffic surfaces.

1. Joint Sealant Location:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.

b. Tile control and expansion joints where indicated.

c. Other joints as indicated.

2. Joint Sealant: Silicone.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 081113
HOLLOW METAL DOORS AND FRAMES AND WINDOW FRAMES

PART 1 - GENERAL

1.1 WORK

A. Custom fabricated hollow steel doors, door frames and glazed light frames with accessories and anchors complying with HMMA 861 “Guide Specifications for Commercial Hollow Metal Doors and Frames.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including General and Supplementary conditions and Division 01 specification sections apply to this section.

1.3 RELATED WORK SECTIONS

A. Section 087100 Finish Hardware

B. Section 088000 Glass and Glazing

C. Section 099000 Painting

1.4 REFERENCES SPECIFIED

A. ISO 9001 – Quality System.

B. UL 10B - Fire Tests of Door Assemblies.

C. UL 10C – Standard for Positive Pressure Fire Tests of Door Assemblies, UBC 7-2-1997 Fire Tests of Door Assemblies.

D. UL10B or NFPA 252 at Atmospheric Pressure.

E. A1008/A1008M – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Allow and High-Strength Low-Allow with Improved Formability.

F. ASTM-A568 – General Requirements for Steel, Carbon and High Strength Low Alloy Hot Rolled Strip, and Cold Rolled Sheet.

G. ASTM-A924 -General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.

H. ANSI A250.8/SDI-100 - Recommended Specifications for Standard Steel Doors and Frames.

I. ANSI A250.11 - Recommended Erection Instructions for Steel Frames.

J. SDI-107 - Hardware on Steel Doors (Reinforcement Application).

K. NFPA-80 - Standard for Fire Doors and Windows.

L. NFPA-101 - Life Safety Code.

M. ANSI-A250.4 and ANSI-A250.5 -Test Procedure and Acceptance Criteria for Physical Endurance, Steel Doors and Frames.

N. ANSI-A250.10 - Test Procedure and Acceptance Criteria for Painted Steel Surfaces for Steel Doors and Frames.

O. ADA-The Americans with Disabilities Act - Title III - Public Accommodations.

P. ANSI-A117.1 - American National Standards Institute - Accessible and Usable Buildings and Facilities.

Q. U. L. - Underwriter's Laboratories.

R. ITS - Intertek Testing Service [Warnock Hersey].

S. CBC - California Building Code and Local Codes Including Authority Having Jurisdiction.

T. N.F.P.A. 105 - Smoke and draft control assemblies.

U. U.L. - 1784 Air leakage test of door assemblies.

V. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.

W (HMMA) Hollow Metal Mfr's. Assoc., a Div. of National Assoc. of Arch. Metal Mfr's. (NAAMM), Guide Spec. for Commercial Hollow Metal Doors & Frames, HMMA Standard #861-87; NFPA #80

1.5 SUBMITTALS

A. Shop Drawings: Indicate door and frame elevations and sections, materials, gauges, fire ratings, finishes, fabrication and erection details, location and extent of hardware reinforcement, type and location of frame anchors, locations of finish hardware by dimension and locations/details of all openings and louvers. Do not proceed with any fabrication until all details are approved.

1. Show all frame sections, anchorage of frames in openings, preparation for hardware, metal gauges, field splice joints, and other data.

2. Doors: Show all construction; gauges, preparation for hardware, door lining materials, openings for louvers and glazing, and other data.

3. Coordinate with Contractor and typically indicate acceptable tolerances to be incorporated into frame throat to allow for finish materials installation.

4. Show elevations of each hollow metal door and window type, details of each frame type, location schedule using same reference numbers as contract drawings, details of installation in the various openings, wall thicknesses and materials to be encountered in this Project, installation requirements for hardware, and typical and special details of construction, including relationships to adjacent construction and materials.

B. Certification of Compliance: Submit any information necessary to indicate compliance to these specifications. Finished work and shop drawings shall match approved samples.

C. Submit samples prior to submission of shop drawings or beginning any fabrication.

1. Samples will be retained until Project is completed.

2. Door Construction: Provide cut-away sample showing edge, top, and bottom construction; insulation; hinge, closer, lock, and panic bar reinforcement; face stiffening.

3. Frame Construction: Provide sample of typical profile, with welded corner joint, hinge and closer reinforcement, mortar guards, wall anchor, and floor anchor, in full compliance with these Project specifications. For exterior openings to receive glazing, provide additional sample of typical profile with glazing stops and ALL joints/seams filled and sealed watertight.

D. Job Closeout: Provide two (two) complete manufacturer's catalogs to the building owner's designated representative.

1.6 QUALITY ASSURANCE

A. Source Quality Control: Products to be certified by manufacturer showing compliance with these specifications; specifically describe and certify complete hot-dipped galvanizing and shop prime painting of all hollow metal doors and frames at exterior openings. Certification must be submitted with shop drawings and with each product upon delivery. No doors or frames shall be delivered to job site, installed, or accepted without this certification.

B. All hollow metal doors and frames shall be the product of one (1) manufacturer. Exceptions will not be permitted under any circumstances.

C. Requirements of Regulatory Agencies: Conform to Title 24 CBC and NFPA #80 for fire-rated assemblies.

D. Certification of A-60 galvanizing and prime paint finishing.

E. Certification that the Polystyrene Core Swinging Type Fire Doors – Model 707 as manufactured by The Curries Company, has been investigated by Underwriters Laboratories and certified for Standard(s) of Safety: UL 10C – Standard for Positive Pressure Fire Tests of Door Assemblies, UBC 7-2-1997, Fire Tests of Door Assemblies.

F. Hollow metal manufacture shall be a SDI member.

G. The Hollow Metal Manufacturer shall supply doors and frames through a national distribution system as described in 1.06.D herein. Marketing material through a factory direct method will not be acceptable to the building owner.

1. Successful distributor shall be located within the project area.

H. Hollow metal supplier shall be a qualified “local direct distributor” of products to be furnished. The distributor shall have in their regular employment an AHC and/or CDC with a local business address, telephone and fax line, which will be available at reasonable time’s through-out the project, to consult with the architect, contractor and building owner regarding matters affecting the door and frame openings.

I. Contractor will allow in his bid for the replacement of two exterior (2) doors selected at random by the project architect and owner’s representative for dismantling and inspection of internal construction and compliance with the specification. Contractor to provide labor and tools for inspection under architect's direction.

J. Failure of any hollow metal frame or door to meet specified standards shall be grounds to reject the entire shipment of hollow metal doors and frames, including the hollow metal manufacturer. Components shall be replaced at contractor’s expense, including two additional doors for dismantling. No extensions of time or additions to the contract will be allowed due to a rejection of material and substitution of the hollow metal manufacturer.

L. Installer requirement: Firm with a minimum of five years experience in the installation of metal doors and frames similar in the type included in this specification and have a meeting with lock representative for proper installation of said locks.

M. A pre-construction meeting is required for proper installation of said lock.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver doors and frames cardboard wrapped, crated, palletized or otherwise protected during transit and site storage.

B. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and accepted by the architect. Otherwise remove and replace damaged items.

C. Store doors and frames at the building site in a dry, secure place.

1. Place units on minimum 4-inch high wood blocking.

2. Avoid non-vented shelters [covering] that can create a humidity chamber.

3. If cardboard wrapper on door becomes wet, remove carton immediately.

4. Provide 1/4-inch spaces between stacked doors to promote air circulation.

1.8 SEQUENCING AND SCHEDULING

A. Sequencing, Scheduling: Verify all existing conditions, opening sizes, finishes, frame throat dimensions, existing conditions to remain, hardware, glazing, and doors with respective Sections.

B. Deliver all doors and frames to the job site in a timely manner so as not to delay progress of other trades.

C. Issue purchase orders to frame, door and hardware suppliers in sufficient time so as not to interfere with normal quoted delivery of materials.

1.9 WARRANTY

A. Hollow metal doors and frames shall be supplied with a two (2) year warranty against defects in materials and workmanship.

B. Warranty to commence with substantial completion of the job.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Or Equal, provided products meet the specified performance and construction requirements, and are acceptable to the building owner. Such products are subject to California Public Contracts Code Section 3400.

B. Performance criteria as specified in 2.03 will be supported by an independent laboratory cycle and twist test certification document, and will be included in the supplier's shop submittals. The building owner's authorized representative including locksmith and project supervisor will review any proposed substitution. Request will be required ten (10) days before bid. Request will require a complete sample of product with supporting data. In addition, the architect and owner will be furnished a list of a minimum of twenty (20) local (75-mile radius of client) institutional end-user customers with facilities locksmith names and telephone numbers.

D. Manufacturers:

1. Curries, Division of AADG, Inc.
2. Krieger
3. Stiles

2.2 MATERIALS

A. Steel requirements, all doors and frames to be manufactured of commercial quality, stretcher leveled flatness, cold rolled steel per ASTM-A1008 and A-568 general requirements or galv. to A60 minimum coating weight standard per ASTM-A924 or A653 hot dip galvanized to A60 minimum coating weight standard. Internal reinforcing may be manufactured of hot rolled pickled and oiled steel per ASTM-A1011.

1. Typical, For Frames at Interior Openings: ASTM A-366; Prime quality, cold rolled, pickled and annealed, free from scale pitting and surface defects.

2. Typical, For Exterior Doors and Frames at Exterior Openings: ASTM A525 and ASTM A526; Prime quality, cold rolled, zinc coated (fully galvanized) by the hot dip process,

3. Coating Materials Primer: all doors and frames to be bonderized and finished as standard with manufacturer's baked-on primer conforming to ANSI-A250.10, or galvanized conforming to Commercial Quality A-60 or G-90 (1.25 oz/sq. ft.), free from scale pitting and surface defects. Use stretcher leveled sheets for doors and panels.

B. Door Core

1. Polystyrene core. All doors to have:

   a. Fiberglass: Semi-rigid compressed fiberglass board, 6 pcf density, R = 4.55/inch.

   b. Fire-Rated Doors: As required to provide required ratings.

   c. Permanently bonded to the inside of each face sheet providing rigidity, insulating and sound deadening properties to the door.

   d. Refer to 2.03 for additional specification.

   e. Steel ribbed core doors are unacceptable and will be rejected and

   f. replaced at the contractor’s expense.

2. Temperature rise rated doors should be provided for stairwell enclosures, which indicate “Temperature rise 30 minutes - 450 degrees F maximum or 250 degrees F maximum” as required by the local building code.

C. Glass lite frames in doors fabricated of not less than 18 GA. galvanized steel with attachment screws allowed only on the non-secure side, screws not visible when viewing door lite frame face.

1. Metal Moldings/Frames and Stops For Glass Lites In Hollow Metal Doors: Provided by door mfr., fixed moldings integral with interior side of door; glass channels fully continuously welded watertight; loose stops min. 18 ga. for exterior side of door, tightly butted corner joints. At fire-rated doors, provide fire-rated stops.

   a. Glazing Stops For Glass Lites & Porcelain Enamel Panels in Frames:

      i. Typical: #20 ga., 5/8" deep typical; unless noted otherwise.
      ii. All Exterior Stops: Galvanized A-60 or G-90.
      iii. Stops For Fire-Rated Glass: #16 ga. min., 3/4” deep typical (5/8" min.); verify with glass mfr. for the particular fire rating.

D. Security Metal Louvers For Hollow Metal Doors: "Anemostat" Type PLSL, fixed inverted split-Y, #18 ga. steel louvers, #12 ga. frame, #12 ga. security grille face plates with 13/16" sq. perforations, security thru-bolt fasteners, baked prime coat finish, with integral insect screen at exterior locations.

E. Fastenings: As required; FHSM vandalproof / tamper-resistant screws for glazing stops. Use stainless steel type screws at exterior doors.

F. Electric Through Wire [HMD]

1. Provide all hollow metal doors receiving electrified hardware with electrical through-door wiring harness and concealed plug connectors on each end to accommodate up to twelve wires.

2. Coordinate connectors on each end of the wiring harness to plug directly into the electrified hardware and the electric hinge.

G. Electric Through Wire [HMF]

1. Provide all hollow metal frames receiving electrified hardware with Electrical wiring harness and concealed plug connectors to accommodate up to twelve wires.

2. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the electric hinge.

2.3 FABRICATION

A. General

1. Fabricate all doors and frames in accordance with ANSI A250.8-1998/SDI-100 except where requirements that are more stringent are specified.

2. As detailed on plans, fabricated "welded" frame units to be delivered to job site as single units. Transoms, sidelights, and window walls, which are "oversize" for transportation and installation, shall be furnished with field splices to be field assembled by the general contractor.

3. Supply only doors and frames manufactured by the acceptable manufacturer listed in this specification.

4. Doors to be 707 Series as manufactured by the Curries Co, Mason City, IA.

727 Series at Temperature rise rated doors, which indicate “Temperature rise 30 min. 450F degrees maximum or 250F degrees maximum” as required by local building code.

5. Prepare doors to receive door hardware per approved schedule, including internal reinforcing. Do not include unnecessary cutouts in door faces not required by hardware template.

B. Door Construction

1. Classification: SDI Level 3 - Model 2 (16GA.) at all interior and exterior drs.

2. Face sheets formed of cold rolled steel.

3. Exterior doors to be galvanized to A60 minimum weight standard.

4. Seamless construction by continuous wire weld of both edges full height of door, and to be performed at the factory.

5. Lite and louver door cutouts: Furnish perimeter channel reinforcement and seal watertight by supplier.

6. Lock edges beveled 1/8 inch in 2 inches.

7. Door lock edge reinforcing shall be one-piece, full height 14GA. Channel. Door hinge edge reinforcing shall be one-piece, full height 12GA. Channel formed and tapped for hinges or as required per listed hardware.

8. Both hinge and lock channels to be welded to each face sheet of the door.

9. Top and bottom channels:

   a. Not less than 16GA. - flush or inverted.

   b. Welded to the face sheet.

   c. Close tops of exterior doors flush by the addition of 16GA. Galvanized steel channel fillers. Channel filler to sealed watertight.

10. Astragals: To be flat security type or 'Z' as called for in the specifications.

11. All doors to conform to A.N.S.I.-A 250.4 Test Procedure and Acceptance Criteria for Physical Endurance. Door size cycle tested to be 4070 to min. Level A performance. Furthermore, doors will have been subjected to an additional one (1) million cycle and twist tests with a combined two (2) million cycles and 46 twist tests. Testing to be accomplished by an independent lab. Certification of these criteria to be submitted with approval drawing by the HM distributor.

12. Transom Panels: To be constructed similar to doors.

13. Where indicated, provide insert type louvers in bottom of doors. Louvers to be not less than 18 GA. prime coated steel.

14. Minimum HG/FG stiles shall be six (6) inches wide. Top rail shall be a minimum eight (8) inches.

C. Door and Window Frame Construction

1. Frames shall comply with ANSI/SDI A250.5 Level A, one-million cycle swing test performance for a 4070 door frame.

2. All frames to be formed from cold rolled steel. Furnish 14GA. door and window frames at exterior openings and 16GA. at interior. Exterior door and window frames to be galvanized to A60 minimum weight standard.

3. All frames are to be Full Profile welded, ground smooth, and re-primed at the welded area.

4. Window frame glass stops shall be minimum 18GA.steel and 5/8" in height.

   a. Exterior stops and countersunk flat-head attachment screws to be galvanized.

   b. Typical, unless noted or detailed otherwise: Integral stop at interior face; loose (removable) stops at exterior face, for field assembly with countersunk removable vandalproof screws at 16" o.c. typical.

   c. Removable Stops: #20 ga., 58" x 5/8" typical, unless noted otherwise. Finish to match steel frames, A-60 hot-dipped galvanize at all exterior openings.

   d. All exposed screws to be non-magnetic stainless steel; finish to match steel frames.

5. Provide temporary shipping bars to help protect from damage during transit and handling.

   a. Temporary shipping bars to be removed before setting frames.

6. All welds on frames, transoms and side-lites to be flush with neatly mitered or butted material cuts.

D. Frame Anchors: Provide sufficient anchorage to attach to wall in accordance with ANSI/SDI A250.5-‘94 Test Compliance Level A of one million cycles, or anchorage as detailed on plans to specific wall conditions.

1. Wall anchor for frame attachment to masonry construction: Masonry anchors, adjustable, flat, corrugated or perforated 'T' shaped anchors with leg not less than 2 inches wide by 10 inches long or masonry "wire" type not less than 3/16” diameter.

2. All frame jamb anchors to be provided: one each jamb per 24 inches of frame height or fraction thereof (minimum 3 in masonry or concrete and 4 in stud construction). Furnish a minimum of two head anchors for frames installed in stud walls and three or more anchors in frame width exceeding 42”.

3. Floor anchors - angle clip type:

   a. Minimum 14 GA.

   b. To receive two (2) fasteners per jamb.

c. Welded to the bottom of each jamb.

4. In place masonry or concrete:

a. 3/8 inch countersunk flat head stove bolt and expansion shields.

b. Spaced 6 inches from top and bottom of frame and at 26 inches on center maximum between.

c. Weld pipe spacers or other type of spacers per manufacturer's standard design in back of frame soffit to protect frame profile during tightening of bolts and anchors.

5. Head struts: for frames not anchored to masonry or concrete construction provide ceiling struts spot-welded to jambs each side extending to building structure where called for on schedule.

E. Hardware Preparation [NOTE: Utility door prep is not acceptable]

1. Reinforcements: reinforce components for hardware installation in accord with ANSI-A115. Provide minimum gage hardware channel type reinforcing for mortise or surface applied hardware as follows:

Hinge	- 7 GA. on frames for mortise butt hinges (min 1- 1/4"x10").
Cont Hinge	- 12 GA. full length on frames for continuous hinges.
Lock	- 12 GA. or equivalent number of threads.
Panic Devices	- 14 GA.
Surface Closer	- 12 GA.
Hold Open Arm	- 12 GA.
Other Items	- Conform to HMMA Standards

2. Field drilling and/or tapping for surface applied hardware is installation contractor's responsibility.

3. Punch single leaf frames to receive three (3) silencers. Double leaf frames to receive two silencers per leaf at head.

4. Factory prepared hardware locations to be in accord with "Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames", as adopted by The Steel Door Institute.

5. Grout solid all frames in masonry or concrete walls. Provide steel plaster-guards or mortar boxes, welded to frame, at back of hardware cutouts where installed in concrete, masonry or plaster openings. Protect inside throat of each frame in grout filled wall conditions or where antifreeze additives are used in fill, with a waterproof undercoating material minimum 1/8" thick, field applied by installer.

F. Drips:

1. Location: Provide at all locations where indicated and at all new or replacement exterior door frames where there is no above-the-door overhang which projects beyond a line drawn upward at 45 degrees from the door head.

2. Construction: 14 ga; Steel material same as door frame; tack weld to top of door frame embedded in wall; seal watertight.

G. Water Penetration: Borrowed lite assemblies, transom, sidelite, and combination transom sidelite frames are not factory sealed to prevent water penetration. In situations where water penetration is a concern, contractor must seal with a high quality long lasting sealant, all joints that are exposed to the elements after the frame assembly is installed. Whenever possible, it is recommended that glass and glazing be installed on the exterior rabbet of the frame assembly. This will help act as a deterrent to water penetration.

1. The member companies of the hollow metal industry cannot control the workmanship associated with the frame installation; therefore, it is the responsibility of the installer to assure all steps are taken to prevent water penetration.

H. Excess Material

1. Contractor to deliver any unused doors and frames to the building owner's designated representative.

PART 3 - EXECUTION

3.1 FRAME INSTALLATION

A. Erection Installation: Install hollow metal units in accordance with manufacturer's instructions and final shop drawings. Fit doors to frames and floors with proper clearances and to achieve the maximum operational effectiveness and appearance of each unit. SDI 122-99 "Installation and Trouble Shooting Guide for Standard Steel Doors and Frames" or "The Installation of Commercial Steel Doors and Steel Frames" as published by DHI are recommended guidelines.

B. Set welded frames in position prior to beginning partition work. Brace frames until permanent anchors are set.

C. Set anchors for frames as work progresses. Install anchors at hinge and strike levels.

D. Use temporary setting spreaders at all locations. Use intermediate spreaders to assure proper door clearances and header braces for grouted frames.

E. Install frames in prepared openings in concrete and masonry walls using countersunk bolts and expansion anchors.

F. Install all fire rated frames in accord with requirements of N.F.P.A.-80.

G. Where frames require ceiling struts or other structural overhead bracing, they shall be anchored securely to structure above, as required.

H. Frames shall be filled solid with Portland cement grout where shown or required b by class of opening in masonry or concrete walls. Provide steel plaster guards or mortar boxes, welded to frame, at back of hardware cutouts where installed in concrete, masonry or plaster openings. Protect inside throat of each frame in grout filled wall conditions or where antifreeze additives are used in fill, with a waterproof undercoating type material minimum 1-2 mils thick and field applied by installer.

3.2 DOOR INSTALLATION

A. Install hollow metal doors in frames using hardware specified in Section 08710 Finish Hardware. Doors are to be expertly hung and shall fit snug against all stops. Doors shall fit accurately and hang free from hinge bind with a uniform clearance of 1/8 inch at head and jambs. After hanging, make all adjustments and then remove respective hardware for finish painting. Reinstall hardware after finish painting.

B. Maximum clearances at edge of doors:

1. Between door and frame at head and jambs: 1/8 inch.
2. At meeting edges pairs of doors and at mullions: 1/8 inch.
3. At transom panels, without transom bars: 1/8 inch.
4. At sills without thresholds: 5/8 inch max above finish floor.
5. At sills with thresholds: 1/8 inch above threshold.

C. Hardware Installation: to be installed securely without marking or defacing hardware or finish work. Protect finish hardware with suitable protective covering until completion of building. Hardware to be in perfect working order. Clean and polish.

3.3 ADJUSTMENT AND CLEANING

A. Remove dirt and excess sealant, mortar or glazing compounds from exposed surfaces.

B. Adjust for smooth operation as required. Install shims as required to allow for proper closing.

C. Fill all dents, holes, etc. with metal filler and sand smooth and flush with adjacent surfaces - reprime/paint to match finish.

3.4 FINISH; FRAMES & DOORS

A Cleaning: After assembly, clean thoroughly, removing all rust, scale, grease, oil, rough spots. Use Hand Tool Cleaning (SSPC-SP2) or Power Tool Cleaning (SSPC-SP3) as applicable.

D. Touch-Up Coating of Galvanized Work: After assembly, prior to prime painting, clean and coat all abraded or damaged galvanizing coating with cold galvanizing compound, 3 mils minimum thickness, per mfr's. requirements to achieve a finish equal to min. A-60 hot-dipped galvanizing.

E. Prime Painting: After surfaces are clean, phosphatize and prime with one coat of specified rust inhibitive primer, baked on, 1.5 mils dry film thickness minimum.

3.5 ADJUSTMENT

A. Straighten, repair, and/or replace damaged work.

B. Repair any damaged or abraded areas of prime coat.

C. Repair any sealant leaks watertight.

END OF SECTION

SECTION 081416
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.

2. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:

1. Division 088000 Section "Glass and Glazing" for glass view panels in flush wood doors.

1.2 SUBMITTALS

A. Product Data: For each type of door indicated.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of mortises and holes for hardware.

2. Indicate dimensions and locations of cutouts.

3. Indicate requirements for veneer matching.

4. Indicate doors to be factory finished and finish requirements.

5. Indicate fire-protection ratings for fire-rated doors.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Quality Standard: In addition to requirements specified, comply with WIC's "Manual of Millwork".

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ampco, Inc.
2. Buell Door Company Inc.
3. Eagle Plywood & Door Manufacturing, Inc.
4. Eggers Industries.
5. Graham; an Assa Abloy Group company.
6. Haley Brothers, Inc.
7. Ipik Door Company.
8. Lambton Doors.
9. Marlite.
10. Marshfield Door Systems, Inc.
11. Mohawk Flush Doors, Inc.; a Masonite company.
12. Oshkosh Architectural Door Company.
13. Poncraft Door Company.
14. Vancouver Door Company.
15. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. WDMA I.S.1-A Performance Grade:

1. Extra Heavy Duty.

C. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lbf (3100 N).

b. Screw Withdrawal, Edge: 400 lbf (1780 N).

D. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Comply with specified requirements for exposed edges.

2.3 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:

1. Grade: Custom.

2. Faces: Any closed-grain hardwood of mill option.

3. Core: Structural composite lumber.

4. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

2.4 FABRICATION

A. Openings: Cut and trim openings through doors in factory.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 8 Section "Glazing."

2.5 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime doors with one coat of wood primer specified in Division 9 Section "Interior Painting". Seal all four edges, edges of cutouts, and mortises with primer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Division 8 Section "Door Hardware".

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.

1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

    a. Comply with NFPA 80 for fire-rated doors.

END OF SECTION

SECTION 083113
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes access doors and frames for walls and ceilings.

1.2 SUBMITTALS

A. Product Data: For each type of access door and frame indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each door face material in specified finish.

D. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.3 QUALITY ASSURANCE

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252for vertical access doors and frames.

2. ASTM E 119 for horizontal access doors and frames.

1.4 COORDINATION

A. If retaining this Article, also retain "Schedule" Paragraph in "Submittals" Article.

B. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

1. ASTM A 123/A 123M, for galvanizing steel and iron products.

2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

1. ASTM A 123/A 123M, for galvanizing steel and iron products.

2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

C. Steel Sheet: electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with A60 (ZF180) zinc-iron-alloy (galvannealed) coating or G60 (Z180) mill-phosphatized zinc coating.

E. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Factory-Primed Finish: Manufacturer's standard shop primer.

2. Baked-Enamel Finish: Minimum dry film thickness of 2 mils (0.05 mm).

3. Powder-Coat Finish: Thickness not less than 1.5 mils (0.04 mm).

F. Drywall Beads: 0.0299-inch (0.76-mm) zinc-coated steel sheet to receive joint compound.

G. Plaster Beads: 0.0299-inch (0.76-mm) zinc-coated steel sheet with flange of expanded metal lath.

H. Manufacturer's standard finish.

2.2 ALUMINUM MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6, mill finish.

B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6, mill finish.

C. Aluminum Sheet: ASTM B 209 (ASTM B 209M).

1. Mill finish.

2. Anodic Finish: Class II, clear anodic coating complying with AAMA 611 Class I, clear anodic coating complying with AAMA 61].

3. Baked-Enamel Finish: Manufacturer's standard.

2.3 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Acudor Products, Inc.

2. Babcock-Davis; A Cierra Products Co.

3. Bar-Co, Inc. Div.; Alfab, Inc.

4. Cendrex Inc.

5. Dur-Red Products.

6. Elmdor/Stoneman; Div. of Acorn Engineering Co.

7. Jensen Industries.

8. J. L. Industries, Inc.

9. Karp Associates, Inc.

10. Larsen's Manufacturing Company.

11. MIFAB, Inc.

12. Milcor Inc.

13. Nystrom, Inc.

14. Williams Bros. Corporation of America (The).

B. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.

1. Locations: Wall and ceiling

2. Door: Minimum 0.060-inch- (1.5-mm-)thick sheet metal.

3. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with 1-1/4-inch- (32-mm-) wide, surface-mounted trim.

4. Hinges: Continuous piano.

5. Latch: Cam latch with interior release.

6. Lock: Mortise cylinder.

a. Lock Preparation: Division 08 Section "Door Hardware".

C. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.

1. Locations: Wall and ceiling surfaces.

2. Fire-Resistance Rating: Not less than that of adjacent construction .

3. Temperature Rise Rating: 250 deg F (139 deg C) at the end of 30 minutes.

4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch (0.9 mm).

5. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with 1-inch- (25-mm-) wide, surface-mounted trim.

6. Hinges: Continuous piano.

7. Automatic Closer: Spring type.

8. Latch: Self-latching device operated by flush key with interior release.

9. Lock: Self-latching device with mortise cylinder lock.

a. Lock Preparation: Division 08 Section "Door Hardware".

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view, provide materials with smooth, flat surfaces without blemishes.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder lock, furnish two keys per lock and key all locks alike.

F. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 084000
ENTRANCES AND STOREFRONTS

1.00 GENERAL

1.01 DESCRIPTION

A. Principal Work in this Section:

1. Exterior storefront framing.

2. Aluminum framed glass doors.

3. Mullion covers, subframes, reinforcement, anchors and sealants for the work of this Section.

4. Panel 15 infill panel.

5. Glass and glazing for the work of this Section.

6. Supplementary parts and components, such as inserts, clips, fasteners, anchors, bracing and other miscellaneous supports required for a complete, waterproof installation.

B. Work Installed but Furnished in other Sections:

1. Door Hardware: Section 087100.

C. Related Work:

1. Refer to Section 088000 for glazing requirements for the work of this Section, including door specified to be factory-glazed.

1.02 SUBMITTALS

A. Procedure: In compliance with Section 013323.

B. Manufacturer's Data: Submit list of all manufactured and fabricated products and components proposed for use.

C. Shop Drawings: Submit the following.

1. Complete, large scale dimensioned shop and erection drawings for the work of this Section showing the following:

a. Elevations.

b. Detail section of typical composite members.

c. Hardware mounting heights.

d. Anchorage and reinforcements.

e. Expansion provisions.

f. Glazing details.

2. Show relative layout of adjacent beams and slab, all correctly dimensioned.

3. Identify shop and field sealants by product name and locate on shop drawings.

4. Identify welds, both shop and field, by AWS welding symbols.

D. Samples: Submit the following.

1. Metal: Samples not less than 12 in. long, and corner section, with glass and glazing gaskets, typical of the storefront construction, all with specified finish and color. Identify samples gauge, alloy, color and finish.

2. Glazing Gaskets: 12 in. long samples.

E. Calculations: Prepare and submit structural calculations for the work of this Section.

1. Prepare calculations in compliance with current design rules of AA, AISC, AISI, and ACI. Include analysis for wind and dead load on framing members, anchors, and concrete inserts.

2. Show section property computations for framing members. Show vertical and horizontal loads on curbs and other supports. Existing test reports will be acceptable substitute for calculations. Calculations shall be signed and sealed by a California-licensed civil of structural engineer.

3. Do not increase allowable stresses or decrease applied loads for design wind loads, or wind loads in combination with other loads, where not permitted by Code, or if resultant allowable stress after increase is greater than or equal to yield stress.

F. Certification: Provide certified test results showing that entrance and storefront systems have been tested by a recognized testing laboratory or agency and comply with specified performance characteristics.

1.03 QUALITY ASSURANCE

A. Reference Standards: Applicable provisions of the following govern the work of this Section, except as noted.

1. AA, Aluminum Standards and Data.

2. AISC, Steel Construction Manual.

3. AISI, Cold-Framed Steel Design Manual.

4. AWS D1.1, Structural Welding Code.

5. 2019 California Building Code.

B. Fabricator/Installer's Qualifications: Single firm with a minimum of 5 years experience fabricating and erecting work similar to that required for this project.

C. Engineering Responsibility:

1. Engineer, fabricate, assemble and erect the work of this Section to meet or exceed the following criteria and to provide watertight, structurally sound, self-draining assembly conforming to governing codes and regulations.

2. The assemblies shown on the Drawings and specified herein are intended to define design intent and minimum performance requirements. Do not change indicated profiles without the Architect's written consent.

3. Fasteners and connections are shown schematically. Final types and sizes shall be determined by a California-licensed civil or structural engineer employed by the Contractor.

a. In no case shall the fasteners or connections conflict with or require revision of the finish profiles of the assemblies specified herein or the supporting work.

b. Connections to the structural frame shall not impose any eccentric loading, or induce twisting or warping.

c. Connections to the structural frame shall be able to accommodate misalignment of the steel structure within limits allowed by the AISC tolerances.

D. Performance Requirements:

1. System Performance Requirements and Criteria:

a. General: Provide assemblies that comply with performance characteristics specified, as demonstrated by testing the manufacturer's corresponding stock assemblies according to test methods indicated.

b. Thermal Movement: Design the assemblies to provide for expansion and contraction of the component materials. Doors shall function normally over the specified temperature range.

(1) The system shall be capable of withstanding a metal surface temperature range of 150 deg F. without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, and other detrimental effects.

2. Structural Performance: Conduct tests for structural performance in compliance with ASTM E 330. At the conclusion of the tests there shall be no glass breakage or permanent damage to fasteners, anchors, hardware or actuating mechanism. Framing members shall have no permanent deformation in excess of 0.2% of their clear span.

    a. Deflection Normal to the Plane of the Assembly: Test pressure required to measure deflection of framing members normal to the plane of the assembly shall be equivalent to the wind load specified below. Deflection shall not exceed 1/175 of the clear span, when subjected to uniform load deflection test.

    b. Deflection Parallel to the Plane of the Assembly: Test pressures required to measure deflection parallel to the plane of the assembly shall be equal to 150% the wind pressures specified above. Deflection of any member carrying its full dead load shall not exceed an amount that will reduce glass bite below 75% of the design dimension and shall not reduce the edge clearance between the member and the fixed panel, glass or other fixed member above to less than 1/8 in. The clearance between the member and an operable door shall be at least 1/16 in.

    c. Loads used in design shall be those prescribed by Code but not less than 20 psf inward and 20 psf outward acting normal to the plane of the assembly.

3. Performance Requirements for Doors: Resistance to corner racking shall be tested by the “Dual Moment Load” test as follows.

    a. Test section shall consist of a standard top door corner assembly. Side rail section shall be 24 in. long and top rail section shall be 12 in. long.

    b. Anchor “top rail” positively to test bench so that corner protrudes 3 in. beyond the bench edge.

    c. Anchor a lever arm positively to “side rail” at a point 19 in. from the inside edge of “top rail”. Attach weight support pad at a point 19 in. from inner edge of “side rail”.

    d. Test section shall withstand a load of 170 lbs. on the lever arm before reaching the point of 1/18 in. gap at the stile/rail, joint or a 3 deg. rotation in the stile. Further failure, defined as a rotation of the lever arm in excess of 45, shall not be reached before 270 lbs.

4. Air Infiltration:

    a. Provide fixed assemblies with an air infiltration rate of not more than 0.06 cmf/sq. ft. when tested in compliance with ASTM E 283 at an inward test pressure differential of 1.57 psf.

b. Provide single acting offset doors with air infiltration not exceeding 0.50 cfm per linear foot or perimeter crack. A pair of 6 ft. x 7 ft. doors and frame shall not exceed 1 cfm/lin. Ft. of perimeter crack.

5. Water Penetration: Provide assemblies with no uncontrolled water penetration (excluding operable door edges) as defined in the test method when tested in compliance with ASTM E 331 at an inward test pressure differential of 6.24 lbf/sq. ft.

a. "Water Penetration" means the appearance of uncontrolled water other than condensation on the indoor face of any part of assemblies.

b. "Uncontrolled Water" in this context shall mean any leakage that is not contained or drained away in a manner as to cause no damage to assemblies or adjacent construction.

1.04 HANDLING

A. Procedure: Comply with Section 016600 and "Care and Handling of Architectural Aluminum from Shop to Site" published by AAMA.

1.05 WARRANTY

A. Warrant the work of this Section against defective materials and workmanship for 2 years after Substantial Completion.

B. Repair or replace, when repairs are acceptable to the District, defective materials and workmanship during the warranty period at no cost to the District.

2.00 PRODUCTS

2.01 MANUFACTURE

A. Aluminum Framed Doors: Wide stile, 350 Tuffline by Kawneer Company, Inc. or equal.

1. Fabrication:

a. Make proper allowance for clearances at jambs, meeting stile of pairs, head and threshold thickness and clearance.

b. Equip meeting stiles on pairs of doors with an adjustable astragal.

c. Cut, reinforce, drill and tap doors and frames at the factory to receive hardware. Provide hardware reinforcement of stainless steel or hot-dip galvanized steel secured by welding or stainless steel screws.

B. Fixed Storefront Sections: of the dimensions and profiles indicated on the Drawings.

1. Kawneer Co.

2. US Aluminum Corp.

3. Tubelite Architectural Systems.

4. Vistawall Architectural Products.

C. Opaque Glazing Panel: equal to GlazeGuard 1000 by Citadel Architectural Products. 2 sided with clear smooth aluminum anodized (drawing designation Panel 15).

2.02 MATERIALS

A. Aluminum: Alloy and temper recommended by the manufacturer for strength and application of required finish, complying with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.

B. Steel Mullion Reinforcement, if Required by Wind Loading and other Considerations: Proprietary bent steel plate or structural steel shape complying with the following.

1. Hot-Rolled Sections: ASTM A 36.

2. Structural Tube Framing: ASTM A 500, Grade B.

C. Fasteners: Aluminum, non-magnetic stainless steel or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.

1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 in. thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.

2. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened.

a. Provide Phillips flat-head machine screws for exposed fasteners.

3. Welding Electrodes: As recommended by AWS for the type of metal to be welded and the conditions of use.

D. Brackets: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide non-magnetic stainless steel or steel complying with ASTM A 386.

E. Concrete Inserts: Inserts fabricated from cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.

F. Compression Weatherstripping: Manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.

G. Sliding Weatherstripping: Manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.

H. Glass and Glazing Materials: As indicated on the Drawings and specified in Section 088000.

I. Sealants and Back-Up Rods:

1. Within Assemblies: Manufacturer's standard non-drying, non-skinning sealant complying with AAMA 809.2.

2. Between Assemblies and Adjacent Materials: As specified in Section 079200.

3. Glazing Sealants: Refer to Section 088000.

J. Finish: Clear Anodized Aluminum.

K. Paint:

1. Shop Primer for Ferrous Metal: Manufacturer or fabricator standard, fast-curing, lead-free, universal rust–inhibitive alkyd primer complying with performance requirements of FS TT-P645.

2. Shop Primer for Concealed Aluminum Surfaces: Alkyd barium metaborate made by one of the manufacturers listed in Section 09900, or bituminous paint.

3. Galvanizing Repair Paint: SSPC Paint No. 20, Type II (Organic), Theme-Zinc 90-97 by Tnemec Co., MZ-4 by Valspar Corp., 308 Zink-Lok by Porter International or Amercoat 68HS by Ameron Protective Coating Division.

4. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC Paint 12, but containing no asbestos fibers.

2.03 FABRICATION

A. Furnish shop drawings, inserts and similar items to other trades, at appropriate times as required for proper sequence of construction.

1. Verify dimensions of the supporting structure and other elements, which precede this work before fabrication of the required components.

2. Provide erection tolerances corresponding with specified tolerances for other work wherever field measurements cannot be obtained.

B. Maintain the visual design concept shown, including member sizes, profiles and alignment of components.

C. Fabricate and assemble this work with proper and acceptable provision for noiseless thermal expansion and contraction, fabrication and erection tolerances, adjoining building component tolerances, and dynamic movements.

D. Removable members such as glass stops, fillers or closures shall be extruded, and securely engaged into adjacent components. Fabricate extrusions to eliminate edge projection, bowing, and misalignment at joints.

E. Design and construct expansion joints so that they will be, and remain, permanently watertight, and will accommodate weather and building dynamics.

F. For surfaces exposed to view employ only materials, which are free from alloy defects, die marks, scratches, streaks and other surface blemishes.

G. When using aluminum sheets, use material light enough to permit workability but heavy enough to accurately retain the brake shape or contour without oil canning when fastened to backing or blocking.

H. Complete the fabrication and assembly of the components in the shop to the greatest extent possible to minimize field cutting, splicing, fastening, sealing and finishing.

1. Maintain provisions for expansion and movement.

2. Disassemble only as necessary for shipment and erection.

3. Provide secure attachment and support at joints, with hairline, flush fit between contacting members.

I. Complete the cutting, fitting, forming, drilling and grinding of metal before cleaning and applying specified finish. Remove arrises from cut edges and ease edges and corners to a radius of approximately 1/64 in. minimum, 1/32 in. maximum.

J. Welding:

1. Comply with industry standards for assembly and fabrication using system and rods for exposed metals, which will provide texture match with materials being joined.

2. Grind exposed welds smooth and flush with parent metal using clean grinding wheels of a type, which will not result in stains or discoloration.

K. Hardware:

1. Cut, reinforce, drill and tap doors and frames at the factory to receive hardware.

2. Provide hardware reinforcement of stainless steel or hot-dip galvanized steel secured by welding or stainless steel screws.

L. Finishing: Finish surfaces as follows to be within the color range represented by approved samples.

1. Paint aluminum surface exposed in the Work as specified in Section 099000.

2. Prime concealed aluminum surfaces in contact with masonry, concrete or steel with rust-inhibitive primer or with bituminous paint.

3. Prime steel parts of anchors, anchor inserts, reinforcement and supports with rust-inhibitive primer. After field welding, remove weld slag and touch –up abraded primer.

4. Provide minimum dry film thickness of 30 mils for bituminous paint and one mil for all other primers.

3.00 EXECUTION

3.01 INSPECTION

A. Inspect adjacent construction and supports.

B. Make sure that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface, and that other conditions detrimental to the proper or timely completion of this work are corrected before proceeding with installation.

3.02 INSTALLATION

A. General:

1. Do not install defective components, including warped, bowed, dented, abraded and broken members, and glass with damaged edges.

2. Remove and replace members, which have been damaged during installation or thereafter before final acceptance.

3. Do not cut, trim, or weld components during erection in any manner, which would damage the finish, decrease their strength, or result in a visual imperfection or a failure in performance of the work.

4. Return components, which require alteration to the shop for refabrication or replacement.

5. Install components level, plumb, true to line and with uniform tight joints and reveals. Attach to structure with non-staining and non-corrosive shims, anchors, fasteners and spacers.

6. Provide all accessories such as fastenings, sealants and concealed anchorage needed for a complete weatherproof installation.

7. Erection tolerances.

8. Provide adjustment within the assemblies to accommodate job variations.

9. Install the work of this Section within the following tolerances.

   a. Deviation from established vertical, horizontal, or designed position shall not exceed 1/8 in. per 12 ft. of length of any member, or ¼ in. in any total run in any line.

   b. Maximum offset from true alignment between 2 consecutive members placed end–to-end shall not exceed 1/16 in.

   c. Maximum offset between glass framing members at corners of glazing pocket must not exceed 1/32 in.

B. Assembly and Anchorage:

1. Anchor components securely by bolting, welding or other permanent mechanical attachments system, which will comply with specified requirements and permit movements, which are intended or necessary.

2. Install slip-joint linings where required to ensure movement.

3. Provide tape separator between contact surfaces of dissimilar materials where there is a possibility of corrosive or electrolytic action.

4. Remove weld slag and apply primer over welds. Touch-up shop applied paint damaged by welding or other causes.

C. Glazing: Glaze assemblies as specified in Section 088000.

D. Hanging Doors:

1. Install finish hardware on doors in compliance with its manufacturer's printed instructions.

2. Hang doors with minimum clearance to frame and threshold to meet the performance criteria specified.

3. Hang doors and adjust hardware so doors operate freely for their entire travel, without sticking or binding.

E. Touch-Up: Touch-up damaged finish as specified in Section 099000, when the results are satisfactory to the Architect, otherwise return the damaged component to the shop for refinishing.

3.03 SEALANTS

A. The requirements of Section 079200 apply to sealants used in this work. Seal all joints between the work of this Section and adjacent construction to be weather tight.

3.04 FIELD QUALITY CONTROL

A. Field water tests may be performed on completed glazed portions of the exterior storefronts at the District's option in compliance with AAMA 501.2.

B. Provide hose and sufficient personnel to conduct the tests.

C. In the event that such testing should result in uncontrolled leakage, eliminate the causes of such leakage at no additional cost to the District.

END OF SECTION

SECTION 085113
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Thermal break aluminum windows with 2-1/4-inch frame depth; fill and debridge.

1.2 RELATED SECTIONS

A. Section 079200 - Joint Sealants.

B. Section 084000 - Entrances and Storefronts.

C. Section 088000 – Glass and Glazing.

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

2. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

3. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

4. ASTM E 987 - Standard Test Methods for Deglazing Force of Fenestration Products.

5. ASTM E 2068 - Standard Test Method for Determination of Operating Force of Sliding Windows and Doors.

6. ASTM F 588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact.

B. American Architectural Manufacturers Association (AAMA): AAMA/WDMA/CSA 101/I.S.2/AM0 - Standard/Specification for Windows, Doors and Unit Skylights.

C. American Architectural Manufacturers Association (AAMA): AAMA 609 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum.

D. American National Standards Institute (ANSI): ANSI/AAMA 101.88 - Voluntary Specifications for Aluminum Prime Windows and Sliding Glass Doors.

E. Glass Association of North America (GANA): GANA 01-0300 - Proper Procedures for Cleaning Architectural Glass Products.

1.4 SUBMITTALS

A. Submit under provisions of Section 013323.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Certified test laboratory reports to show compliance with requirements.

2. Manufacturer's standard head, jamb and sill details.

3. Installation methods.

4. Cleaning and maintenance instructions.

C. Manufacturer's Certificates: Submit certified independent testing agency reports indicating window units meet or exceed specified performance requirements.

D. Shop Drawings: Provide shop drawings indicating details of construction and installation including but not limited to window location chart, window schedule, size, muntin type and design, window elevations, sections and details of multiple window assemblies, hardware, glazing details and interface with adjacent construction.

E. Verification Samples: For each product specified, two samples, representing colors and finishes to be installed.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years' experience in producing aluminum windows of the type specified.

1. Manufacturer must be certified through the PPG Certified Window Fabricator and the Guardian Select Window Fabricator programs.

B. Installer Qualifications: Minimum 2 years' experience installing similar windows.

C. Performance: Comply with AAMA standards and ANSI/AAMA 101.88.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Finish areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

3. Modify mock-up as required to produce acceptable work.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards. Protect from damage.

1.7 SEQUENCING AND SCHEDULING

A. Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.8 WARRANTY

A. Warranty: Provide manufacturer's standard limited warranty for materials and workmanship.

1. Aluminum Window Warranty Period: 1 year.

2. Standard Insulating Glass Warranty Period: 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: All Weather Architectural Aluminum, which is located at: 777 Aldridge Rd. ; Vacaville, CA 95688; Tel: 707-452-1600; Email: request info (info‹EaIlweathersweb.com]; Web: www.allweathersweb.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 016600.

2.2 SERIES 5000 THERMAL BREAK ALUMINUM WINDOWS WITH 2-1/4 INCH FRAME DEPTH; FILL AND DEBRIDGE

A. Aluminum Windows: Fill and debridge, Series 5000 as manufactured by All Weather Architectural Aluminum Inc.

1. Window Type: Fixed windows.

a. Compliance: FW-HC75

2. Construction

a. Integral Extrusion Walls:

1) Wall Thickness: 0.094 inches (2.39 mm).

2) Nominal Web Thickness: 1/8 inch.

b. Lite is retained from the exterior.

c. Full perimeter aluminum snap in glazing stops.

d. Full length pull in flat vinyl gasket.

e. Corners of Frame and Ventilators: Mitered and welded; muntin and intermediate bars attached to cross joints and abutting sash sections.

3. Thermal Break: Poure and debridge, two pan polyurethane.

4. Weather-stripping: Two rows of santoprene, 64A durometer black bulb insert inserted in extruded slot at perimeter of vent and opening; replaceable in field.

5. Glazing:

a. Insulated glazed units, 1 inch (25.4 mm) overall thickness.

b. Laminated safety units at Gymnasium.

2.2 FINISHES

A. Single Color Frames:

1. Finish: 70 percent Kynar paint, As selected by Architect

PART 3 - EXECUTION

3.1 PREPARATION

A. Do not proceed with installation until substrates have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

B. Prepare substrates using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

1. Verify that openings are dimensionally correct and within allowable tolerances and substrates are plumb, level, and clean.

2. Verify that anchoring surface is in accordance with approved shop drawings.

C. If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's written instructions and recommendations. Adjust for proper operation after installation.

3.3 FIELD QUALITY CONTROL

A. Engage a certified testing laboratory to conduct on-site tests for air infiltration and water infiltration in accordance with published standards.

B. Repair or replace window units not meeting specified performance requirements; re-test an equal quantity of windows.

3.4 CLEANING AND PROTECTION

A. Cleaning:

1. Clean sealants, caulking, and other materials from surfaces, including adjacent work.

2. Clean window frames, casings, and glass using materials and methods recommended by the window and glass manufacturer that do not cause defacement of work.

3. Clean using methods which comply with AAMA 609.

4. Clean glass using methods which comply with GANA 01-0300.

B. Protect installed products until completion of project.

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 087100
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Door hardware, including electric hardware.
2. Gate Hardware
3. Cylinders for doors fabricated with locking hardware.
4. Padlocks.

B. Related Divisions:

1. Division 06 – door hardware installation
2. Division 07 – sealant at exterior thresholds
3. Division 08 – metal doors and frames.

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets, including open wall shelving and locks.
3. Signs.
4. Toilet accessories, including grab bars.
5. Installation.
6. Rough hardware.
7. Access doors and panels.
8. Corner Guards.

1.2 REFERENCES**:**

A. Use date of standard in effect as of Bid date.

1. American National Standards Institute

a) ANSI 156.18 – Materials and Finishes.

2. BHMA – Builders Hardware Manufacturers Association

3. 2019 California Building Code

a) Chapter 11B – Accessibility To Public Buildings, Public Accommodations, Commercial Buildings and Public Housing

4. DHI – Door and Hardware Institute

5. WHI – Warnock Hersey Incorporated State of California Building Code

6. Local applicable codes

7. SDI – Steel Door Institute

8. NAAMM – National Association of Architectural Metal Manufacturers

B. Abbreviations

1. Manufacturers**:** see table at 2.1.A of this section.
2. Finishes**:** see 2.7 of this section.

1.2 SUBMITTALS & SUBSTITUTIONS

A. SUBMITTALS**:** Submit six copies of schedule per D. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Minimum 10pt font size. Include following information**:**

1. Type, style, function, size, quantity and finish of hardware items.
2. Use BHMA Finish codes per ANSI A156.18.
3. Name, part number and manufacturer of each item.
4. Fastenings and other pertinent information.
5. Location of hardware set coordinated with floor plans and door schedule.
6. Explanation of abbreviations, symbols, and codes contained in schedule.
7. Mounting locations for hardware.
8. Door and frame sizes, materials and degrees of swing.
9. List of manufacturers used and their nearest representative with address and phone number.
10. Catalog cuts.
11. Manufacturer's technical data and installation instructions for electronic hardware.

B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.

C. Deviations**:** Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.

D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.

E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.

F. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.

G. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, riser and point-to-point wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.4 QUALITY ASSURANCE**:**

A. Qualifications**:**

1. Hardware supplier**:** direct factory contract supplier who employs a hardware consultant, available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.

a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

B. Hardware**:** Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

C. Exit Doors**:** Operable from inside with single motion without the use of a key or special knowledge or effort.

D. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.

1.5 DELIVERY, STORAGE AND HANDLING**:**

A. Delivery**:** coordinate delivery to appropriate locations (shop or field).

1. Permanent keys and cores**:** secured delivery direct to Owner's representative.

B. Acceptance at Site**:** Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.

C. Storage**:** Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION**:**

A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.

B. Coordination**:** Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information**:**

1. Location of embedded and attached items to concrete.
2. Location of wall-mounted hardware, including wall stops.
3. Location of finish floor materials and floor-mounted hardware.

4. At masonry construction, coordinate with the anchoring and hollow metal supplier prior to frame installation by placing a strip of insulation, wood, or foam, on the back of the hollow metal frame behind the rabbet section for continuous hinges, as well as at rim panic hardware strike locations, silencers, coordinators, and door closer arm locations. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.

5. Coordinate: flush top rails of doors at outswinging exteriors, and throughout where adhesive-mounted seals occur.

6. Manufacturers' templates to door and frame fabricators.

C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.

D. Environmental considerations**:** segregate unused recyclable paper and paper product packaging, uninstalled metals, and plastics, and have these sent to a recycling center.

1.7 WARRANTY**:**

A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties.

B. Include factory order numbers with close-out documents to validate warranty information, required for Owner in making future warranty claims:

C. Minimum warranties:

1.	Locksets**:**	Three years
2.	Exit Devices**:**	Three years mechanical
3.	Closers**:**	Thirty years mechanical
4.	Hinges**:**	One year
5.	Other Hardware	Two years

1.8 COMMISSIONING**:**

A. Conduct these tests prior to request for certificate of substantial completion**:**

1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.

1.9 REGULATORY REQUIREMENTS**:**

A. Locate latching hardware between 34 inches to 44 inches above the finished floor, per-2019 California Building Code, Section 11B-404.2.7.

1. Panic hardware: locate between 36 inches to 44 inches above the finished floor.

B. Handles, pull, latches, locks, other operable parts**:**

1. Readily openable from egress side with one hand and without tight grasping, tight pinching, or twisting of the wrist to operate. 2019 California Building Code Section 11B-309.4.

2. Force required to activate the operable parts: 5.0 pounds maximum, per 2019 California Building Code Section 11B-309.4.

C. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2019 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.

1. Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.

D. Adjust door closer sweep periods so that from an open position of 90 degrees, the door will take at least 5 seconds to move to a point 12 degrees from the latch, measured to the landing side of the door, per 2019 California Building Code Section 11B-404.2.8.

E. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per 2019 California Building Code Section 11B-404.2.10.

1. Applied kickplates and armor plates: bevel the left and right edges; free of sharp or abrasive edges.

2. Tempered glass doors without stiles: bottom rail may be less than 10 inches if top leading edge is tapered 60 degrees minimum.

F. Door opening clear width no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and below 80 inches, and the hardware projects no more than 4 inches. 2019 California Building Code Section 11B-404.2.3.

1. Exception: doors not requiring full passage through the opening, that is, to spaces less than 24 inches in depth, may have the clear opening width reduced to 20 inches. Example: shallow closets.

2. Door closers and overhead stops: not less than 78 inches above the finished floor or ground, per 2019 California Building Code 11B-307.4.

G. Thresholds**:** floor or landing no more than 0.50 inches below the top of the threshold of the doorway, per 2019 California Building Code Section 11B-404.2.5. Vertical rise no more than 0.25 inches, change in level between 0.25 inches and 0.50 inches**:** beveled to slope no greater than 1**:**2 (50 percent slope). 2019 California Building Code Section 11B-303.2 & ~.3.

H. Floor stops**:** Do not locate in path of travel. Locate no more than 4 inches from walls, per DSA Policy #99-08 (Access).

I. Pairs of doors with independently-activated hardware both leafs**:** limit swing of right-hand or right-hand-reverse leaf to 90 degrees to protect persons reading wall-mounted tactile signage, per 2019 California Building Code Section 11B-703.4.2.

J. Door and door hardware encroachment**:** when door is swung fully-open into means-of-egress path, the door may not encroach/project more than 7 inches into the required exit width, with the exception of door release hardware such as lockset levers or panic hardware. These hardware items must be located no less than 34-inches and no more than 48-inches above the floor/ground. 2019 California Building Code, Section 1005.7.1.

K. New buildings that are included in public schools (kindergarten through 12th grade) state funded projects and receiving state funding pursuant to Leroy F. Green, School Facilities Act of 1998, California Education Code Sections 17070.10 through 17079, and that are submitted to the Division of the State Architect for plan review after July 1, 2011 in accordance with the Education Code 17075.50, shall include locks that allow doors to classrooms and any room with an occupancy of five or more persons to be locked from the inside. The locks shall conform to the specification and requirements found in Section 1010.1.9. 2019 California Building Code Section 1010.1.11

Exceptions:

1. Doors that are locked from the outside at all times such as, but not limited to, janitor's closet, electrical room, storage room, boiler room, elevator equipment room and pupil restroom.
2. Reconstruction projects that utilize original plans in accordance with California Administrative Code, Section 4-314.
3. Existing relocatable buildings that are relocated within same site in accordance with California Administrative Code, Section 4-314.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: these will be considered; submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE ALTERNATE:
Hinges	(IVE) Ives	Owner standard
Continuous Hinges	(IVE) Ives	Owner standard
Key System	(SCH) Schlage	Owner standard
Mechanical Locks	(SCH) Schlage	Owner standard
Exit Devices	(VON) Von Duprin	Owner standard
Closers	(LCN) LCN	Owner standard
Kickplates	(IVE) Ives	Owner standard
Stops & Holders	(IVE) Ives	Owner standard
Thresholds	(ZER) Zero	Owner standard
Seals & Bottoms	(ZER) Zero	Owner standard

2.2 HINGING METHODS:

A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.

C. Conventional Hinges: Steel or stainless-steel pins and approved bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.

1. Out-swinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.

2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.

D. Continuous Hinges:

1. Geared-type aluminum.

a) Use wide-throw units where needed for maximum degree of swing, advise architect if commonly available hinges are insufficient.

b) If units are used at storefront openings, color-coordinate hinge finish with storefront color. Custom anodizing and custom powdercoat finishes subject to Architect approval.

2.3 LOCKSETS, LATCHSETS, DEADBOLTS**:**

A. Mortise Locksets and Latchsets**:** as scheduled.

1. Chassis**:** cold-rolled steel, handing field-changeable without disassembly.

2. Universal lock case – 10 functions in one case.

3. Floating mounting tabs automatically adjusts to fit a beveled door edge.

4. Latchbolts**:** 0.75 inch throw stainless steel anti-friction type.

5. Lever Trim**:** through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.

a) Spindles**:** security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.

b) Inside lever applied by screwless shank mounting – no exposed trim mount screws.

c) Levers rotate up or down for ease of use.

d) Vandalgard locks**:** locked lever freely rotates down while remaining securely locked. This feature prevents damage to internal lock components when subjected to excessive force.

6. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.

7. Turnpieces**:** accessible offset turn-lever design not requiring pinching or twisting motions to operate.

8. Deadbolts**:** stainless steel 1-inch throw.

9. Strikes**:** 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.

10. Scheduled Lock Series and Design**:** Schlage L series, 06A design.

11. Certifications**:**

a) ANSI A156.13, 1994, Grade 1 Operational.
b) ANSI/ASTM F476-84 Grade 31 UL Listed.

12. Accessibility: Require not more than 5 lb to retract the latchbolt or deadbolt, or both, per CBC 2019 11B-404.2.7 and 11B-309.4.

13. Accepted substitutions**:** None.

2.4 EXIT DEVICES / PANIC HARDWARE

A. General features**:**

1. Independent lab-tested 1,000,000 cycles.

2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.

3. Deadlocking latchbolts, 0.75 inch projection.

4. End caps**:** impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.

5. No exposed screws to show through glass doors.

6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.

7. Releasable in normal operation with 15-pound maximum operating force per UBC Standard 10-4, and with 32-pound maximum pressure under 250-pound load to the door.

8. Accessibility: Require not more than 5 lb to retract the latchbolt, per CBC 2019 11B-404.2.7 and 11B-309.4.

   a) Mechanical method: Von Duprin “AX-“ feature, where touchpad directly retracts the latchbolt with 5 lb or less of force. Provide testing lab certification confirming that the mechanical device is independent third-party tested to meet this 5 lb requirement.

B. Specific features**:**

1. Non-Fire Rated Devices**:** cylinder dogging with security indicator.

2. Lever Trim**:** breakaway type, forged brass or bronze escutcheon min. 0.130 inch thickness, compression spring drive, match lockset lever design.

3. Removable Mullions**:** Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

4. Accepted substitutions: None.

2.5 CLOSERS

A. Surface Closers**:** 4011/4111

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.

2. ISO 2000 certified. Units stamped with date-of-manufacture code.

3. Independent lab-tested 10,000,000 cycles.

4. Non-sized and adjustable. Place closers inside building, stairs and rooms.

5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.

6. Advanced Variable Backcheck (AVB)**:** where scheduled, these units commence backcheck at approximately 45 degrees.

7. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2019 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.

    a) Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.

8. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.

9. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units. EDA arms**:** rigid main and forearm, reinforced elbow.

10. Exterior door closers**:** tested to 100 hours of ASTM B117 salt spray test, furnish data on request.

11. Exterior doors**:** seasonal adjustments not required for temperatures form 120 degrees F to -30 degrees F, furnish checking fluid data on request.

12. Non-flaming fluid, will not fuel door or floor covering fires.

13. Pressure Relief Valves (PRV) not permitted.

14. Accepted substitutions**:** None.

2.6 OTHER HARDWARE

A. Kick Plates**:** Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.

B. Automatic Flush Bolts**:** Low operating force design

C. Door Stops**:** Provide stops to protect walls, casework or other hardware.

1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.

D. Seals**:** Four-fingered type at head & jambs. Inelastic, rigid back, not subject to stretching. Self-compensating for warp, thermal bow, door settling, and out-of-plumb. Adhesive warranted for life of installation.

1. Proposed substitutions**:** submit for approval.

2. Three-fingered type at hinge jambs of doors fitted with continuous hinges where jamb leaf of hinge is fastened to the frame reveal.

E. Thresholds**:** As scheduled and per details. Comply with CBC 2019 11B-404.2.5. Substitute products**:** certify that the products equal or exceed specified material's thickness. Proposed substitutions**:** submit for approval.

1. Saddle thresholds**:** 0.125 inches minimum thickness.

2. Exteriors**:** Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Minimum 0.25 inch diameter fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors. National Guard Products' "COMBO" or Pemko Manufacturing's "FHSL".

3. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.

4. Fasteners**:** Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws**:** full-thread. Sleeve nuts**:** full length to prevent door compression.

F. Through-bolts**:** Do not use. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.

1. Exception**:** surface-mounted overhead stops, holders, and friction stays.

2.7 FINISH**:**

A. Generally**:** BHMA 626 Satin Chromium.

1. Areas using BHMA 626: furnish push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise scheduled.

B. Door closers**:** factory powder coated to match other hardware, unless otherwise noted.

2.8 KEYING REQUIREMENTS**:**

A. Key System**:** Schlage Classic Primus high-security utility-patented keyway, interchangeable core throughout. Utility patent protection to extend at least until 2014. Key blanks available only from factory-direct sources, not available from after-market key blank manufacturers. For estimate use factory GMK charge. Initiate and conduct meeting(s) with Owner and Allegion representatives to determine system keyway(s), keybow styles, structure, stamping, degree of physical security and degree of geographic exclusivity. Furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner. Owner will install permanent cylinders/cores.

1. Existing factory-registered master key system.

2. Primus Level 3G

3. Construction keying**:** furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cylinders/cores in Owner's presence. Demonstrate that construction key no longer operates.

4. Temporary cylinders/cores remain supplier's property.

5. Furnish 10 construction keys, unless otherwise instructed by Owner.

6. Furnish 2 construction control keys, unless otherwise instructed by Owner.

7. Furnish 2 Emergency keys per each L9485 Faculty Restroom Lock

8. Key Cylinders**:** furnish 6-pin solid brass construction, unless otherwise instructed by Owner.

B. Cylinders/cores**:** keyed at factory of lock manufacturer where permanent records are maintained. Locksets and cylinders same manufacturer.

C. Permanent keys**:** use secured shipment direct from point of origination to Owner.

1. For estimate**:** 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys, unless otherwise instructed by Owner.

2. For estimate**:** VKC stamping plus "DO NOT DUPLICATE".

D. Bitting List**:** use secured shipment direct from point of origination to Owner at completion.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS**:**

A. Can read and understand manufacturers' templates, suppliers' hardware schedule and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.2 PREPARATION**:**

A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation. Installation denotes acceptance of wall/frame condition.

B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Architect of code conflicts before ordering material.

2. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 11B-404.2.7.

3. Locate panic hardware between 36 inches to 44 inches above the finished floor.

3.3 INSTALLATION

A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.

1. Gaskets**:** install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.

2. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.

3. Replace fasteners damaged by power-driven tools.

B. Locate floor stops no more than 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.

3.4. ADJUSTING

A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.

1. Hardware damaged by improper installation or adjustment methods**:** repair or replace to Owner's satisfaction.

2. Adjust doors to fully latch with no more than 1 pound of pressure.

a) Door closer valves: turn valves clockwise until at bottom – do not force. Turn valves back out one and one-half turns and begin adjustment process from that point. Do not force valves beyond three full turns counterclockwise.

3. Adjust door closers per 1.9 this section.

B. Final inspection**:** Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following**:**

1. Has re-adjusted hardware.

2. Has evaluated maintenance procedures and recommend changes or additions and instructed Owner's personnel.

3. Has identified items that have deteriorated or failed.

4. Has submitted written report identifying problems.

3.5 DEMONSTRATION**:**

A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING**:**

A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.

B. Clean adjacent wall, frame and door surfaces soiled from installation / reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

A. See door schedule in drawings for hardware set assignments.

B. Do not order material until submittal has been reviewed, stamped, and signed by Architect's door hardware consultant.

C. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

Opt. #: OPT0289950-V1

HARDWARE GROUP NO. 01
Provide each PR door(s) with the following:

2	EA	CONT. HINGE	112XY		628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-EO		626	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL-OP-110MD		626	VON
1	EA	MULLION STORAGE KIT	MT54		689	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX 36-083		626	SCH
2	EA	MORTISE CYLINDER	20-061 ICX XQ11-948 36-083		626	SCH
4	EA	PRIMUS CORE	20-740		626	SCH
1	EA	DOOR PULL	VR910 DT SNB		630	IVE
1	EA	DOOR PULL	VR910 NL SNB		630	IVE
2	EA	SURFACE CLOSER	4111 AVB EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
2	EA	FLOOR STOP	FS18L/FS18S AS REQ'D		BLK	IVE
1	SET	GASKETING	429AA-S		AA	ZER
2	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	EA	MEETING STILE	155AA		AA	ZER
2	EA	DOOR SWEEP	39A		A	ZER
1	EA	MEETING STILE	55AA		AA	ZER
1	EA	THRESHOLD	547A-223 OR AS DETAILED		A	ZER

HARDWARE GROUP NO. 02
Provide each SGL door(s) with the following:

1	EA	CONT. HINGE	112XY		628	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-L-06		630	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX XQ11-948 36-083		626	SCH
2	EA	PRIMUS CORE	20-740		626	SCH
1	EA	SURFACE CLOSER	4111 AVB EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18L/FS18S AS REQ'D		BLK	IVE
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	547A-223 OR AS DETAILED		A	ZER

HARDWARE GROUP NO. 03
Provide each RU door(s) with the following:

1	SET	NOTE	ALL HARDWARE BY ROLL UP DOOR MANUFACTURER/SUPPLIER			B/O

HARDWARE GROUP NO. 04
Provide each SGL door(s) with the following:

1	EA	CONT. HINGE	112XY		628	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL-OP-110MD		626	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX XQ11-948 36-083		626	SCH
2	EA	PRIMUS CORE	20-740		626	SCH
1	EA	DOOR PULL	VR910 NL SNB		630	IVE
1	EA	SURFACE CLOSER	4111 AVB SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	547A-223 OR AS DETAILED		A	ZER

HARDWARE GROUP NO. 05
Provide each SGL door(s) with the following:

3	EA	HINGE	3CB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	LV9080T 06N		626	SCH
1	EA	PRIMUS CORE	20-740		626	SCH
1	EA	LOCK GUARD	LG12		630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18L/FS18S AS REQ'D		BLK	IVE
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	547A-223 OR AS DETAILED		A	ZER

HARDWARE GROUP NO. 06
Provide each PR door(s) with the following:

2	EA	CONT. HINGE	112XY		628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	PANIC HARDWARE	LD-PA-AX-98-EO		626	VON
1	EA	PANIC HARDWARE	LD-PA-AX-98-NL-OP-110MD		626	VON
1	EA	MULLION STORAGE KIT	MT54		689	VON
1	EA	RIM CYLINDER	20-057 ICX		626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX 36-083		626	SCH
2	EA	PRIMUS CORE	20-740		626	SCH
1	EA	DOOR PULL	VR910 NL SNB		630	IVE
2	EA	SURFACE CLOSER	4111 AVB SCUSH		689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	SET	GASKETING	429AA-S		AA	ZER
2	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	EA	MEETING STILE	155AA		AA	ZER
2	EA	DOOR SWEEP	39A		A	ZER
1	EA	MEETING STILE	55AA		AA	ZER
1	EA	THRESHOLD	547A-223 OR AS DETAILED		A	ZER

HARDWARE GROUP NO. 07
Provide each PR door(s) with the following:

2	EA	CONT. HINGE	041XY	628	IVE
1	EA	CONST LATCHING BOLT	FB51P/FB61P AS REQ'D	630	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ'D	626	IVE
1	EA	OFFICE/ENTRY LOCK	LV9050T 06N L583-363	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB1/MB2 AS REQ'D	689	IVE
2	EA	SURFACE CLOSER	4111 AVB HEDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18L/FS18S AS REQ'D	BLK	IVE
1	SET	GASKETING	429AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	ASTRAGAL	43SP	SP	ZER
1	EA	THRESHOLD	547A-223 OR AS DETAILED	A	ZER

HARDWARE GROUP NO. 08
Provide each SGL door(s) with the following:

3	EA	HINGE	3CB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	OFFICE/ENTRY LOCK	LV9050T 06N L583-363	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	SURFACE CLOSER	4111 AVB EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18L/FS18S AS REQ'D	BLK	IVE
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	547A-223 OR AS DETAILED	A	ZER

HARDWARE GROUP NO. 09
Provide each SGL door(s) with the following:

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	L9040 06N L583-363 L283-722	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	SET	GASKETING	429AA-S	AA	ZER

HARDWARE GROUP NO. 10
Provide each SL door(s) with the following:

1	EA	NOTE	ALL HARDWARE BY SLIDING DOOR MANUFACTURER/SUPPLIER	B/O

HARDWARE GROUP NO. 11
Provide each SGL door(s) with the following:

1	SET	NOTE	ALL HARDWARE BY DOOR MANUFACTURER/SUPPLIER	B/O

HARDWARE GROUP NO. 12
Provide each CO door(s) with the following:

1	EA	NOTE	CASED OPENING, NO HARDWARE		

HARDWARE GROUP NO. 13
Provide each SGL door(s) with the following:

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	LV9050T 06N L583-363	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 AS REQ'D	626	IVE
1	SET	GASKETING	429AA-S	AA	ZER

HARDWARE GROUP NO. 14
Provide each DAP door(s) with the following:

	EA	NOTE	ALL HARDWARE BY ELIASON		ELI

HARDWARE GROUP NO. 15
Provide each SGL door(s) with the following:

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	LV9071T 06N L283-711	626	SCH
2	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 AS REQ'D	626	IVE
1	SET	GASKETING	429AA-S	AA	ZER

HARDWARE GROUP NO. 16
Provide each PR door(s) with the following:

2	EA	CONT. HINGE	112XY	628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-EO	626	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL-OP-110MD	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX 36-083	626	SCH
2	EA	MORTISE CYLINDER	20-061 ICX XQ11-948 36-083	626	SCH
4	EA	PRIMUS CORE	20-740	626	SCH
1	EA	DOOR PULL	VR910 DT SNB	630	IVE
1	EA	DOOR PULL	VR910 NL SNB	630	IVE
2	EA	SURFACE CLOSER	4111 SHCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	SET	GASKETING	429AA-S	AA	ZER
2	EA	MULLION SEAL	8780NBK PSA	BK	ZER
1	EA	MEETING STILE	155AA	AA	ZER
1	EA	MEETING STILE	55AA	AA	ZER

HARDWARE GROUP NO. 17
Provide each SGL door(s) with the following:

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	LV9080T 06N	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/FS438 AS REQ'D	626	IVE
1	SET	GASKETING	429AA-S	AA	ZER

HARDWARE GROUP NO. 18
Provide each SGL door(s) with the following:

3	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	LV9050T 06N L583-363	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	SET	GASKETING	429AA-S	AA	ZER

HARDWARE GROUP NO. 19
Provide each SGL door(s) with the following:

1	EA	CONT. HINGE	112XY	628	IVE
1	EA	CLASSROOM DEAD LOCK	L9463T XB11-720	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	PUSH PLATE	8200 6" X 16" CFC	630	IVE
1	EA	PULL PLATE	8302 10" 6" X 16" CFT G	630	IVE
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	SET	GASKETING	429AA-S	AA	ZER

HARDWARE GROUP NO. 20
Provide each PR door(s) with the following:

6	EA	HINGE	3CB1HW 4.5 X 4.5	652	IVE
1	EA	CONST LATCHING BOLT	FB51P/FB61P AS REQ'D	630	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQ'D	626	IVE
1	EA	CLASSROOM SECURITY	LV9071T 06N L283-711	626	SCH
2	EA	PRIMUS CORE	20-740	626	SCH
2	EA	FLOOR STOP	FS436/FS438 AS REQ'D	626	IVE
1	SET	GASKETING	429AA-S	AA	ZER
1	EA	MEETING STILE	383AA	AA	ZER

HARDWARE GROUP NO. 21
Provide each SGL door(s) with the following:

1	EA	STOREROOM LOCK	LV9080T 06N	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	WELD-IN LOCK BX	K-BXED-V990NL-2	600	KEE
1	EA	FLOOR STOP	FS18L/FS18S AS REQ'D	BLK	IVE
	SET	NOTE	REMAINDER OF HARDWARE BY GATE MANUFACTURER/SUPPLIER		B/O

HARDWARE GROUP NO. 22
Provide each PR door(s) with the following:

2	EA	CANE BOLT	LOCKING CANE BOLT BY GATE MANUFACTURER			B/O
2	EA	PADLOCK L/CYL-FSIC	KS43F3200		606	SCH
2	EA	PRIMUS CORE	20-740		626	SCH
2	EA	FLOOR STOP	FS18L/FS18S AS REQ'D		BLK	IVE
	SET	NOTE	REMAINDER OF HARDWARE BY GATE MANUFACTURER/SUPPLIER			B/O

END OF SECTION

SECTION 087100
DOOR HARDWARE
SCHEDULE

Door Numbers	HwSet#
01	01
02	02
03	03
04	03
06	04
07	05
08	06
09	07
10	08
11	09
12	10
12A	11
12B	11
13	12
14	13
15	14
17	14
18	15
19	16
20	16
21	17
22	18
23	19
24	19
25	20
G01	21
G02	22
G03	22

Catalog Cuts

For

Rosamond High School Cafeteria

Sorted By DHI Sequence

Prepared By

David Harder

Created On 8/23/2022

Generated By

OVERTUR™

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IVE	112XY	CONT. HINGE		5
IVE	3CB1HW 4.5 X 4.5	HINGE		6
IVE	3CB1HW 4.5 X 4.5 NRP	HINGE		6
B/O	LOCKING CANE BOLT BY GATE MANUFACTURER	CANE BOLT		NA
IVE	FB51P/FB61P AS REQ'D	CONST LATCHING BOLT		8
IVE	DP1/DP2 AS REQ'D	DUST PROOF STRIKE		9
VON	KR4954 STAB	REMOVABLE MULLION		10
SCH	L9040 06N L583-363 L283-722	PRIVACY LOCK		13
SCH	L9463T XB11-720	CLASSROOM DEAD LOCK		13
SCH	LV9050T 06N L583-363	OFFICE/ENTRY LOCK		13
SCH	LV9071T 06N L283-711	CLASSROOM SECURITY		13
SCH	LV9080T 06N	STOREROOM LOCK		13
SCH	KS43F3200	PADLOCK L/CYL-FSIC		NA
VON	CDSI-PA-AX-98-EO	PANIC HARDWARE		38
VON	CDSI-PA-AX-98-L-06	PANIC HARDWARE		38
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VON	LD-PA-AX-98-EO	PANIC HARDWARE		38
VON	LD-PA-AX-98-NL-OP-110MD	PANIC HARDWARE		38
VON	MT54	MULLION STORAGE KIT		NA
SCH	20-057 ICX	RIM CYLINDER		54
SCH	20-061 ICX 36-083	MORTISE CYLINDER		55
SCH	20-061 ICX XQ11-948 36-083	MORTISE CYLINDER		55
SCH	20-740	PRIMUS CORE		55
IVE	LG12	LOCK GUARD		59
KEE	K-BXED-V990NL-2	WELD-IN LOCK BX		61
IVE	8200 6" X 16" CFC	PUSH PLATE		62
IVE	8302 10" 6" X 16" CFT G	PULL PLATE		63
IVE	VR910 DT SNB	DOOR PULL		64
IVE	VR910 NL SNB	DOOR PULL		64
IVE	COR X FL	COORDINATOR		65
IVE	MB1/MB2 AS REQ'D	MOUNTING BRACKET		65
LCN	4011	SURFACE CLOSER		70
LCN	4111 AVB EDA	SURFACE CLOSER		76
LCN	4111 AVB HEDA	SURFACE CLOSER		76
LCN	4111 AVB SCUSH	SURFACE CLOSER		76
LCN	4111 SCUSH	SURFACE CLOSER		76
LCN	4111 SHCUSH	SURFACE CLOSER		76
IVE	8400 10" X 1" LDW B-CS	KICK PLATE		82
IVE	8400 10" X 2" LDW B-CS	KICK PLATE		82
IVE	8400 4" X 1" LDW B-CS	MOP PLATE		82
IVE	FS18L/FS18S AS REQ'D	FLOOR STOP		84
IVE	WS406/407CCV	WALL STOP		85
IVE	FS436/FS438 AS REQ'D	FLOOR STOP		86
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Mfr	Catalog Number	Description	ItemID	Page #
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ZER	383AA	MEETING STILE		89
ZER	39A	DOOR SWEEP		90
ZER	43SP	ASTRAGAL		91
ZER	155AA	MEETING STILE		92
ZER	55AA	MEETING STILE		92
ZER	547A-223 OR AS DETAILED	THRESHOLD		93
B/O	ALL HARDWARE BY DOOR MANUFACTURER/SUPPLIER	NOTE		NA
B/O	ALL HARDWARE BY ROLL UP DOOR MANUFACTURER/SUPPLIER	NOTE		NA
B/O	REMAINDER OF HARDWARE BY GATE MANUFACTURER/SUPPLIER	NOTE		NA
ELI	ALL HARDWARE BY ELIASON	NOTE		NA
B/O	ALL HARDWARE BY SLIDING DOOR MANUFACTURER/SUPPLIER	NOTE		NA
	CASED OPENING, NO HARDWARE	NOTE		NA



041XY Full Mortise - Swing Clear

UL10C certified
Meets ANSI 156.26 for 150lbs and 300lbs

- Swing Clear for 1 3/4" Doors
- Installs easily on doors with 90° opening
- Door Edge Protector
- Patented center loaded, interlocking bearing design
- Non Handed for custom cut lengths
- 1/16" door inset
- 48" Maximum Door Width
- Beveled or Square Edge Doors
- For Doors Weighing up to 450 pounds without reinforcing. 600 pounds with reinforcing
- For lead-lined application consult factory for engineering specials

Standard lengths 83", 85", 95", 119"

Standard Mounting Hardware

12-24 x 3/4" Steel Self Drilling / Self Tapping Phillips Head Screw

Finishes

Clear Anodized (US28), Dark Bronze Anodized (313AN)
Custom Anodizing and Painting are available, consult factory

Optional Mounting Hardware:

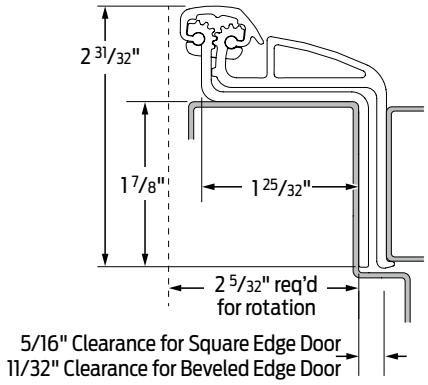
TEK/WD	1/2 Self Drill, Self Tap 1/2 Wood
WD	Wood Door and Frame

Available Accessory Kits:

Security Screws - Hollow Metal
Security Screws - Wood
Thread Forming Screws

For Single Door Applications

For pairs of doors see chart and general information





112XY Full Mortise - Narrow Frame and Door Leaf

UL10C certified
Meets ANSI 156.26 for 150 lbs and 300 lbs.

- For 1 3/4" Doors
- Patented center loaded, interlocking bearing design
- Non Handed for custom cut lengths
- Flush Mounted, No inset
- 48" Maximum Door Width
- Beveled or Square Edge Doors
- Frame guidance lip is extended further for retrofit applications to cover existing heavy weight architectural hinge preps
- For doors weighing up to 450 pounds without reinforcing, 600 pounds with reinforcing
- For lead-lined application consult factory for engineering specials

Standard lengths 83", 85", 95", 119"

Standard Mounting Hardware

12-24 x 3/4" Steel Self Drilling / Self Tapping Phillips Head Screw

Finishes

Clear Anodized (US28), Dark Bronze Anodized (313AN)
Custom Anodizing and Painting are available, consult factory

Options:

HT	Hospital Tip
EPT	Electric Power Transfer
TWP CON	Electrical Through Wire Panel with Allegion Connect

Optional Mounting Hardware:

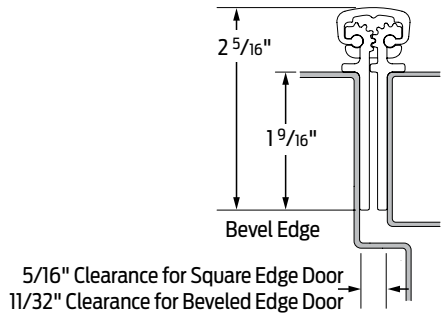
TEK/WD	1/2 Self Drill, Self Tap 1/2 Wood
WD	Wood Door and Frame

Available Accessory Kits:

Security Screws - Hollow Metal
Security Screws - Wood
Thread Forming Screws

For Single Door Applications

For pairs of doors see chart and general information





Meets ANSI/BHMA A156.1
A8133 – Steel
A5133 – Stainless Steel
A2133 – Brass

3PB1 3 Knuckle, Plain Bearing Full Mortise Hinge

- For standard weight doors
- Low frequency usage
- Packed with wood and metal screws

Not for use with a door closer.

Options

- NRP, Non-Removable Pin
- SH, Security Stud
- HT, Hospital Tip
- RC, Round Corners - 1/4" or 5/8" Radius
- SEC, Security Fasteners - Pin-in-Socket

Dimensions

Size (Inches)	Size (mm)	Gauge
3.5 x 3.5	90 x 90	0.134
4 x 4	102 x 102	0.134
4.5 x 4	114 x 102	0.134
4.5 x 4.5	114 x 114	0.134
5 x 4.5	127 x 114	0.134



Meets ANSI/BHMA A156.1
A8112 – Steel
A5112 – Stainless Steel
A2112 – Brass

3CB1 3 Knuckle, Concealed Bearing Full Mortise Hinge

- For standard weight doors
- Medium frequency usage
- Packed with wood and metal screws

Options

- NRP, Non-Removable Pin
- SH, Security stud
- HT, Hospital Tip
- RC, Round Corners - 1/4" or 5/8" Radius
- SEC, Security Fastners - Pin-in-Socket

Dimensions

Size (Inches)	Size (mm)	Gauge
3.5 x 3.5	90 x 90	0.134
4 x 4	102 x 102	0.134
4.5 x 4	114 x 102	0.134
4.5 x 4.5	114 x 114	0.134
5 x 4.5	127 x 114	0.134

Finishes *brass*

Ives Finish	US3	US4	US10	US10B	US10A	US11	US15	US26	US26D
BHMA	605	606	612	613	614	616	619	625	626

Finishes *steel*

Ives Finish	USP	US3	US4	US10	US10B	US10A	US11	US15	US26	US26D
BHMA	600	632	633	639	640	641	643	646	651	652

Finishes *stainless steel*

Ives Finish	US32	US32D
BHMA	629	630



Meets ANSI/BHMA A156.1
A8112 – Steel
A5112 – Stainless Steel
A2112 – Brass

3CB1HW 3 Knuckle, Concealed Bearing Full Mortise Hinge

- For heavy weight doors
- High frequency usage
- Packed with wood and metal screws

Options

- NRP, Non-Removable Pin
- SH, Security stud
- HT, Hospital Tip
- RC, Round Corners - 1/4" or 5/8" Radius
- SEC, Security Fastners - Pin-in-Socket

Dimensions

Size (Inches)	Size (mm)	Gauge
4.5 x 4	114 x 102	0.180
4.5 x 4.5	114 x 114	0.180
5 x 4.5	127 x 114	0.190
5 x 5	127 x 127	0.190



Meets ANSI/BHMA A156.7
K81071F – Steel
K51071F – Stainless Steel

UL listed for use with fire rated doors

3SP1 3 Knuckle Spring Full Mortise Hinge

- For automatic closing of doors
- Packed with wood and metal screws

Options

- HT, Hospital Tip
- RC, Round Corners - 1/4" or 5/8" Radius
- SEC, Security Fastners - Pin-in-Socket

Dimensions

Size (Inches)	Size (mm)	Gauge
4 x 4	102 x 102	0.134
4.5 x 4	114 x 102	0.134
4.5 x 4.5	114 x 114	0.134

Finishes *brass*

Ives Finish	US3	US4	US10	US10B	US10A	US11	US15	US26	US26D
BHMA	605	606	612	613	614	616	619	625	626

Finishes *steel*

Ives Finish	USP	US3	US4	US10	US10B	US10A	US11	US15	US26	US26D
BHMA	600	632	633	639	640	641	643	646	651	652

Finishes *stainless steel*

Ives Finish	US32	US32D
BHMA	629	630



Meets ANSI A156.3 Type 27.
UL Listed 90 Minute Fire Doors 8'0" x 8'0"

FB61P Top and Bottom Bolts (Pair)

- Constant Latching—inactive door remains latched until the active door is opened, releasing the automatic bottom bolt and then the top bolt can be manually released. Inactive door will relatch automatically when door closes.
- Low Actuation Forces.
- Non-handed.
- Bolt throw is 3/4" with a 7/8" vertical adjustment.
- Bolt backset is 3/4"

DP1 or DP2 optional dust proof strike available, see page C11.

FB61T Top Bolt Only

FB62 Top Bolt with Auxiliary Fire Latch

- FB62 Model with Auxiliary Fire Latch eliminates the bottom bolt and is UL Listed for Fire Doors..



Meets ANSI A156.3 Type 27.
UL Listed 20 Minute Fire Doors 8'0" x 8'0"

Dimensions

Body Size: 1" Wide x 8-1/2" Long x 2" Deep

Guide Size: 1" Wide x 6" Long x 1/8" Thick

Strike Size: 15/16" Wide x 2-1/4" Long x 1/16" Thick

Rub Plate Size: 1-1/4" Wide x 1-11/16" Long x 3/64" Thick

Auxiliary Fire Latch Size: 1" Wide x 1-3/4" Long x 3-1/4" Deep

Finishes

Ives Number	US3	US4	US10	US10B	US32	US32D
BHMA	605	606	612	613	629	630



DP1



DP2

Meets Meets ANSI/BHMA 156.16, L14011.

DP1
DP2 Dust Proof Strikes

- Designed for use with the bottom bolt of all flush bolts.
- Spring-loaded plunger returns to floor or threshold level anytime flush bolt is retracted, eliminating need to clean standard floor strikes.
- Strike hole is 3/4" Diameter and 1-1/8" Deep

Dimensions

DP1 Face Plate: 1-7/16" Diameter
DP2 Face Plate: 1-5/8" W x 3-1/2" L x 1/8" Thick
Body: 1-3/16" Diameter x 1-7/8" Deep

Finishes

Ives Number	US3	US4	US10	US10B	US26	US26D
BHMA	605	606	612	613	625	626

Mullions

Mullions

Removable steel mullions Mullions provide single door performance in double door openings with rim devices. Mullions are easily removed by loosening bottom set screw and removing top fitting cover. The top mullion fitting is attached to the frame and is concealed by the fitting cover.

Steel mullions are 2" (51mm) wide and 3" (76mm) deep, with a wall thickness of 1/8" (3mm).

Mullions are shipped with mounting screws and prepared for strikes. Strikes are not included except where indicated.

Steel mullions are available in SP28 and SP313 finishes. Consult factory for other powder coat finish options.

KR – Keyed removable steel mullions makes removal faster and easier by a single operation of the mortise cylinder. Once mullion is removed, large equipment or furniture can freely pass through the opening. The unit will self lock when re-installed, without use of the cylinder key. Uses a 1 1/4" mortise cylinder with a straight cam (Schlage cam reference B502-191). Cylinders are sold separately. Prefix mullion model with "KR".

Removeable aluminum mullions are 1 1/16" (27mm) wide on face closest to the door and 2 3/8" (60mm) at the widest point. The depth is 3 1/8" (79mm) with a wall thickness of 1/8" (3mm).

Aluminum mullions are available in US4, US10, US28, 313 and 315 finishes. Consult factory for other powder coat finish options.

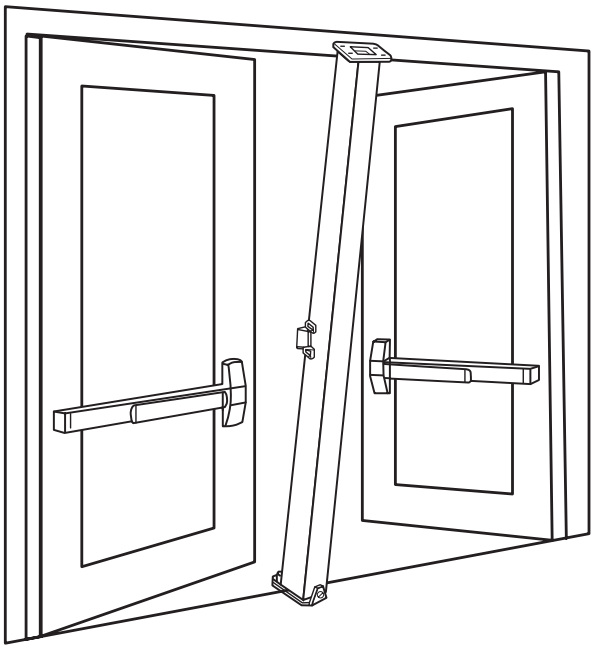
Stock Hollow Metal Applications for devices mounted to cover ANSI 161 cutouts are higher than the standard mullion strike location. Consult the factory for special strike preparation or order a blank mullion. See below.

Blank Mullions are furnished without strike preparation. They are used to mount devices at a strike height different from the standard mullion preparation.

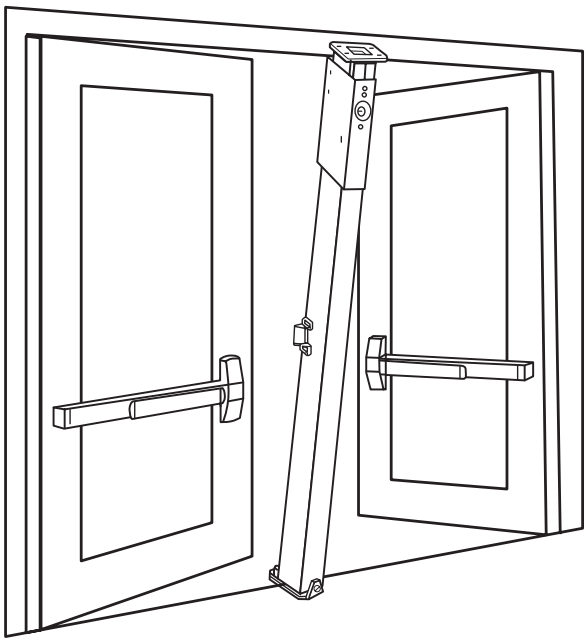
To order, specify:

1. For keyed Removable option on steel mullions, prefix model number with "KR"
2. Model number.
3. Height of opening
4. Finish
5. Handing if required.
6. Centerline deviation (refer to device template for standard centerline).
7. Strikes, when required, should be ordered with device.
8. For keyed Removable option on steel mullions, prefix model number with "KR"

Removable mullions



Keyed removable steel mullions



Mullions

Steel mullions

1654 Prepared for two 1606 strikes. **If 1606 strikes are not specified on the order, two per mullion will be added. Additional charges apply.**

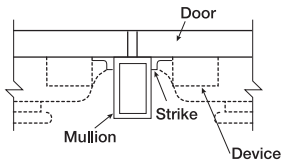
4954 Prepared for 264 or 299 strikes. For use with all Von Duprin Panic rim devices. **Note: specify strike choice with device.**

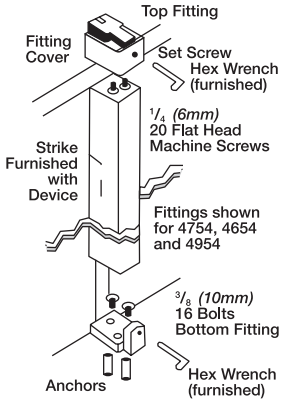
9954 Prepared for and must be used with two 268 strikes (88-F device), or two 499F (22-F, 98-F, 99F devices). UL fire labeled mullion for up to 3 hour opening using Von Duprin fire exit rim devices. This mullion is not easily removed due to special fittings.

22-F and 88-F devices are rated up to 8' x 8" (2438mm x 2438mm).

98-F and 99-F devices are rated up to 10'0" (3048mm).

Note: If 268 or 499F strikes are not specified on the order, two per mullion will be added. Additional charges apply.



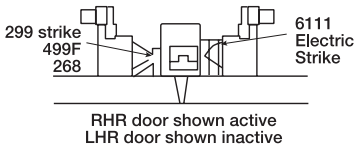


4754 Prepared for two 4263 monitor strikes.

4854 Prepared for one 299 and one 6111 electric strike. Indicate handing for electric strike.

9854 Prepared for one 268 or 499F strike and one 6111 electric strike. Indicate handing for electric strike. UL fire labelled mullion for up to 3 hour openings up to 8' x 8' (2438mm x 2438mm) using Von Duprin Fire Exit Rim Devices

4854/9854 – Using one electric strike



Aluminum mullions

5654 Prepared for two 264 or 299 strikes with weatherstripping. Includes one set of 154 stabilizers.

5754 Prepared and furnished with one 1408 double door strike. Includes one 154 stabilizer set. Note: specify device "less strike".

Sizes for mullions

1654, 4954, 4754, 4854, 5654	**9854, 9954**
7' 2" (2184mm)	7' 3" (2210mm)
*8' 2" (2489mm)	8' 3" (2475mm)
*10' 2" (3099mm)	10' 3" (3124mm)

KR1654, KR4954, KR4754, KR4854	**KR9854**, KR9954***
7' 6" (2286mm)	7' 5" (2261mm)
8' 6" (2591mm)	*8' 5" (2565mm)
10' 6" (3200mm)	*10' 5" (3175mm)

* Only qualifying applications will be provided with UL Label.
** Fire rated same as 9854
*** Fire rated same as 9954



Angle plate is used with narrow transom frames. The plate attaches to the transom extending the surface area needed to mount the mullion. Must be ordered separately. Specify finish.

154 Stabilizer is a two-piece interlocking set. One piece mounts on the mullion with the top mounting hole 5 3/16" (148mm) below the centerline of the strike; the other piece mounts on the door. Shims are provided to adjust for misalignment between the door and mullion.



The set maintains integrity between the door and mullion to prevent vandalism and to ensure contact between the device and strike as the doors expand and contract with temperature changes.

Furnished standard on aluminum mullions; optional for steel and all blank steel mullions.

MT54 Storage kit is a set of floor and wall brackets that provide convenient storage of the keyed removable mullion when removed from the opening.

To order, specify

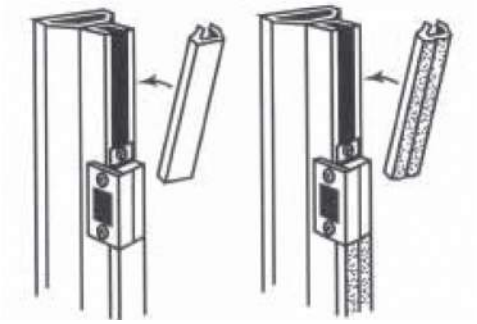
1. Model MT54.

2. Finish SP28, SP313, or SPBLK

Weatherstripping

Weatherstripping

Weatherstripping prevents cold air from blowing between doors and mullion. It also serves as a silencer when the door is closed against the mullion. The silicone treated weatherstrip pile is bonded to a polypropylene backing. A slide-in molding houses the weatherstripping, covers mounting screws of the strike and extends to both the top and bottom of the mullion. Available on aluminum mullions only.



Standard edging

Edging with weatherstripping

SCHLAGE

Grade 1, mortise locks

L Series



Overview

The Schlage® L Series has long been the benchmark for Grade 1 mortise locks. Beyond strength and security – it offers flexibility to meet most needs. Fifty mechanical functions include ten that can be field configured from one universal lock case and ten electrified functions are regularly used as part of electronic access control systems. L Series locks have the ability to suite across electronic, tubular, exit trim, and multi-point locks to integrate seamlessly into any environment. The series features an array of security options including 180-degree visibility status indicators and support for multiple keyway families and cylinder types including Primus® XP high-security cylinders.

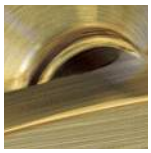
Finishes



605
Bright Brass



606
Satin Brass



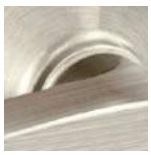
609
Antique Brass



612 [1]
Satin Bronze



613 [1]
Oil Rubbed Bronze



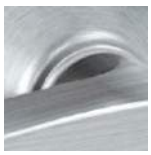
619
Satin Nickel



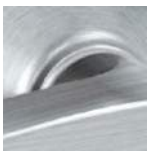
622
Matte Black



625
Bright Chrome



626
Satin Chrome



626AM
Satin Chrome, Antimicrobial



629 [2]
Bright Stainless



630 [2]
Satin Stainless



630AM [2]
Satin Stainless, Antimicrobial



643e
Aged Bronze

[1] Available on standard levers only, not available on Latitude, Longitude, Accent, Asti, or Merano

[2] Not available on Accent, Asti, or Merano

ALLEGION

M Collection decorative lever styles[1]



M51
851 - Knurled tactile warning



M52
852 - Knurled tactile warning



M53



M54



M55



M56



M57[2]



M61
- Handed



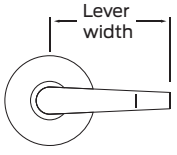
M62[2]
- Handed

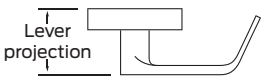


M63
- Handed

Dimensions

Lever	Width	Projection
M51	4.5"	3.2"
M52	4.5"	3"
M53	4.35"	3.2"
M54	4.35"	2.75"
M55	4.3"	3"
M56	4.6"	3"
M57	4.5"	2.9"
M61	4.5"	3.2"
M62	4.5"	2.7"
M63	4.5"	3.2"





[1] M Collection not available in 612 and 613 finishes.
[2] Available in 629, 630, and 630AM only.

M Collection decorative lever styles[1]



M81
881 - Knurled tactile warning



M82



M83



M84



M85
- Handed



ME1
8ME1 - Milled tactile warning
- Handed



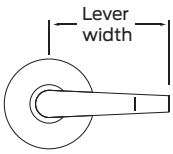
ME2
8ME2 - Milled tactile warning
- Handed

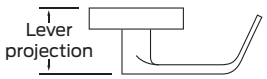


ME3
8ME3 - Milled tactile warning

Dimensions

Lever	Width	Projection
M81	4.8"	2.9"
M82	4.8"	2.9"
M83	4.6"	2.9"
M84	5.1"	3"
M85	4.9"	3.3"
ME1	5.5"	3"
ME2	5.2"	2.8"
ME3	5.1"	3.2"





Return to door meets ½" requirement for all levers shown on this page.

ME1, ME2 and ME3 ergonomic levers designed with Gensler as product design consultant.

Standard lever and knob styles



01
801 - Milled tactile warning



02
802 - Knurled tactile warning



03
803 - Knurled tactile warning



05
805 - Milled tactile warning



06
806 - Milled tactile warning



07
807 - Milled tactile warning



12
812 - Milled tactile warning
- Handed



17
817 - Milled tactile warning



18
818 - Milled tactile warning

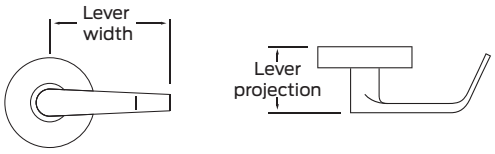


Accent (ACC)[1]
- Handed

Dimensions

Lever	Width	Projection
01	3.875"	2.688"
02	4.75"	2.813"
03	4.75"	2.813"
05	3.75"	2.875"
06	4.625"	2.5"
07	4.625"	2.875"
12	4.625"	3.063"
17	4.75"	3"
18	4.875"	2.688"
Accent (ACC)	4.125"	3.125"

Return to door meets 1/2" requirement for 03, 06 and 17 levers.



[1] Not available in 612, 613, 629, or 630 finishes.

Standard lever and knob styles



Asti (AST)[1]
- Handed



Latitude (LAT)[2]



Longitude (LON)[2]



Merano (MER)[1]
- Handed



Omega (OME)



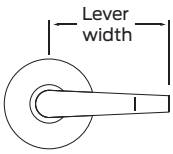
41

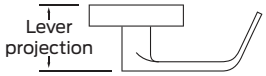


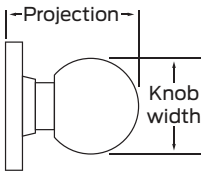
42

Dimensions

Lever	Width	Projection
Asti (AST)	4"	2.625"
Latitude (LAT)	4.75"	2.563"
Longitude (LON)	4.875"	2.563"
Merano (MER)	4"	3.125"
Omega (OME)	5.063"	3.313"
41	2.211"	2.34"
42	2.132"	2.538"







Return to door meets ½" requirement for Longitude and Omega levers.

[1] Not available in 612, 613, 629, or 630 finishes.
[2] Not available in 612 or 613 finishes.

Escutcheons



L full face
Specify by adding 'L' after lever design.



L concealed
Specify by adding 'C' suffix to function and by adding 'L' after lever design.



N full face
Specify by adding 'N' after lever design.

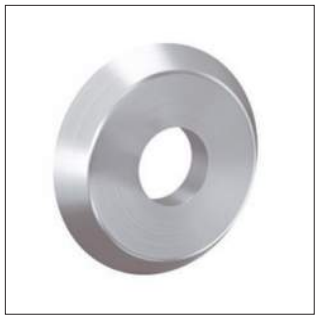
Roses



A rose
Available for use on L Series knob and lever designs. Specify by adding 'A' after lever design
Finishes: available in all L Series finishes.



B rose
Available for use on L Series knob and lever designs. Specify by adding 'B' after lever design.
Finishes: available in all L Series finishes.



C rose
Available for use on L Series knob and lever designs. Specify by adding 'C' after lever design.
Finishes: 605, 606, 609, 619, 622, 625, 626, 629, 630, 643e



AVA rose
Available for use on ACC lever, other levers upon request.
Finishes: 605, 606, 609, 619, 622, 625, 626, 643e

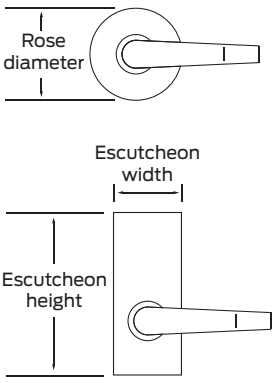


MER rose
Available for use on MER lever, other levers upon request.
Finishes: 605, 606, 609, 619, 622, 625, 626, 643e

Dimensions

Rose	Diameter
A	2.125"
B	2.5625"
C	2.625"
AVA	2.625"
MER	2.625"

Escutcheon	Width	Height
L full face	1.75"	8"
L concealed	1.75"	8"
N full face	2.5"	7.875"



Thumbturns



Standard turn
09-509



ADA turn
09-509 x L583-363
Not available with L9463 and L463

Indicators



Cylinder



Thumbturn



Cointurn



Emergency key indicator



Cylinder



Thumbturn



Cointurn



Emergency key indicator

	Locked Unlocked	Occupied Unoccupied	Do Not Disturb	
Inside trim	L283-711	L283-712	L283-713	L283-714
Outside trim	L283-721	L283-722	L283-723	L283-724

Ligature resistant solutions



SL1 [1, 2]



SK1 [1,2]



HSLR [2,3]
- Handed

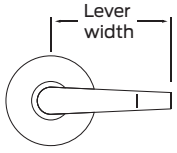
Specifications and certifications

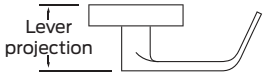
	SL1	SK1	HSLR
Accepted by OHM	■	■	■
ADA compliant	■	-	■
Suitable for:			
High risk areas	-	■	■
Medium risk areas	■	■	■
Low risk areas	■	■	■

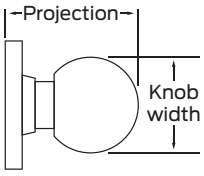
Caution: Cone shaped door knobs and thumbturns do not compliant with ADA requirements for graspability.

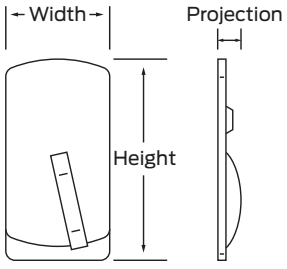
Dimensions

	Width	Height	Projection
SL1	4.5"		3.13"
SK1	3.125"		2.3125"
HSLR	6"	13.17"	2.27"









[1] Only available in 630 and 630AM finishes.
[2] Not available with Vandlgard option.
[3] Only available in 630 finish.

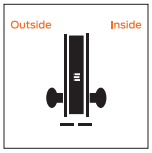




Vandlgard® protection available on functions noted with an “LV” option.

Vandlgard allows the outside lever to rotate freely down when locked to limit the ability of vandals to apply excessive force to the chassis helping to prevent damage to internal components.

Non-keyed functions



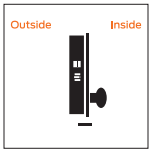
Schlage L9010
ANSI F01

Passage latch

- Latchbolt retracted by lever/knob from either side at all times
- Inside lever always free for immediate egress



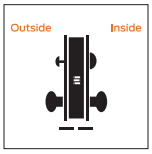
Optional HSLR trim available



Schlage L9025
ANSI F31

Exit lock

- No outside trim
- Inside lever always free for immediate egress



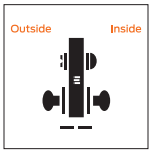
Schlage L9040
LV9040
ANSI F22

Bath/bedroom privacy lock

- Latchbolt retracted by lever/knob from either side unless outside lever is locked by inside thumbturn
- Actuating inside lever or closing door unlocks outside lever
- To unlock from outside remove emergency button, insert emergency thumbturn in access hole and rotate
- Inside knob/lever is always free for immediate egress



Optional 180 degree messaging indicator available



Schlage L9044
LV9044
ANSI -

Privacy with coin turn outside

- Latchbolt retracted by lever/knob from either side unless outside lever is locked by inside thumbturn or outside coin turn
- Actuating inside lever, closing door, or rotating outside coin turn unlocks outside lever
- Available in rose trim only



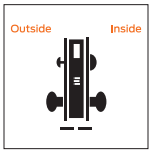
Coin turn for lock with rose trim



Optional 180 degree messaging indicator available



Optional HSLR trim available



Schlage L9440
LV9440
ANSI F19

Privacy with deadbolt

- Latchbolt retracted by lever/knob from either side
- Deadbolt actuated by inside thumbturn
- Throwing deadbolt locks outside knob/lever
- Inside lever retracts both deadbolt and latchbolt and unlocks outside lever
- To unlock from outside remove emergency button, insert emergency thumbturn in access hole and rotate
- Inside lever always free for immediate egress

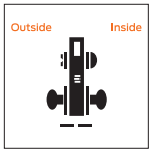


Optional 180 degree messaging indicator available

Cylinder · Knob/lever · Thumbturn · Thumbturn cylinder · Coin turn · Solid spindle · Two-piece spindle · Emergency thumbturn · Electrified function

ALLEGION

Non-keyed functions



Schlage **L9444**
LV9444
ANSI **-**

Privacy with deadbolt and coin turn outside

- Latchbolt retracted by knob/lever from either side
- Deadbolt actuated by inside thumbturn or outside coin turn
- Throwing deadbolt locks outside knob/lever
- Inside lever retracts both deadbolt and latchbolt and unlocks outside lever
- Rotating coin turn retracts deadbolt and unlocks outside lever
- Inside lever always free for immediate egress
- Available with rose trim only



Coin turn for lock with rose trim

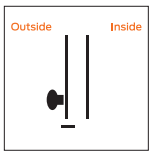


Optional 180 degree messaging indicator available



Optional HSLR trim available

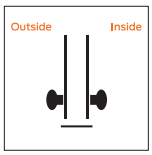
Non-keyed dummy functions



Schlage L0170
ANSI -

Half dummy trim

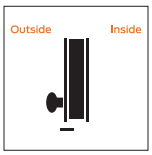
- Fixed lever/knob on one side



Schlage L0172
ANSI -

Full dummy trim

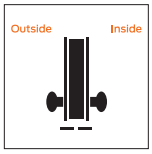
- Fixed lever/knob on both sides



Schlage L9175
ANSI -

Half dummy trim with lock case

- Fixed lever/knob on one side
- Includes lock case and blank armor plate



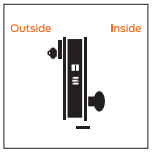
Schlage L9176
ANSI -

Full dummy trim with lock case

- Fixed lever/knob on both sides
- Includes lock case and blank armor plate

In a double-door application where the dummy will be used as the strike order 10-091 armored front strike separately.

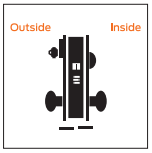
Single cylinder non-deadbolt functions



Schlage L9026
ANSI -

Exit lock with cylinder

- No outside trim
- Outside cylinder retracts latchbolt
- Inside lever always free for immediate egress
- Auxiliary latch deadlocks latchbolt when door is locked



Schlage L9050
LV9050
ANSI F04

Office and inner entry lock

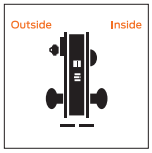
- Latchbolt retracted by knob/lever from either side unless outside is made inoperative by key outside or by turning inside thumbturn
- When outside is locked, latchbolt is retracted by key outside or by knob/lever inside
- Outside knob/lever remains locked until thumbturn is returned to vertical or unlocked by key
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside knob/lever is always free for immediate egress



Optional 180 degree messaging indicator available



Optional HSLR trim available



Schlage L9056
LV9056
ANSI -

L9050 with automatic unlocking

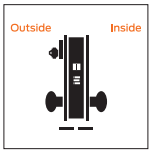
- Latchbolt retracted by knob/lever from either side unless outside is made inoperative by key outside or by rotating inside thumbturn
- Outside knob/lever unlocked by key outside, thumbturn or closing door
- Rotating inside knob/lever simultaneously retracts latchbolt and unlocks outside knob/lever
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside knob/lever is always free for immediate egress



Optional 180 degree messaging indicator available



Optional HSLR trim available



Schlage L9070
LV9070
ANSI F05

Classroom lock

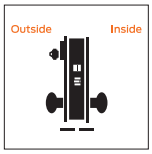
- Latchbolt retracted by lever/knob from either side unless outside lever is locked by key
- Unlocked from outside by key
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress



Optional 180 degree messaging indicator available



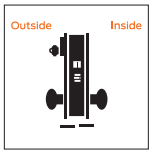
Optional HSLR trim available



Schlage L9076
LV9076
ANSI F06

Classroom holdback lock

- Latchbolt retracted by lever/knob from either side unless outside lever is locked by key
- When locked, latchbolt retracted by key or inside lever
- Auxiliary latch deadlocks latchbolt when door is locked
- Holdback feature activated by turning inside lever/knob and rotating key 360°
- Inside lever always free for immediate egress



Schlage L9080
LV9080
ANSI F07

Storeroom lock

- Latchbolt retracted by lever/knob inside or key outside
- Outside lever/knob is always inoperable
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress

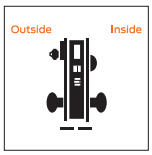


Optional HSLR trim available

Cylinder · Knob/lever · Thumbturn · Thumbturn cylinder · Coin turn · Solid spindle · Two-piece spindle · Emergency thumbturn · Electrified function

ALLEGION

Single cylinder deadbolt functions



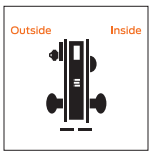
Schlage L9453
LV9453
ANSI F20

Entrance lock

- Latchbolt retracted by lever/knob from either side unless outside locked by 20° thumbturn rotation
- Deadbolt actuation through 90° thumbturn rotation
- When locked, outside key or inside lever/knob retracts both deadbolt and latchbolt
- Outside lever/knob locked until thumbturn is restored to vertical position
- Throwing deadbolt locks outside lever/knob
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress



Optional HSLR trim available



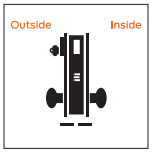
Schlage L9456
LV9456
ANSI F13

Corridor lock

- Latchbolt retracted by lever/knob from either side
- Deadbolt actuation by key or thumbturn rotation
- Throwing deadbolt locks outside lever/knob
- Turning inside knob/lever retracts both deadbolt and latchbolt and unlocks outside lever/knob
- Inside lever always free for immediate egress



Optional HSLR trim available



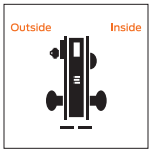
Schlage L9465
ANSI -

Closet/storeroom lock

- Latchbolt retracted by lever/knob from either side
- Deadbolt actuation by key



Optional HSLR trim available



Schlage L9473
ANSI F21

Dormitory/bedroom lock

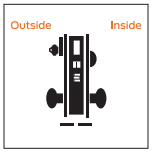
- Latchbolt retracted by lever/knob from either side
- Deadbolt actuation by outside key or inside thumbturn



Optional 180 degree messaging indicator available



Optional HSLR trim available



Schlage L9480
LV9480
ANSI -

Storeroom lock with deadbolt

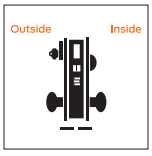
- Latchbolt retracted by outside key or inside knob/lever
- Outside knob/lever always fixed
- Deadbolt actuation by outside key or inside thumbturn
- Inside knob/lever actuation retracts both deadbolt and latchbolt
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress



Optional 180 degree messaging indicator available



Optional HSLR trim available



Schlage L9485
LV9485
ANSI -

Faculty/hotel/restroom lock

- Latchbolt retracted by outside key or inside knob/lever
- Outside knob/lever always fixed
- Deadbolt actuation by thumbturn
- All keys (except emergency) inoperative when deadbolt is thrown
- Inside knob/lever retracts both deadbolt and latchbolt
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress



Optional 180 degree messaging indicator available

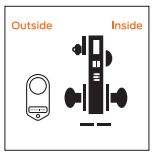


Optional HSLR trim available

Cylinder · Knob/lever · Thumbturn · Thumbturn cylinder · Coin turn · Solid spindle · Two-piece spindle · Emergency thumbturn · Electrified function

ALLEGION

Single cylinder deadbolt functions



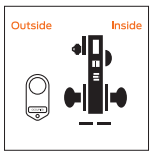
Schlage L9486
LV9486
ANSI F15

L/LV9485 with 09-611 “DO NOT DISTURB” indicator for rose trim

- Latchbolt retracted by outside key or inside knob/lever
- Outside knob/lever always fixed
- Deadbolt actuation by thumbturn
- When deadbolt is thrown “DO NOT DISTURB” message is displayed and all keys (except emergency) become inoperative
- Inside knob/lever retracts both deadbolt and latchbolt
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress



Adds hotel occupancy indicator (09-611) for lock with A or B roses on sectional trim. Message: “DO NOT DISTURB”.



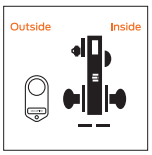
Schlage L9486xL583-375
LV9486xL583-375
ANSI -

L/LV9485 with “OCCUPIED” indicator for rose trim

- Latchbolt retracted by outside key or inside knob/lever
- Outside knob/lever always fixed
- Deadbolt actuation by thumbturn
- When deadbolt is thrown “OCCUPIED” message is displayed and all keys (except emergency) become inoperative
- Inside knob/lever retracts both deadbolt and latchbolt
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress



Adds hotel occupancy indicator (09-611) for lock with A or B roses on sectional trim. Message: “OCCUPIED”.



Schlage L9496
ANSI -

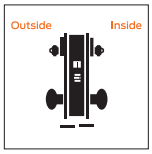
Privacy with 09-611 “OCCUPIED” indicator for rose trim

- Latchbolt retracted by knob/lever from either side
- Deadbolt actuation by outside key or inside thumbturn
- Thrown deadbolt displays “OCCUPIED” message and locks outside lever
- Inside knob/lever retracts both deadbolt and latchbolt and unlocks outside lever
- Inside lever always free for immediate egress



Adds hotel occupancy indicator (09-611) for lock with A or B roses on sectional trim. Message: “OCCUPIED”.

Double cylinder non-deadbolt functions



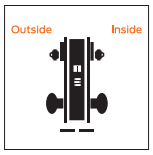
Schlage L9060
LV9060
ANSI F09

Apartment entrance lock

- Latchbolt retracted by knob/lever from either side unless outside is locked by key from inside
- When locked, latchbolt retracted by key outside or knob/lever inside
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside knob/lever is always free for immediate egress



Optional 180 degree messaging indicator available



Schlage L9071
LV9071
ANSI F32

Classroom security lock

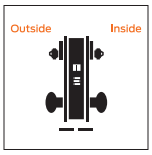
- Latchbolt retracted by knob/lever from either side unless outside is locked by key from either side
- When locked, latchbolt retracted by outside key or inside knob/lever
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside knob/lever always free for immediate egress



Optional 180 degree messaging indicator available



Optional HSLR trim available



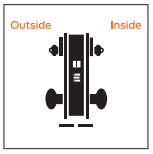
Schlage L9077
LV9077
ANSI -

Classroom security holdback lock

- Latchbolt retracted by knob/lever from either side unless outside is locked by key from either side
- When locked, latchbolt retracted by key outside or knob/lever inside
- Auxiliary latch deadlocks latchbolt when door is locked
- Rotate inside lever/knob and turn key 360º to enable holdback feature
- Inside knob/lever always free for immediate egress



Optional 180 degree messaging indicator available



Schlage L9082
LV9082
ANSI F30

Institution lock

- Latchbolt retracted by key from either side
- Knob/lever on both sides always inoperative
- Auxiliary latch deadlocks latchbolt when door is locked

Caution: Double cylinder locks on any door, in any structure requiring use of a key to achieve egress can create a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.



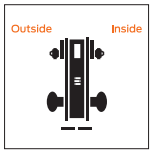
Optional 180 degree messaging indicator available



Optional HSLR trim available

Cylinder · Knob/lever · Thumbturn · Thumbturn cylinder · Coin turn · Solid spindle · Two-piece spindle · Emergency thumbturn · Electrified function

Double cylinder deadbolt functions



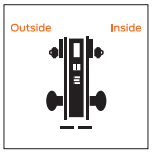
Schlage L9457
LV9457
ANSI F33

Classroom security lock with deadbolt

- Latchbolt retracted by lever/knob from either side
- Deadbolt actuated by either key
- Throwing deadbolt locks outside lever/knob
- Actuating inside lever/knob retracts both deadbolt and latchbolt and unlocks outside lever
- Inside lever always free for immediate egress



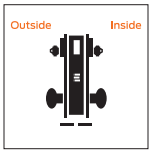
Optional HSLR trim available



Schlage L9458
LV9458
ANSI F34

Classroom security lock w/deadbolt and auxiliary latch

- Latchbolt retracted by knob/lever from either side
- Deadbolt actuated by either key
- When door is locked outside lever inoperative
- Inside lever retracts deadbolt and latchbolt and unlocks outside lever
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress



Schlage L9466
ANSI F14

Store/utility room lock with deadbolt

- Latchbolt retracted by knob/lever from either side
- Deadbolt thrown or retracted by key from either side

Caution: Double cylinder locks on any door, in any structure requiring use of a key to achieve egress can create a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.



Optional 180 degree messaging indicator available

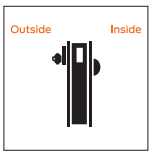


Optional HSLR trim available

Cylinder · Knob/lever · Thumbturn · Thumbturn cylinder · Coin turn · Solid spindle · Two-piece spindle · Emergency thumbturn · Electrified function

ALLEGION

Mortise deadlock functions



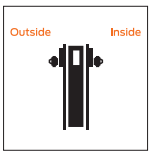
Schlage L9460
ANSI F17

Cylinder x thumbturn lock

- Deadbolt actuated by key or thumbturn



Optional 180 degree messaging indicator available



Schlage L9462
ANSI F16

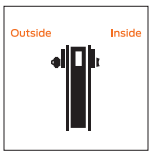
Double cylinder lock

- Deadbolt actuated by either key

Caution: Double cylinder locks on any door, in any structure, requiring the use of a key to achieve egress can create a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.



Optional 180 degree messaging indicator available



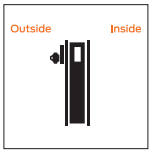
Schlage L9463
ANSI F29

Classroom lock

- Deadbolt actuated by key
- Thumbturn retracts deadbolt but cannot extend it



Optional 180 degree messaging indicator available



Schlage L9464
ANSI F18

Cylinder lock

- Deadbolt actuated by key
- No trim opposite side

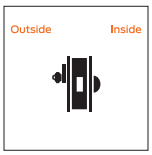


Optional 180 degree messaging indicator available

Cylinder · Knob/lever · Thumbturn · Thumbturn cylinder · Coin turn · Solid spindle · Two-piece spindle · Emergency thumbturn · Electrified function

ALLEGION

Small mortise deadlock functions



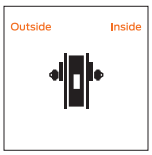
Schlage L460
ANSI E06071

Cylinder x thumbturn lock

- Deadbolt actuated by key or thumbturn



Optional 180 degree messaging indicator available



Schlage L462
ANSI E06061

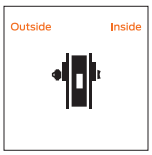
Double cylinder lock

- Deadbolt actuated by either key

Caution: Double cylinder locks on any door, in any structure, requiring use of a key to achieve egress can create a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.



Optional 180 degree messaging indicator available



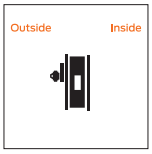
Schlage L463
ANSI E06091

Classroom lock

- Deadbolt actuated by key
- Thumbturn retracts deadbolt but cannot extend it



Optional 180 degree messaging indicator available



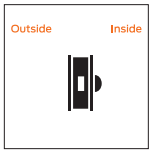
Schlage L464
ANSI E06081

Cylinder lock

- Deadbolt actuated by key
- No trim opposite side



Optional 180 degree messaging indicator available



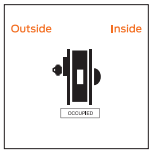
Schlage L480
ANSI -

Door bolt

- Deadbolt actuated by thumbturn
- No trim opposite side



Optional 180 degree messaging indicator available



Schlage L496
ANSI -

Deadbolt with "OCCUPIED" indicator

- Deadbolt actuated by key or thumbturn
- When deadbolt is thrown "OCCUPIED" message is displayed

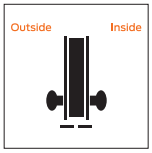


Optional 180 degree messaging indicator available

Cylinder | Knob/lever | Thumbturn | Thumbturn cylinder | Coin turn | Solid spindle | Two-piece spindle | Emergency thumbturn | Electrified function

ALLEGION

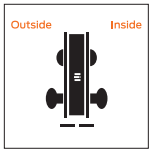
Special functions



Schlage L9110 x XL11-741
ANSI -

Double dummy with active trim

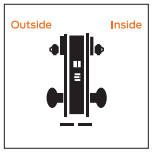
- Knob/lever both sides active
- Lock case and armor front included
- Can receive deadbolt with XL11-743 armor front



Schlage L0940 x XL11-446
LV9040 x XL11-446
ANSI -

Privacy with turn both sides

- Latchbolt retracted by either lever
- Rotating either thumbturn locks outside lever
- Actuating inside lever, closing door, or rotating either thumbturn unlocks outside lever



Schlage L9066 x XL11-897
ANSI -

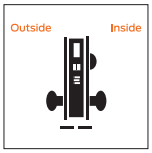
Storeroom lock

- Either key retracts latchbolt
- Either key locks or unlocks both levers

Caution: Double cylinder locks on any door, in any structure requiring use of a key to achieve egress can create a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.



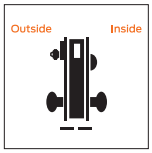
Optional 180 degree messaging indicator available



Schlage L9412 x XL11-907
ANSI -

Exit lock with deadbolt

- Latchbolt retracted by inside lever
- Outside lever always fixed
- Thumbturn actuates deadbolt
- Inside lever retracts deadbolt and latchbolt
- Auxiliary latch deadlocks latchbolt when door is locked



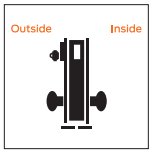
Schlage L9460 x XL11-635
ANSI -

L9460 with fixed dummy trim

- Knob/lever both sides fixed
- Deadbolt thrown or retracted by key outside or thumbturn inside
- Specify per XL11-635



Optional 180 degree messaging indicator available



Schlage L9460, L9462, L9464 x XL11-886
ANSI -

Deadbolt with retraction by inside lever or knob

L9460 x XL11-886
- Deadbolt actuation by key or thumbturn
- Outside lever always fixed
- Inside lever active when deadbolt is thrown
- Inside lever retracts deadbolt

L9462 x XL11-886
- Same as L9460 x XL11-886 except deadbolt actuated by key from either side

L9464 x XL11-886
- Same as L9460 x XL11-886 except deadbolt actuated by key from one side

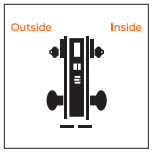


Optional 180 degree messaging indicator available

Cylinder | Knob/lever | Thumbturn | Thumbturn cylinder | Coin turn | Solid spindle | Two-piece spindle | Emergency thumbturn | Electrified function

ALLEGION

Special functions

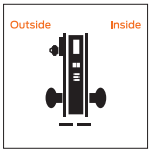


Schlage **L9482 x XL11-543**
LV9482 x XL11-543
ANSI **-**

Institutional lock with deadbolt

- Latchbolt retracted by either key
- Both levers always inoperative
- Deadbolt actuated by either key
- Auxiliary latch deadlocks latchbolt when door is locked

Caution: Double cylinder locks on any door, in any structure requiring use of a key to achieve egress can create a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.

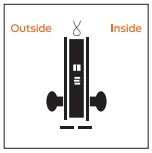


Schlage **L9485 x XL11-557**
ANSI **-**

Prison function lock

- Latchbolt retracted by outside key or inside knob/lever
- Outside knob/lever always free spinning
- Deadbolt actuation by guard key
- Inside knob/lever fixed when deadbolt is thrown
- Prisoner key only retracts latchbolt
- Tamper resistant Torx screws standard

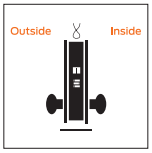
Electrified locks functions



Schlage **L9090EL**
L9090EU
ANSI **F13**

Electrically locking/ unlocking outside lever (no cylinder)

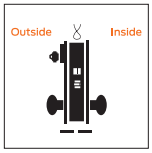
- Outside lever/knob continuously locked (EL) or unlocked (EU) by 12V or 24V DC
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever/knob always free for immediate egress



Schlage **L9091EL**
L9091EU
ANSI **-**

Electrically locking/ unlocking both levers (no cylinder)

- Both levers/knobs continuously locked (EL) or unlocked (EU) by 12V or 24V DC
- Auxiliary latch deadlocks latchbolt when door is locked



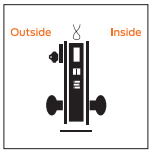
Schlage **L9092EL**
L9092EU
ANSI **-**

Electrically locking/ unlocking outside lever (single cylinder)

- Outside lever/knob continuously locked (EL) or unlocked (EU) by 12V or 24V DC
- Latchbolt retracted by lever/knob inside or key outside
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever/knob always free for immediate egress
- EL: Switch or power failure allows outside lever/knob to retract latchbolt
- EU: Switch or power failure locks (EU) outside lever/knob



Optional HSLR trim available



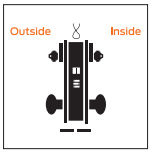
Schlage **L9093EL**
L9093EU
ANSI **-**

Electrically locking/ unlocking both levers (outside cylinder)

- Both levers/knobs continuously locked (EL) or unlocked (EU) by 12V or 24V DC
- Latchbolt retracted by key outside
- Auxiliary latch deadlocks latchbolt when door is locked



Optional HSLR trim available



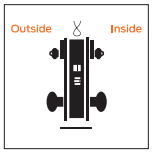
Schlage **L9094EL**
L9094EU
ANSI **-**

Electrically locking/ unlocking outside lever (double cylinder)

- Outside lever/knob continuously locked (EL) or unlocked (EU) by 12V or 24V DC
- Lathbolt retracted by either key or by inside lever/knob
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever/knob always free for immediate egress



Optional HSLR trim available



Schlage **L9095EL**
L9095EU
ANSI **-**

Electrically locked or electrically unlocked both levers (double cylinder)

- Both levers/knobs continuously locked (EL) or unlocked (EU) by 12V or 24V DC
- Latchbolt retracted by either key
- Auxiliary latch deadlocks latchbolt when door is locked
- EL: Switch or power failure unlocks both levers/knobs and allows knob/lever to retract latchbolt
- EU: Switch or power failure locks both levers/ knobs

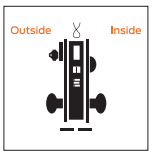


Optional HSLR trim available

Cylinder · Knob/lever · Thumbturn · Thumbturn cylinder · Coin turn · Solid spindle · Two-piece spindle · Emergency thumbturn · Electrified function

ALLEGION

Electrified locks functions



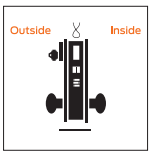
Schlage **L9492EL**
L9492EU
ANSI **-**

Electrically locking/ unlocking outside lever (outside cylinder, inside thumbturn with deadbolt)

- Outside lever continuously locked (EL) or unlocked (EU) 12V or 24V DC
- Deadbolt actuation by key or thumbturn
- Inside lever retracts both deadbolt and latchbolt
- For EU outside lever retracts deadbolt and latchbolt
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress



Optional HSLR trim available



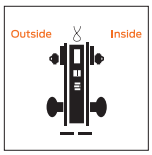
Schlage **L9493EL**
L9493EU
ANSI **-**

Electrically locking/ unlocking both levers (outside cylinder, inside thumbturn with deadbolt)

- Deadbolt actuation by key or thumbturn
- Inside lever retracts both deadbolt and latchbolt
- For EU both levers retract deadbolt and latchbolt
- Auxiliary latch deadlocks latchbolt when door is locked



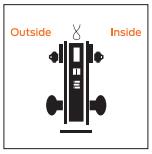
Optional HSLR trim available



Schlage **L9494EL**
L9494EU
ANSI **-**

Electrically locking/ unlocking outside lever (double cylinder with deadbolt)

- Outside lever continuously locked (EL) or unlocked (EU) 12V or 24V DC
- Deadbolt actuation by either key
- Inside lever retracts both deadbolt and latchbolt
- For EU outside lever retracts deadbolt and latchbolt
- Auxiliary latch deadlocks latchbolt when door is locked
- Inside lever always free for immediate egress



Schlage **L9495EL**
L9495EU
ANSI **-**

Electrically locking/ unlocking both levers (double cylinder with deadbolt)

- Both levers continuously locked (EL) or unlocked (EU) 12V or 24V DC
- Deadbolt actuation by either key
- When unlocked both levers retract deadbolt and open door
- Auxiliary latch deadlocks latchbolt when door is locked

Available electrified options include:

RX Request to Exit

LX Latch bolt monitor

DPS Door Position Switch

DM Deadbolt monitor (DM)

Cylinder · Knob/lever · Thumbturn · Thumbturn cylinder · Coin turn · Solid spindle · Two-piece spindle · Emergency thumbturn · Electrified function

ALLEGION

Cylinders

Conventional mortise cylinder	
P	6-pin Conventional (standard) with Schlage logo
Z	SL 7-pin Conventional (A2 pinning) with Schlage logo
L	Less full face cylinder
C	Concealed mortise cylinder
W	Less concealed mortise cylinder

Full size interchangeable core (FSIC) mortise cylinder	
R	6-pin FSIC with Schlage logo
M	SL 7-pin FSIC (A2 pinning) with Schlage logo
J	Less FSIC
F	6-pin FSIC less Schlage logo
T	Refundable FSIC construction core

Small format interchangeable core (SFIC) mortise cylinder	
G	7-pin SFIC (A2 pinning) with Schlage logo
B	Less core
BDC	Disposable SFIC construction core
H	Refundable SFIC construction core

Specifications

Chassis	
Case material	CRS with zinc dichromate plating
Case size	L9000 Series: 4 7/16" x 6 1/16" x 1"(113 mm x 154 mm x 25 mm) L400 Series: 4 7/16" x 3 5/8" x 1"(113 mm x 92 mm x 25 mm)
Spacing	Knob or lever to cylinder: 3 7/8" (98 mm); Knob or lever to thumbturn hub: 2 11/16" (68 mm)
Door thickness	Standard: 1 3/4" (44 mm) Optional: 1 3/8" (35 mm) to 2 1/2" (64 mm) Over 2 1/2" (64 mm) door ranges vary by function. Specify door thickness if other than 1 3/4" and position in door EE, EI, EO, ED

Trim	
Handing	L9000 Series: Field-reversible without disassembly L400 Series: Non-handed
Lever/knob	Lever designs: forged brass or bronze and cast stainless steel Knob designs: heavy-duty wrought brass, bronze or stainless steel
Rose/ escutcheon	L full face and concealed: Cold-forged brass, bronze and stainless steel N full face: Heavy wrought reinforced brass, bronze and stainless steel Roses: A ,B, C: wrought brass or bronze and stainless steel; AVA and MER: forged brass
Combinations	Available with knob both sides, lever both sides, or knob/lever combinations. Roses cannot be combined with escutcheons.

Latch	
Backset	2 3/4" (70 mm) only
Armor	L9000 Series Standard: 1 1/4" x 8" x 7/32" (32 mm x 203 mm x 6 mm) Optional: 1 1/16" x 8" x 7/32" (27 mm x 203 mm x 6 mm) L400 Series: Standard: 1 1/4" x 5 9/16" x 7/32"(32 mm x 141 mm x 6 mm)
Latch	3/4" (19 mm) throw stainless steel latch with anti-friction tongue
Deadbolt	1" (25 mm) throw stainless steel deadbolt
Strike	L9000 Series Standard: ANSI curved lip strike 1 1/4" x 4 7/8" (32 mm x 124 mm) x 1 3/16" (30 mm) lip to center with dust box Optional: Extended lip strike options (7/8", 1", 1 1/2", 1 3/4", 2") L400 Series Standard: 1 1/8" x 3 1/2" (29 mm x 89 mm) with dust box Optional: 1 1/4" x 4 7/8"(32 mm x 124 mm) with dust box

Specifications

Keying	
Cylinder format	6-pin Conventional mortise cylinder (standard); also available in concealed mortise cylinder, FSIC, SFIC and 7-pin SL cylinder formats plus less cylinder options.
Keyway	Patented Everest 29 S123 (standard); also available in open, restricted, and Primus XP security levels with available master keying and construction keying.
Wired electrified	
Input voltage	12V or 24V DC for L909X
Operating mode	Fail Safe or Fail Secure via switch on chassis
Current draw	0.23 amps maximum; 0.01 amps holding
Request to Exit	Rating: 3A @ 125V AC/2A @ 30V DC. Available on all L909X and L949X electrified functions. Also available option for the following mechanical functions: L9010/50/56/70/71/80 and L9453/56/58/65/66/80/85.
Latch bolt monitor	Available on all L909x and L949x electrified and L9010/25/26/50/56/70/71/80/82 and L9453/56/65/66/80/85 mechanical functions.
Door position sensor	Internal available on L909x electrified and L9010/80/82 mechanical functions; external available on all functions.
Deadbolt monitor	Available on L949x electrified and L9453/56/57/58/80/85/86/96 mechanical functions
Warranty	
	3 year limited mechanical and 1 year limited electromechanical
Certifications	
ANSI/BHMA	L/LV9000: ANSI/BHMA A156.13-2017 Series 1000, Grade 1 operation and security; with FSIC Grade 2; with SFIC Grade 3 L400: ANSI/BHMA A156.36, Grade 1
ICC	Complies with ICC A117.1 Accessible and Usable Buildings and Facilities
UL/cUL	Mechanical: UL 10C and CAN/ULC-S104 3 hour fire listed; all locks listed for A label single doors, 4' x 10' and pairs 8' x 10' Electrified: UL/ULC listed for single-point locking applications; UL listed for 3-hour fire door (except L9076 and L9077)
CA Fire Code	All levers with a return to door of 1/2" (64 mm) or less comply
FL Building Code	Miami-Dade NOA's and Florida Building Commission listings
Federal	BAA compliant, all functions

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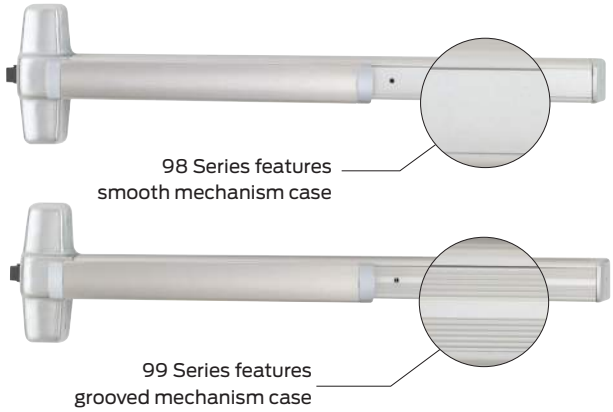
VON DUPRIN®

Exit device

98/99 Series

Overview

The 98/99 Series devices are heavy-duty push pads. The 98 Series has a smooth mechanism case, while the 99 Series has a grooved mechanism case. The 98/99 Series has been certified to the highest industry standards and are used in schools, hospitals and government buildings.



Device types



Rim device



75 Mortise lock device



27 Surface mounted vertical rod device [1]



47 Concealed vertical rod device, 5/16" throw [1]

48 Concealed vertical rod device, 5/8" top, 1 1/2" bottom throw



47WDC Concealed vertical rod wood door device [1]



49 Concealed vertical cable device [2]



50WDC Concealed vertical cable wood door device



57 Three-point latch device

[1] Also available less bottom rod (LBR)
[2] Also available less bottom latch (LBL)

ALLEGION™

VON DUPRIN®

Exit device
98/99 Series

Finishes



605
Bright Brass



606
Satin Brass



612
Satin Bronze



619
Satin Nickel



622
Matte Black

625
Bright Chrome



626
Satin Chrome



626AM
Satin Chrome, Antimicrobial



628
Aluminum, Clear Anodized



630
Satin Stainless



630AM
Satin Stainless, Antimicrobial



643e
Aged Bronze



693
Black



710
Dark Brown, Anodized

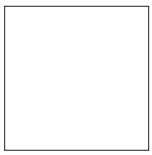
Due to the many variations in monitors and printers, color samples may appear different than the physical product. Contact your local sales representative for a physical color sample.

ALLEGION™

VON DUPRIN®

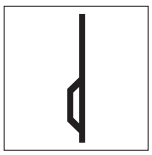
Exit device
98/99 Series

Trim functions



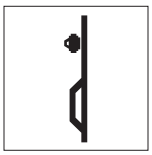
EO **No outside trim**

- Exit only



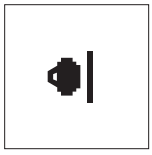
DT **Dummy trim**

- Pull when dogged (not recommended for fire device)



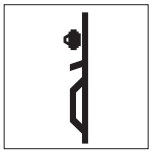
NL **Night latch**

- Key retracts latchbolt
- Rim and 1 ¼" mortise cylinder



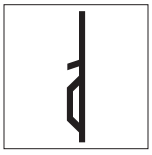
NLOP **Night latch**

- Key retracts latchbolt, pull required



TP **Thumbpiece**

- Key locks and unlocks
- Rim and 1 ¼" mortise cylinder



TPBE **Thumbpiece, blank escutcheon**

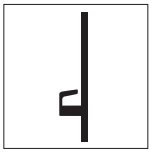
- Blank escutcheon always operable (no cylinder, use with DT trim)



L **Lever**

K **Knob**

- Key locks and unlocks
- Rim and 1 ¼" mortise cylinder
- Handed, reversible lever
- Electrified lever operation available



LDT **Lever, dummy trim**

KDT **Knob, dummy trim**

- Pull when dogged



LNL **Lever, night latch**

KNL **Knob, night latch**

- Key retracts latchbolt
- Rim and 1 ¼" mortise cylinder
- Handed, reversible lever



LBE[1] **Lever, blank escutcheon**

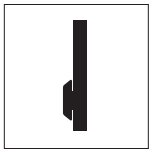
KBE **Knob, blank escutcheon**

- Always operable (no cylinder)



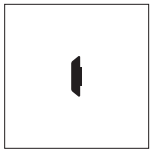
TL **Turn lever**

- Key locks and unlocks (use with DT trim)
- 1 ¼" mortise cylinder



TLBE **Turn lever, blank escutcheon**

- Blank escutcheon always operable (no cylinder, use with DT trim)



TLOP **Turn lever, optional pull**



HL **Hospital latch**

- Key locks and unlocks
- 1 ¼" mortise cylinder

ALLEGION™

VON DUPRIN®

Exit device
98/99 Series

Trim styles



990



996



696



697
3/4" (19mm) diameter pull



392-7



HL



374



VR910



VR914

Dimensions

Trim style	Width	Height	Thickness	Projection
990	3"	14 3/16"	3/32"	2"
996 Knob	2 3/4"	10 3/4"	27/32"	3 1/4"
996 Lever	2 3/4"	10 3/4"	27/32"	2 7/8"
696	1 5/8"	13 1/2"	3/16"	2 1/6"
697	1 5/8"	13 1/2"	3/16"	3"
392-7	3/4" inch round stainless steel with 7" center to center that matches the 98/99 center case. 3 1/2" offset with 1 1/2" clearance.			
HL	2 9/16"	7 7/8"	-	2 5/8"
374	2 3/4"	10 3/4"	27/32"	
VR910/914 with RIM/verticals	5 1/2"	11"	-	
VR910/914 with mortise	7 1/4"	11"	-	

ALLEGION™

Lever styles

Decorative levers



M51
- Knurling available



M52
- Knurling available



M53



M54



M55



M56



M57[1]



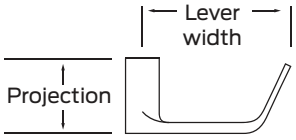
M61
- Handed



M62[1]
- Handed

Dimensions

Lever	Width	Projection
M51	4.5"	2.5"
M52	4.5"	2.4"
M53	4.4"	2.4"
M54	4.4"	2.3"
M55	4.4"	2.7"
M56	4.5"	2.3"
M57	4.5"	2.7"
M61	4.5"	2.7"
M62	4.6"	2.4"



[1] Available in stainless steel substrate only

Lever styles

Decorative levers



M63
- Handed



M81
- Knurling available



M82



M83



M84



M85
- Handed



ME1[1]
- Handed



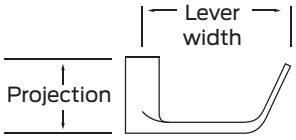
ME2[1]
- Handed



ME3[1]

Dimensions

Lever	Width	Projection
M63	4.6"	2.6"
M81	4.8"	2.5"
M82	4.9"	2.5"
M83	4.7"	2.25"
M84	5.1"	2.2"
M85	4.9"	2.7"
ME1	5.4"	2.6"
ME2	5.2"	2.4"
ME3	5"	2.8"



[1] Designed with Gensler as product design consultant

VON DUPRIN®

Exit device
98/99 Series

Lever styles

Standard levers



01



02
- Knurling available



03
- Knurling available



05



06
- Default lever
- Suites with Schlage Rhodes
- Knurling available



07
- Suites with Schlage Athens



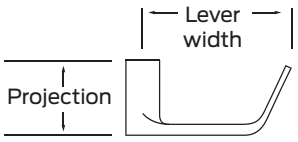
12
- Handed



16
- Suites with Schlage Omega

Dimensions

Lever	Width	Projection
01	4.0"	2.1"
02	4.75"	2.3"
03	4.75"	2.813"
05	3.75"	2.8"
06	4.7"	2.1"
07	4.6"	2.3"
12	4.3"	2.9"
16	5.05"	2.66"



ALLEGION™

Lever styles

Standard levers



17
- Suites with Schlage Sparta
- Knurling available



18



Accent (ACC)
- Handed



Asti (AST)
- Handed



Merano (MER)
- Handed



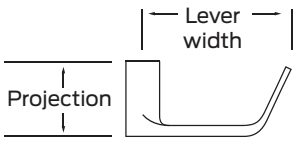
Latitude (LAT)



Longitude (LON)

Dimensions

Lever	Width	Projection
17	4.7"	2.3"
18	4.75"	2.4"
Accent (ACC)	4.4"	3.1"
Asti (AST)	4.2"	2.5"
Merano (MER)	4.1"	2.5"
Latitude (LAT)	4.6"	2.3"
Longitude (LON)	4.9"	2.3"



Electromechanical device options

Switches

LX — **Latchbolt monitoring**

LX-LC — **Latchbolt monitoring, low current**
- Signals use of an opening
- SPDT switch to monitor latch bolt
- 2 A maximum @ 24VDC; below 50 mA @ 24VDC for low current option

RX — **Request to exit**

RXLC — **Request to exit - low current**

RX2 — **Double request to exit - 2 RX switches**

WP-RX — **Waterproof request to exit**

RX-AUX — **RX to RX-2 conversion**
- Signals use of an opening
- SPDT switch to monitor pushpad
- 2 A maximum @ 24VDC; below 50 mA @ 24VDC for low current option

LX-RX — **Request to exit/latchbolt monitoring combination**

LX-RX-LC — **Request to exit/latchbolt monitoring combination, low current**
- 2 A maximum @ 24VDC; below 50 mA @ 24VDC for low current option

SS — **Signal switch**
- Monitors pushpad and latchbolt
- Signals unauthorized use of an opening
- Switch makes latch bolt tamper-resistant
- Up to 2.0 A @ 24VDC

Latch retraction

EL — **Electric latch retraction**

SD-EL — **Electric latch retraction with special center case dogging**
- Enables remote unlatching
- Alternative to manual dogging
- Voltage: 24VDC (continuous duty)
- Current: 16.0 A inrush / 0.3 A holding

QEL — **Quiet electric latch retraction**

HD-QEL — **Quiet electric latch retraction with hex dogging**

SD-QEL — **Quiet electric latch retraction with special center case dogging**
- Bolt retraction via switch
- Converts exit door to push-pull operation
- Voltage: 24VDC
- Current: 1.0 A inrush (0.5 sec.) / 0.14 A holding

Delayed egress

CX — **Chexit delayed exit**
- Meets NFPA 101 requirements
- Self-contained controls, locking, alarm
- Input voltage: 24VDC
- Input current inrush: 1.25 A
- Input current holding: 390 mA
- Alarm relay and secure relay contact ratings: 24 VDC, 1 A

CX-RCM — **Chexit remote module**
- Chexit for smaller doors that can not accommodate a standard Chexit device
- Size: 3.75” x 5.57” x 2.50”
- Input voltage: 24VDC
- Input current inrush: 1.25A
- Input current holding: 390mA
- Alarm relay and secure relay contact ratings: 24 VDC, 1 A

Miscellaneous

ALK — **Alarm exit kit**
- Unauthorized opening triggers 85-decibel horn
- Set in armed or disarmed mode by key
- Assembly includes both a 24VDC input and external inhibit

Electromechanical device options

CON — **Allegion Connect**

- Common connectors to connect various door hardware all the way to the power supply

E996 — **Electric locking and unlocking trim**

- Remains latched while unlocked
- Remote electrical control
- Voltage: 24VDC (Continuous Duty)
- Current: 0.22 amps

E7500 — **Electric mortise lock device**

- Voltage: 12 or 24VDC
- Current: 0.60 amps @ 12VDC, 0.30 amps @ 24VDC

Electromechanical device options

Matrix shows available options per device type but does not represent compatibly across multiple options.

	Switches									Latch retraction					Delayed egress		Misc			
	LX	LX-LC	RX	RXLC	RX2	WP-RX	LX-RX	LX-RX-LC	SS	EL	SD-EL	QEL	HD-QEL	SD-QEL	CX	CX-RCM	ALK	CON	E996	Mortise
98 99	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
98F 99F	■	■	■	■	■	■	■	■	■	■		■			■	■	■	■	■	
XP98 XP99		■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	
XP98-F XP99-F		■	■	■	■	■	■	■		■		■			■	■	■	■	■	
9875 9975			■	■	■	■			■	■	■	■	■	■	■	■	■	■	■	■
9875-F 9975-F			■	■	■	■			■	■		■			■	■	■	■	■	■
9827 9927	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
9827-F 9927-F	■	■	■	■	■	■	■	■	■	■		■			■	■	■	■	■	
9857 9957	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
9857-F 9957-F	■	■	■	■	■	■	■	■	■	■		■			■	■	■	■	■	
9847 9947	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
9847-F 9947-F	■	■	■	■	■	■	■	■	■	■		■			■	■	■	■	■	
9848 9948	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
9848-F 9948-F	■	■	■	■	■	■	■	■	■	■		■			■	■	■	■	■	
9849 9949	■[1]	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
9849-F 9949-F	■[1]	■	■	■	■	■	■	■	■	■		■			■	■	■	■	■	
9847WDC 9947WDC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
9847WDC-F 9947WDC-F	■	■	■	■	■	■	■	■	■	■		■			■	■	■	■	■	
9850WDC 9950WDC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
9850WDC-F 9950WDC-F	■	■	■	■	■	■	■	■	■	■		■			■	■	■	■	■	

[1] For 98/9949 devices, LX switch monitors trim input or electric dogging of EL/QEL devices. LX switch does not monitor latchbolt condition.

Mechanical device options

Dogging

CD — **Cylinder dogging, panic only**

CD-CX — **Center case cylinder dogging for Chexit devices**

CI — **Cylinder dogging indicator**
- Battery-operated dogging indicator in cylinder format with red light visible from over 75 feet away

DI — **Dogging indicator**
- Battery-operated dogging indicator in hex format with red light visible from over 75 feet away

LD — **Less dogging**

SD — **Special center case dogging**
- Center case cylinder dogging

Classroom security

-2 — **Double cylinder**
- Inside key cylinder locks/unlocks outside trim

-2SI — **Double cylinder with security indicator**
- Inside key cylinder locks/unlocks outside trim with visible indicators that provide status of door

CDSI — **Cylinder dogging with indicator**
- Provides visible lock/unlock indicators showing whether device is dogged or undogged

HDSI — **Hex dogging with indicator**
- Provides visible lock/unlock indicators showing whether device is dogged or undogged

Environmental

PN — **Pneumatic latch retraction**
- For areas where electrical devices banned
- Special linkage for mechanical or pneumatic dogging

QM — **Quiet mechanical option**
- Provides damper-controlled relatching of device

INS — **Insulclad kits**
- Kits with longer fasteners or parts for Insulclad doors

AM — **Anti-microbial finish**

Weatherized

WH — **Weep holes**
- Drainage (weep) holes in mechanism case

WS — **Windstorm**
- Severe weather certified/tested
- FEMA and ICC compliant
- Tornado and hurricane tested

California code

AX — **Accessible device**
- UL certified to meet new 5 lb. maximum operating force requirement
- Exceeds ANSI/BHMA requirements

Latches

PL — **Pullman latch**
- Latches are always extended
- Most commonly used in conjunction with electric strikes and LBR-less bottom rod application

Mechanical device options

Touch bar trim

RSS — **Red silk screen**
- Red silk-screened lettered touchbar trim

PUSH — **PUSH**
- Touchbar trim embossed PUSH

SG — **Safety glow**
- Self-illuminating touchpad
- Glows brightly during low or no light conditions

KN — **Knurled touchbar**
- Tactile warning applied to device

BRAILLE — **Braille**
- Vision impaired touchpad
- Raised letter and Braille

Mechanical device options

Matrix shows available options per device type but does not represent compatibly across multiple options.

	Dogging						Classroom security				Environmental				Weatherized		CA code
	CD	CD-CX	CI	DI	LD	SD	-2	-2SI	CDSI	HDSI	PN	QM	INS	AM	WH	WS	AX
98 99	■	■	■	■	■	■	■	■	■	■	■	■		■	■		■
98F 99F							■	■			■	■		■	■		■
XP98 XP99	■	■	■	■	■	■	■	■	■	■				■	■		■
XP98-F XP99-F							■	■						■	■		■
9875 9975	■	■	■	■	■	■	■		■	■	■			■	■		
9875-F 9975-F							■				■			■	■		
9827 9927	■	■	■	■	■	■			■	■	■	■		■	■	■	■ LBR
9827-F 9927-F											■	■		■	■	■	■ LBR
9857 9957	■	■	■	■	■	■			■	■	■			■	■	■	
9857-F 9957-F											■			■	■	■	
9847 9947	■	■	■	■	■	■			■	■	■		■	■	■		■ LBR
9847-F 9947-F											■			■	■		■ LBR
9848 9948	■	■	■	■	■	■			■	■	■			■	■		
9848-F 9948-F											■			■	■		
9849 9949	■	■	■	■	■	■			■	■	■		■	■	■		■ LBL
9849-F 9949-F											■			■	■		■ LBL
9847WDC 9947WDC	■	■	■	■	■	■			■	■	■			■	■		
9847WDC-F 9947WDC-F											■			■	■		
9850WDC 9950WDC	■	■	■	■	■	■			■	■	■			■	■		■ LBL
9850WDC-F 9950WDC-F											■			■	■		■ LBL

Mechanical device options

Matrix shows available options per device type but does not represent compatibly across multiple options.

	Latches	Touch bar trim				
	PL	RSS	PUSH	SG	KN	BRAILLE
98 99		■	■	■	■	■
98F 99F		■	■	■	■	■
XP98 XP99		■	■	■	■	■
XP98-F XP99-F		■	■	■	■	■
9875 9975		■	■	■	■	■
9875-F 9975-F		■	■	■	■	■
9827 9927	■	■	■	■	■	■
9827-F 9927-F		■	■	■	■	■
9857 9957		■	■	■	■	■
9857-F 9957-F		■	■	■	■	■
9847 9947	■	■	■	■	■	■
9847-F 9947-F		■	■	■	■	■
9848 9948		■	■	■	■	■
9848-F 9948-F		■	■	■	■	■
9849 9949		■	■	■	■	■
9849-F 9949-F		■	■	■	■	■
9847WDC 9947WDC		■	■	■	■	■
9847WDC-F 9947WDC-F		■	■	■	■	■
9850WDC 9950WDC		■	■	■	■	■
9850WDC-F 9950WDC-F		■	■	■	■	■

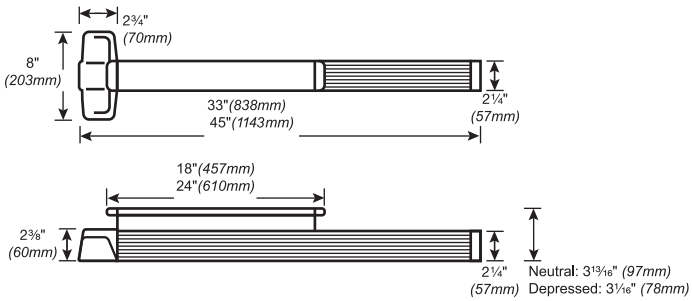
VON DUPRIN®

Exit device
98/99 Series

Specifications

Accessibility	▪ Force to depress push pad – AX device: 5 lbs – Standard device: 15 lbs ▪ Push pad projection – Neutral: 3 13/16" (97 mm) – Depressed: 3 1/16" (78 mm)
Certifications/ approvals	All Von Duprin 98/99 exit devices are ANSI/BHMA Certified. Please refer to the BHMA Certified Products Directory for specific listings.
Mounting height	39 13/16" (1011 mm) 39 11/16" (1008 mm) with mullion
Warranty	36 months from the date of placing the product in operation

Dimensions

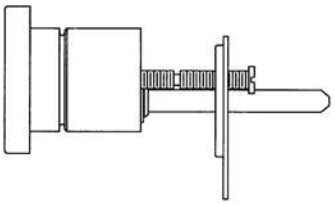


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ALLEGION™

Full size interchangeable core cylinders for exit devices, aluminum door, etc.





Interchangeable core rim cylinders for exit devices	
Number	**Core mechanism**
20-057	Conventional core
20-757	Primus core
20-757-XP	Primus XP core
20-079	Housing only, less core

Available in 605, 606, 609, 612, 613, 619, 625, 626, and 643e finish.



Cylinders for Adams Rite MS and 4700 Series Lori 4500 Series and Corbin Russwin DL3000 Series		
Number	**Core mechanism**	**Collar**
26-098	Conventional core	Compression ring & spring
20-062	Conventional core	3/16" + 3/8" blocking rings
20-766	Primus core	3/16" + 3/8" blocking rings
20-766-XP	Primus XP core	3/16" + 3/8" blocking rings
20-060	Housing less core	None

These cylinders include set screw pack B220-050 for Adams Rite locks.



K510-711
Adams Rite
MS cam

Cylinders for Adams Rite 4070 Series deadlocks		
Number	**Core mechanism**	**Collar**
20-091	Conventional core	3/16" + 3/8" blocking rings
20-722	Primus core	3/16" + 3/8" blocking rings
20-722-XP	Primus XP core	3/16" + 3/8" blocking rings
20-090	Housing less core	None



B520-378
Adams Rite
4070 cam

Notes
1. Mortise cylinders available 605, 606, 609, 612, 613, 619, 625, 626, and 643e finish. Cores furnished 606 and 626 only.
2. To differentiate between Classic and Everest 29, specify keyway. Example: C or CP (Classic), S123 (Everest 29).
3. All cylinders are 1 1/2" long.
4. Specify LKB if 0-bitted Primus XP cylinders are required less key blanks.

Full Size Interchangeable Core Availability



A-Series
Orbit design



ND-Series lever
all designs

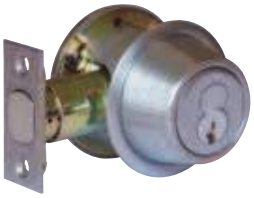


AL-Series
Saturn design



H-Series knob
Orbit design





B500-Series



L-Series
all designs
except concealed



B600 / 700-Series



S-Series
all designs
except Flair



D-Series knob
Orbit design

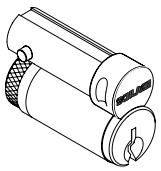


S200-Series
all designs for S210

All except Flair for other functions



Full Size Interchangeable Core Cylinders for Schlage Locksets



Full Size Core Only

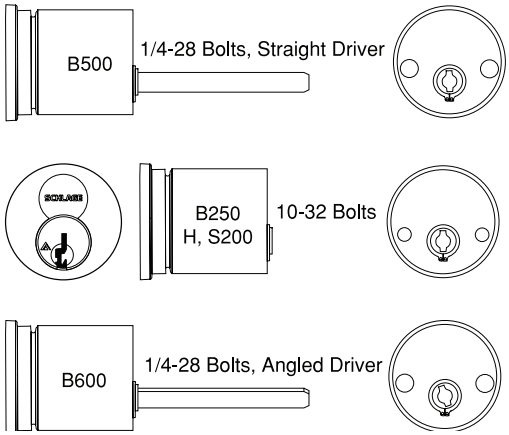
Number	Mechanism
23-030	Conventional core
30-120	Conventional core for hotel function (specify hand)
20-740-XP	Primus XP core (not available in hotel function)

Available 606 and 626 finish only. Order control keys separately.

Full Size IC Housings for Bored Deadlocks, Less Core

Lockset Series	Description	Number	Specify Finish
B500-Series	Outside	B610-203, B610-205	605, 609, 612, 613, 619, 625, 626, and 716
	Inside	B610-028**	605, 609, 612, 613, 619, 625, 626, and 716
B250, H, S200-Series	Outside	22-061	605, 606, 609, 610, 611, 612, 613, 616, 625, 626
	Inside of B252	22-062	
B600 / 700-Series	Outside	B610-027	605, 606, 609, 612, 613, 625, 626
	Inside	B610-028	See Note Below

Specify finish of B610-031 inside snap-on faceplate ordered separately for BC162 and B662/762.
**Inside housing does not include snap-on faceplate

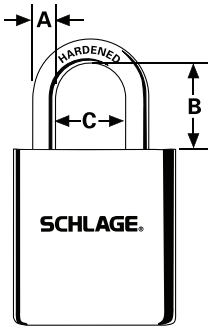




KS43F KS72F KS92M

Full Size Interchangeable Core Padlocks

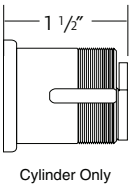
Part #	Shackle Dimensions		
	A	B	C
LESS CYLINDER - FULL SIZE INTERCHANGEABLE CORE			
BRASS BODY			
KS43A3200	3/8″	3/4″	3/4″
KS43D3200	3/8″	1 1/2″	3/4″
KS43F3200	3/8″	2″	3/4″
KS43G3200	3/8″	4″	3/4″
STEEL BODY			
KS72M3200	7/16″	1″	7/8″
KS72F3200	7/16″	2″	7/8″
KS92M3200	3/8″	1″	3/4″



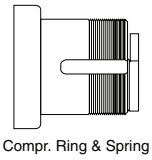
Note: To order Primus XP add the suffix - XP to the Primus part number. (Example: 12-345-XP)

Full Size Interchangeable Core Mortise Cylinders

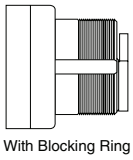




Cylinder Only



Compr. Ring & Spring



With Blocking Ring



Cylinders for Schlage L-Series Mortise Locks

	Design	Function	Core Mechanism		
			Conventional	Primus, Primus XP	Housing Less Core
	**L & N Escutcheons** (cylinders with compression ring)	All Except Below	30-008	20-798, 20-798-XP	30-007
		L9060P Outside	30-030	20-782, 20-782-XP	30-032 + 36-083
		L9485P, L9486P Hotel Funtions	30-010*	N/A	30-007
	**Sectional Trim** (cylinder with compression ring, spring and 3/8" blocking ring). 9060 requires 1/2" blocking ring.	All Except Below	30-138	20-776, 20-776-XP	30-137
		L9060P Outside	30-030 + 36-083 + 35-082-030	20-783, 20-783-XP	30-032 + 36-083 + 36-082-050
		L9485P, L9486P Hotel Funtions	30-040*	N/A	30-137

* Hotel function cores are handed. Specify hand of door.



L583-489
Cam for All Functions Except L9060 Outside



K510-680
Cam for L9060 Outside

Mortise Cylinders with Straight Cam for Exit Devices

Number	Core Mechanism	Collar
26-091	Conventional core	Compression ring & spring
20-061		3/8" blocking rings + compression ring & spring
20-763, 20-763-XP	Primus/Primus XP core	Compression ring & spring
20-771, 20-771-XP		3/8" blocking rings + compression ring & spring
20-059	Housing less core	None
26-064		Compression ring & spring

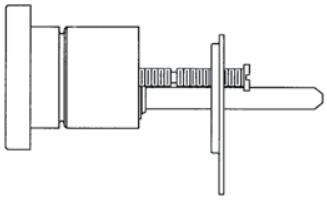


K510-730
Straight Cam, Other Applications

Notes 1. Available 605, 606, 609, 610, 612, 613, 625, and 626 finish. Cores furnished 606 and 626 only.
2. To differentiate between Classic and Everest, specify keyway. Example: C or CP (Classic), C123 (Everest). Everest C123 keyway standard.
3. All cylinders are 1 1/2" long.
4. Specify LKB if 0-bitted Primus XP cylinders are required less key blanks.

Full Size Interchangeable Core Cylinders for Exit Devices, Aluminum Doors, etc.





Interchangeable Core Rim Cylinders for Exit Devices

Number	Core Mechanism
20-057	Conventional core
20-757	Primus core
20-757-XP	Primus XP core
20-079	Housing only, less core

Available 605, 606, 609, 610, 612, 613, 625 and 626 finish.



Cylinders for Adams Rite MS and 4700 Series Lori 4500 Series and Corbin Russwin DL3000 Series

Number	Core Mechanism	Collar
26-098	Conventional core	Compression ring & spring
20-062	Conventional core	3/16″ + 3/8″ blocking rings
20-766	Primus core	3/16″ + 3/8″ blocking rings
20-766-XP	Primus XP core	3/16″ + 3/8″ blocking rings
20-060	Housing less core	None

These cylinders include set screw pack B220-050 for Adams Rite locks.



K510-711
Adams Rite
MS Cam

Cylinders for Adams Rite 4070 Series Deadlocks

Number	Core Mechanism	Collar
20-091	Conventional core	3/16″ + 3/8″ blocking rings
20-722	Primus core	3/16″ + 3/8″ blocking rings
20-722-XP	Primus XP core	3/16″ + 3/8″ blocking rings
20-090	Housing less core	None



B520-378
Adams Rite
4070 Cam

Notes
1. Mortise cylinders available 605, 606, 609, 610, 612, 613, 625, and 626 finish. Cores furnished 606 and 626 only.
2. To differentiate between Classic and Everest, specify keyway. Example: C or CP (Classic), C123 (Everest).
3. All cylinders are 1 1/2″ long.
4. Specify LKB if 0-bitted Primus XP cylinders are required less key blanks.



LG1 LG7 Lock Guard

- Units are non-handed and incorporate security frame pin to prevent separation of the door and frame. LG7 does not incorporate the security frame pin
- Unit covers the latch bolt area of the door and lock, thereby providing added protection from burglars, vandals or normal abuse.
- Ideal for use with mortise or cylindrical locks.
- Easy installation.
- Through bolted with carriage bolts and nuts.
- Available in a variety of materials, 13 gauge stainless steel, 12 gauge steel and brass material.

Dimensions

3" Wide x 11-1/2" High

Bolt center to center: 10-1/2"

Finishes

Ives Number	USP*	US2G*	US4*	US10*	US32D	SP313*
BHMA	600	603	606	612	630	695

** not available on LP7*



LG10 Lock Guard

- Ideally suited for use with rose or escutcheon 2-3/4" wide or less.
- For use with Type 86 Mortise and Type 161 Cylindrical Locks (ANSI 156.13 Series 1000 and ANSI 156.2 Series 4000).
- No exposed fasteners on face of unit.
- Unique design provides maximum security, virtually eliminating the opening between door and frame at the latch point.
- Available in 13 Gauge Stainless Steel or 12 Gauge Steel.

Dimensions

2-1/2" Wide x 9-1/2" High

Stud center to center: 8-1/2"

Finishes

Ives Number	USP	US32D
BHMA	600	630



LG11 Lock Guard

- Designed for use on aluminum doors with latch-type locks or doors equipped with electric strikes.
- Unit is Handed - Specify left or right hand when ordering.
- No exposed fasteners on face of unit.
- Unique design provides maximum security, virtually eliminating the opening between door and frame at latch point.
- Available in 13 Gauge Stainless Steel or 12 Gauge Steel.

Dimensions

2-1/2" Wide x 9-1/2" High

Stud center to center: 8-1/2"

Finishes

Ives Number	US32D	SP313
BHMA	630	695



LG12 Lock Guard

- Narrow design unit for use on rose or escutcheon 3-1/2" or less.
- For use with Type 86 Mortise and Type 161 Cylinder Locks (ANSI 156.13 Series 1000 and ANSI 156.2 Series 4000).
- No exposed fasteners on face of unit.
- Unique design provides maximum security, virtually eliminating the opening between door and frame at the latch point.
- Available in 13 Gauge Stainless Steel or 12 Gauge Steel

Dimensions

1-1/2" Wide x 9-1/2" High

Stud center to center: 8-1/2”

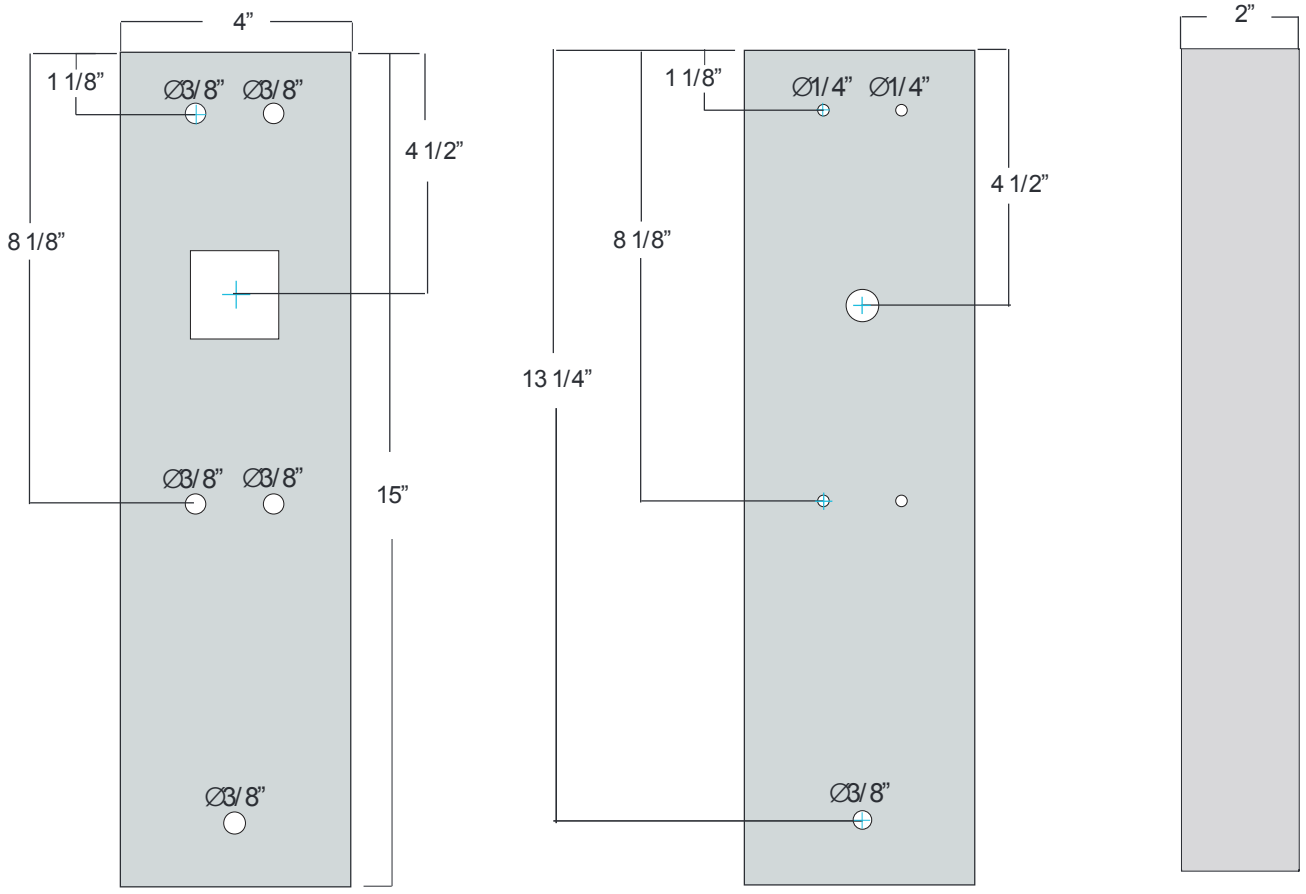
Finishes

Ives Number	USP	US32D
BHMA	600	630

K-BXED-V990NL-2
Weldable Box



Type: Panic Hardware
Dimensions:
4 ”W x 15”H x 2”D
Materials Available:
14 Gauge Steel.....K-BXED-V990NL-2
.125 Gauge Aluminum.....K-BXED-V990NL-A2
Notes: Weldable Box For Von Duprin 99 Rim Exit Device W/ 990NL Trim - Gate Friendly



www.keedex.com • 714-993-4300

This rendering is NOT to scale and dimensions are NOT exact. For precise technical information, please refer to the template for the lock you are using.



8200 Push Plate
8300 Pull Plate, Prep for Pull (less pull)

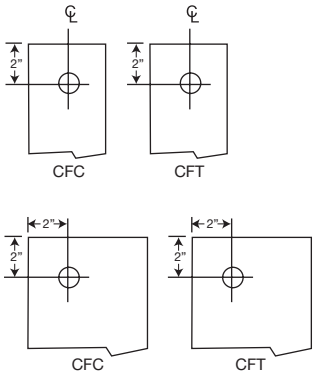
Available Sizes
3" x 12"
3.5" x 15"
4" x 16"
6" x 16"
8" x 16"
Special sizes are available. Consult factory.

Plates Cut for Cylinder or Thumbturns

Plates are available with cutout for cylinder or thumbturn; standard cutout is 2" from top and centered on plates up to 4" wide. For plates wider than 4" cutout is located 2" from outer edge, specify LH or RH. When pull location interferes with standard cutout location a detail drawing should be furnished with the order.

Standard cutout is 1-1/4" for cylinder and 3/8" for thumbturn.

Specify CFC for cutout for cylinder or CFT for cutout for thumbturn.



Finishes *brass*

US Number	US3	US4	US10	US10B	US15	US26	US26D*
BHMA	605	606	612	613	619	625	626

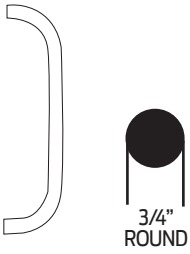
Finishes *stainless steel*

US Number	US32D*
BHMA	630

Finishes *aluminum*

US Number	US28
BHMA	628

** Available with Antimicrobial Coating, use suffix AM*





8302 Pull plate

Available mounting – Standard, F, G, H-I-L, or J see pages B15 and B16
Pulls have new heavy duty 5/16-18" mounting.

8300 Plate	**8102 Pull**
3-1/2" x 15"	6" centers
4" x 16"	8" centers
6" x 16"	10" centers

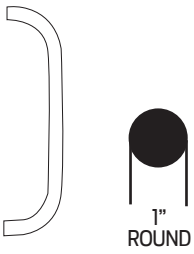
Finishes *brass*

US Number	US3	US4	US10	US10B	US26	US26D*
BHMA	605	606	612	613	625	626

Finishes *stainless steel*	
US Number	US32D*
BHMA	630

Finishes *aluminum*	
US Number	US28
BHMA	628

** Available with Antimicrobial Coating, use suffix AM*





8303 Pull plate

Available mounting – Standard, F, G, H-I-L, or J see pages B15 and B16
Pulls have new heavy duty 3/8-16" mounting.

8300 Plate	**8103 Pull**
3-1/2" x 15"	8" centers
4" x 16"	10" centers
6" x 16"	7" centers

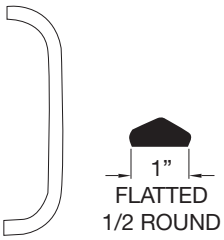
Finishes *brass*

US Number	US3	US4	US10	US10B	US26	US26D*
BHMA	605	606	612	613	625	626

Finishes *stainless steel*	
US Number	US32D*
BHMA	630

Finishes *aluminum*	
US Number	US28
BHMA	628

** Available with Antimicrobial Coating, use suffix AM*





8305 Pull plate

Available mounting – Standard or F see page B15
Pulls have 1/4 - 20" mounting

8300 Plate	**8105 Pull**
3-1/2" x 15"	6" centers
4" x 16"	8" centers
6" x 16"	10" centers

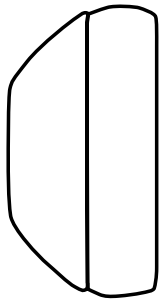
Finishes *brass*

US Number	US3	US4	US10	US10B	US26	US26D
BHMA	605	606	612	613	625	626

Finishes *stainless steel*	
US Number	US32D
BHMA	630

Finishes *aluminum*	
US Number	US28
BHMA	628

** Available with Antimicrobial Coating, use suffix AM*

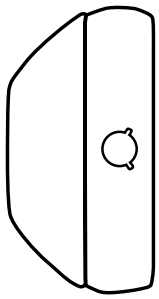


VR910-DT With black grip
VR914-DT Without black grip

- For use with Von Duprin 98/99 Series rim and vertical rod exit device
- Non-handed
- Thru-bolts direct to the exit device
- Pull operation only.

Width	Height	Thru-Bolt Pattern	Clearance Grip to Door	Projection
5-1/4"	11"	1-3/8" wide x 7" high	1-1/2"	1-7/8"

Finishes	
US Finish	US32D
BHMA	630

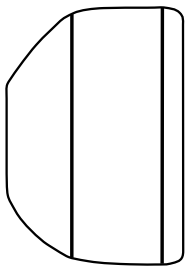


VR910-NL With black grip
VR914-NL Without black grip

- For use with Von Duprin 98/99 rim and vertical rod exit device
- Non-handed
- Thru-bolts direct to the exit device

Width	Height	Thru-Bolt Pattern	Clearance Grip to Door	Projection
5-1/4"	11"	1-3/8" wide x 7" high	1-1/2"	1-7/8"

Finishes	
US Finish	US32D
BHMA	630

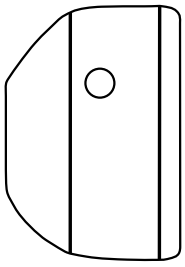


VR910M-DT With black grip
VR914M-DT Without black grip

- For use with Von Duprin 9875/9975 mortise lock exit device
- Non-handed
- Thru-bolts direct to the exit device

Width	Height	Thru-Bolt Pattern	Clearance Grip to Door	Projection
7-1/4"	11"	1-3/8" wide x 7" high	1-1/2"	1-7/8"

Finishes	
US Finish	US32D
BHMA	630



VR910M-NL RHR With black grip
VR910M-NL LHR With black grip
VR914M-NL RHR Without black grip
VR914M-NL LHR Without black grip

- For use with Von Duprin 9875/9975 Series mortise lock exit device
- Thru-bolts direct to the exit device
- Night latch operation (cylinder not furnished)

Width	Height	Thru-Bolt Pattern	Clearance Grip to Door	Projection
7-1/4"	11"	1-3/8" wide x 7" high	1-1/2"	1-7/8"

Finishes	
US Finish	US32D
BHMA	630



COR

Series Bar Coodinators

- The COR Series Coordinators are designed for use on pairs of doors when one door needs to close before the other.
- All COR units function easily. The active door lever, located nearest to the active stop, holds the active door open until the trigger mechanism is released by the closing of the inactive leaf.
- All COR units may not function correctly with swingclear hinges.
- All COR units are equipped with an adjustable override feature which allows the active door to close under extreme pressure.
- All COR units are compatible with Flush Bolts.
- The COR Series is available in five sizes for variable door opening widths.
- The COR Series does not cover the entire length of the stop, so a FL filler bar can be provided to maintain architecturally clean lines.
- COR Series Coordinator Channels and FL fillers are made of aluminum.
- Optional Filler Bars: FL20 - 20", FL32 - 32" and FL44 - 44", available to maintain clean line.
- Optional Mounting Brackets available: MB1, MB2, MB1F, MB2F, MB3F, MB1V, MB2V, and MB3V for other stop applied hardware.

Meets ANSI/BHMA A156.3, Type 21A.
UL Listed for installation on labeled frame.

For Openings Where Doors Are Same Size

Coordinator Number	Length of Channel	For Opening Widths	Common Applications
COR32	32"	34" - 52"	Pair of 2'0" Doors
COR42	42"	52" - 72"	Pair of 2'6" Doors
COR52	52"	62" - 92"	Pair of 3'0" Doors
COR60	60"	70" - 108"	Pair of 3'6" Doors
COR72	72"	84" - 132"	Pair of 4'0" Doors

For Openings Where Doors Are Unequal Size

The coordinator length should equal the active door width plus approximately 1/2 the inactive door width. The coordinator must be 6" longer than the active door width and shorter than the overall frame opening between stops.

Finishes

Ives Finish	US28	US26D	315AN
BHMA	628	713	711



FL

Series Filler Bars

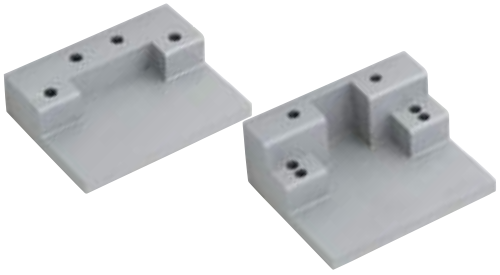
- The FL Filler Bars are available in three sizes for variable frame openings.
- FL Filler Bars are made of aluminum
- FL Filler Bars are field sized to frame opening.

Filler Bar Number	Length	Dimensions
FL20	20"	1-5/8" W x 5/8" D x 20" L
FL32	32"	1-5/8" W x 5/8" D x 32" L
FL44	44"	1-5/8" W x 5/8" D x 44" L

Finishes

Ives Finish	US28	US26D	315AN
BHMA	628	713	711

MB1and MB2



Mounting Brackets

- Allows stop mounted hardware to be properly installed without damaging the COR coordinator, such as a parallel arm closer or a non-fire-rated surface vertical rod strike.
- Stop mounted hardware will need to be lowered to compensate for the height of the coordinator and mounting bracket.
- MB mounting brackets are made of aluminum

Product	Jamb Depth	Stop Width	Dimensions
MB1	4-3/4" Min.	Over 2-1/2"	4" W x 3" D x 15/16" T
MB2	4-3/4" Min.	Up to 2-1/2"	4" W x 3-1/4" D x 1-5/8" T

Finishes

Ives Finish	USP	SP28	SPBLK
BHMA	600	689	622

MB1F, MB2F and MB3F
MB1V, MB2V and MB3V



MB1V



MB2V



MB3V

Fire Rated Mounting Brackets

- Allows for fire-rated stop mounted hardware to be properly installed without damaging the COR Coordinators, such as fire-rated surface vertical rod exit device strikes.
- Latch will need to be lowered to compensate for the height of the coordinator and mounting bracket.
- MB-V are designed for Von Duprin 8827-F soffit latch.
- Mounting brackets are made of steel.

Product	Jamb Depth	Stop Width	Dimensions
MB1F	5"	1-1/2" - 2-1/4"	4" W x 3" D x 1-5/8" T
MB1V	5"	1-1/2" - 2-1/4"	4" W x 3" D x 1-5/8" T
MB2F	5-7/8"	2-3/8" - 3-1/4"	4"W x 4" D x 1-5/8"T
MB2V	5-7/8"	2-3/8" - 3-1/4"	4"W x 4" D x 1-5/8"T
MB3F	6-7/8"	Over 3-3/8"	4"W x 3-1/2" D x 1"T
MB3V	6-7/8"	Over 3-3/8"	4"W x 3-1/2" D x 1"T

Finishes

Ives Finish	USP	SP28	SPBLK
BHMA	600	689	622

COR7G and COR9G

Gravity Coordinators



Meets ANSI/BHMA A156.3, Type 21.
UL Listed for Fire Doors.

- When active door is open, coordinator prevents active door from closing until inactive door bypasses. Closing of inactive door causes strike plate on top of door to contact cam and lift arm, allowing active door to close. As inactive door continues closing, roller rides over strike plate on to door bracket, holding arm above active door.
- Non-handed.
- Gravity action arm and door bracket are adjustable on the job for ease of installation. Rubber roller provides quiet and efficient operation, and helps protect the astragal and doors from damage.
- Nylon roller on short arm glides smoothly over door bracket and strike, ensuring silent operation.
- Made of forged brass.
- COR7G for use on pairs of doors with astragal on active door up to 4' or with astragal on inactive door up to 3'4" or with astragal on both doors up to 2'10"
- COR9G for use on pairs of doors with astragal on active over 4' or with astragal on inactive door over 3'4" or with astragal on both doors over 2'10"

Product	Projection
CORG7G	7"
CORG9G	9"

Finishes

Ives Finish	US3	US4	US10	US10B	US26	US26D
BHMA	605	606	612	613	625	626

CB1 Carry Bar



Meets ANSI/BHMA A156.3, Type 21.

- Used when it is possible for the inactive door to be opened before the active door.
- Prevents damage to the doors and other hardware.
- Nylon roller insures quiet and efficient operation.
- Non-handed.
- All-steel construction.
- Standard sex bolts for mounting.

Finishes

Ives Finish	US3	US4	US10	US10B	US26	US26D	SPBLK	USP
BHMA	605	606	612	613	625	626	622	600

How to Order COR and Accessories

COR 52 US28 FL20 D 36"

COR Size:
32, 42, 52, 60, 72

Finishes:
US28, US26D, 315AN

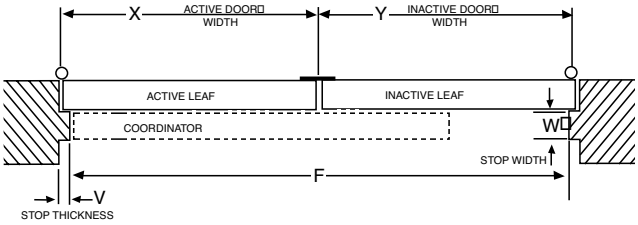
Filler Bar (if desired):
FL20, FL32, FL44

Vertical Rod Exit Device Cutout Type (if applicable):
A, B, C, D, E, F, G
If other Vertical Rod Exit Device not listed on chart, from page C16, include information as shown on page C16.

Active Door Size – Required for ALL Vertical Rod Exit Device Applications

To determine the size COR you need:

1. Start with the active door width (X).
2. Next consider the overall frame opening between stops (F).
3. Preferably, the coordinator would equal the active door width (X) + approximately 1/2 inactive door width (Y). The coordinator must be 6" longer than the active door width (X) and less than the overall frame opening between stop (F).



Examples:

- Pair of 30" Doors, 5/8" Stops
  Active Door Size, X = 30"
  Overall Frame Opening between Stops, F = 58-3/4"
  Recommended Coordinator: COR42

- Pair of 36" Doors, 5/8" Stops
  Active Door Size, X = 36"
  Overall Frame Opening between Stops, F = 70-3/4"
  Recommended Coordinator: COR52

- 36" Active Door, 18" Inactive door, 5/8" Stops
  Active Door Size, X = 36"
  Overall Frame Opening between Stops, F = 52-3/4"
  Recommended Coordinator: COR42

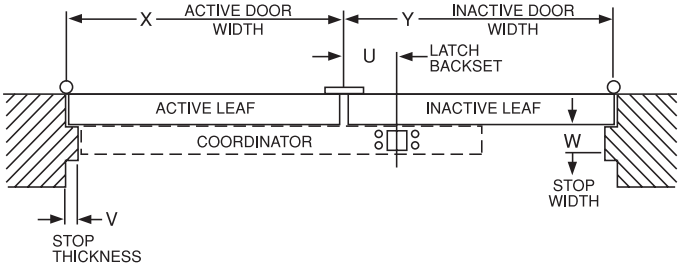
- 48" Active Door, 24" Inactive Door, 5/8" Stops
  Active Door Size, X = 48"
  Overall Frame Opening between Stops, F = 94-3/4"
  Recommended Coordinator: COR60

Special Factory Preparation for Use with Vertical Rod Exit Devices

Coordinators may need to be prepared at the factory for use with some surface or concealed vertical rod exit devices. (See Chart below)

If the exit device is not listed the following information is needed.

1. Exit Device Manufacturer and Model No.
2. Active Door Size, "X"
3. Inactive Door Size, "Y"
4. Exit Device Backset, "U"
5. Stop Width, "W"
6. Stop Thickness if other than 5/8", "V"



Exit Device Manufacturer	Exit Device Number	Device Backset	Maximum Active Door	Coordinator Size Needed	Coordinator Cutout Type	Mounting Bracket Needed
Von Duprin	5547-F	2-3/8"	33" 43" 51" 63"	42" 52" 60" 72"	Type A	None
Von Duprin	8827-F	2-3/4"	33" 43" 51" 63"	42" 52" 60" 72"	Type B	MB1V, MB2V or MB3V *see page C3*
Von Duprin	8847-F	2-3/8"	33" 43" 51" 63"	42" 52" 60" 72"	Type C	None
Von Duprin	33/3547 33/3547-F 98/9947 98/9947-F	2-3/4"	33" 43" 51" 64"	42" 52" 60" 72"	Type D	None
Von Duprin	33/3548 33/3548-F 98/9948 98/9948-F	2-3/4"	33" 43" 51" 64"	42" 52" 60" 72"	Type D	None
Von Duprin	33/3547WDC 33/3547WDC-F 98/9947WDC 98/9947WDC-F	1-5/16"	34" 44" 52" 65"	42" 52" 60" 72"	Type E	None
Falcon	17-C F-17-C 18-C F-18-C XX-C F-XX-C 24-C F-24-C 25-C F-25-C	2-3/4"	33" 43" 51" 63"	42" 52" 60" 72"	Type F	None
Falcon	17-C-WDC F-17-C-WDC 18-C-WDC F-18-C-WDC XX-C-WDC F-XX-C-WDC 24-C-WDC F-24-C-WDC 25-C-WDC F-25-C-WDC	2-13/16"	33" 43" 51" 63"	42" 52" 60" 72"	Type G	None

LCN®

Surface mounted closer

4010 Series



Overview

The 4010 is LCN's best performing heavy duty closer designed specifically for institutional and other rugged high traffic applications.

Cylinder

4011(6)-3071
Cast iron cylinder assembly

Handing
Handed

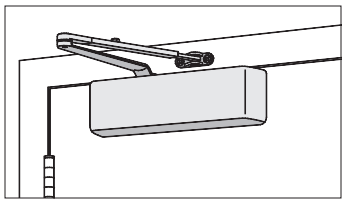
Sizing
Adjustable 1-5 or sized 6

- 4011 (adjustable from size 1 to 5)
- 4016 (Size 6, DEL not available)

Available cylinder options

DEL	Delayed action cylinder

Mounting



Hinge (pull side)

ALLEGION™

Finishes

Powder coat finishes

689
Aluminum

690
Statuary Bronze

691
Light Bronze

693
Black

695
Dark Bronze

696
Brass

150+ additional custom colors available using the RAL numbering system

Metal plated finishes

632
Bright Brass

633
Satin Brass

639
Satin Bronze

616
Satin Bronze, Blackened

646
Satin Nickel

651
Bright Chrome

652
Satin Chrome

Available finish options

MTLPC	Brite metallic: Custom powder coat finish, which resembles that of 651 or 652 plated finish.
SRI	For installations where a higher level of protection against weather conditions, or the effects of a potentially corrosive atmosphere is required, LCN offers a special rust inhibiting (SRI) process. Ferrous metal components receive an SRI pretreatment and a standard powder coat finish of your choice, or a custom powder coat finish for a nominal additional cost. Closers treated with the SRI process exceed the 100 hour protection level available with standard LCN powder coated finishes.

Covers

Standard cover



4010-72
Plastic cover
- Non-handed

Optional cover



4010-72MC
Metal cover
- Handed
- Required for plated finishes and custom powder coat finishes
- Optional

Arms



4010-3077
Regular arm
- Non-handed



4010-3049
Hold-open arm
- Handed
- Provides hold-open function, adjustable at elbow
- Optional



4010-3049FL
Fusible link arm
- Handed
- Releases hold-open function when exposed to temperatures above 165º F. 1/8″ (3 mm) maximum reveal
- Optional
- NOTE: Check local codes before specifying FL arms. NOT A life safety product!

Installation accessories



4010-18
Plate
- Required where top rail is less than 3 3/4" (95 mm)
- Requires minimum 2" (51 mm) top rail

Fasteners

Self-reaming and tapping screws included standard

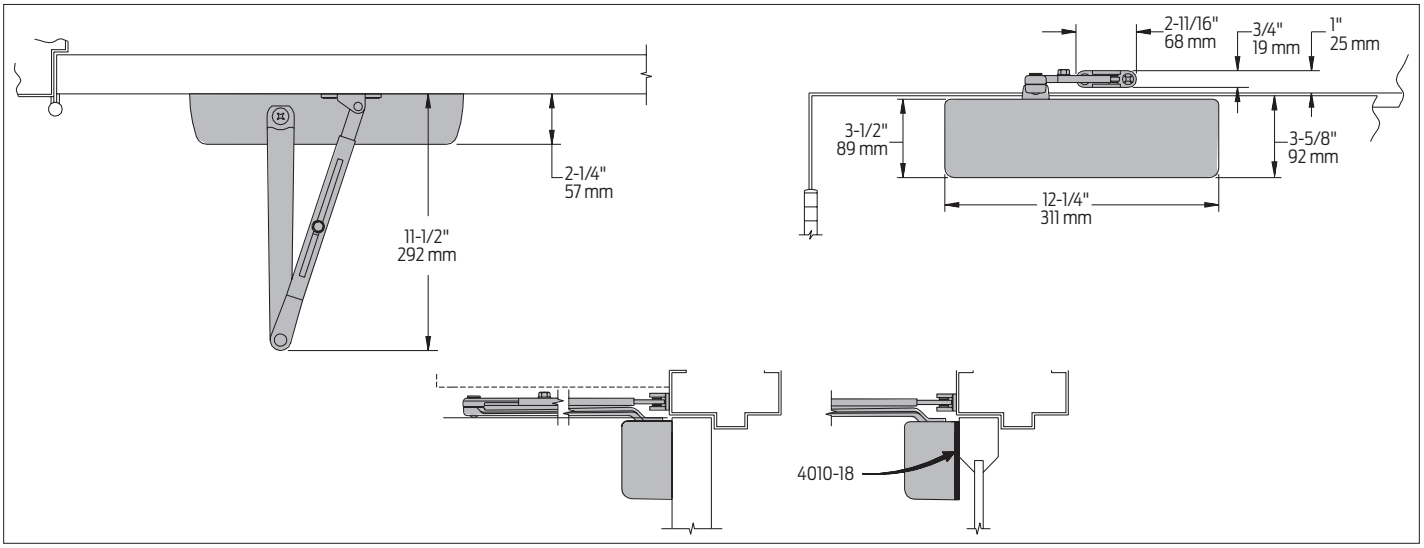
Fastener pack options

TBSRT	TB[1] with self-reaming and tapping screws
WMS	Wood and machine screw
TBWMS	TB[1], wood and machine screw
TORX	TORX machine screw
TBTRX	TB[1] and TORX machine screw

1 Specify door thickness if other than 1 3/4"

Dimensions and mounting

Hinge (pull) side mounting



Specifications

Accessibility	Available with less than 5.0 lbs. opening force on 36" door
Certifications/ approvals	▪ Grade 1 - ANSI A156.4 ▪ UL 10C ▪ Meets BAA - Buy American Act
Degree of operation	Hinge (pull) side Max opening: 140° Hold open: 140°
Environmental conditions	▪ Approved for interior use ▪ Approved for exterior use (SRI coated only) ▪ LCN's standard all weather fluid performs to temperature ranges from 120°F (49°C) to -30°F (-35°C) ▪ LCN's powder coat finish surpasses 100 hours of salt spray which is over four times the ANSI standard for corrosion resistance.
Warranty	30 years
Standard features	▪ Cast iron body ▪ Full complement bearing ▪ 1 1/2" diameter piston ▪ 11/16" diameter double heat treated pinion journal

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ALLEGION™

LCN®

Surface mounted closer

4110 Series



Overview

The 4110 is LCN's best performing heavy duty closer with an adjustable spring and possible hold-open point beyond 140 degrees, meeting ADA requirements. Backed by a 30 year warranty, the cast iron body and all weather fluid offer versatility in high traffic applications.

Cylinder

4111(6)-3071
Cast iron cylinder assembly

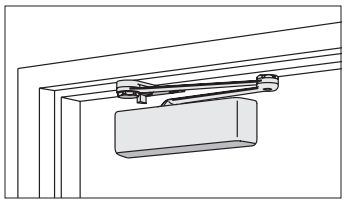
Handing
Handed

Sizing
Adjustable spring size 1-5, or sized 6
Includes patented Green Dial
- 4111 (adjustable from size 1 to 5)
- 4116 (Size 6; DEL, SHCUSH or HCUSH arm not available)

Available cylinder options

DEL	Delayed action cylinder
AVB	Advanced variable backcheck

Mounting



Parallel arm (push side)

ALLEGION™

Finishes

Powder coat finishes

689
Aluminum

690
Statuary Bronze

691
Light Bronze

693
Black

695
Dark Bronze

696
Brass

150+ additional custom colors available using the RAL numbering system

Metal plated finishes

632
Bright Brass

633
Satin Brass

639
Satin Bronze

616
Satin Bronze, Blackened

646
Satin Nickel

651
Bright Chrome

652
Satin Chrome

Available finish options

MTLPC	Brite metallic: Custom powder coat finish, which resembles that of 651 or 652 plated finish.
SRI	For installations where a higher level of protection against weather conditions, or the effects of a potentially corrosive atmosphere is required, LCN offers a special rust inhibiting (SRI) process. Ferrous metal components receive an SRI pretreatment and a standard powder coat finish of your choice, or a custom powder coat finish for a nominal additional cost. Closers treated with the SRI process exceed the 100 hour protection level available with standard LCN powder coated finishes.

Covers

Standard cover



4110-72
Plastic cover
- Non-handed
- Standard

Optional cover



4110-72MC
Metal cover
- Handed
- Required for plated finishes and custom powder coat finishes
- Optional

Arms



4110-3049EDA
Hold-open arm
- Handed
- Optional
- Provides hold-open function, adjustable at shoe



4110-3049FL
Fusible link arm
- Handed
- Releases hold-open function adjustable at shoe when exposed to temperatures above 165º F
- Optional
- NOTE: Check local codes before specifying FL arms. NOT A life safety product!



4110-3077CNS
Cush-N-Stop arm
- Non-handed
- Features solid forged steel main arm and forearm with built-in stop in soffit shoe



4110-3077EDA
Extra duty arm
- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations



4110-3077EDA/ 62G
Extra duty arm
- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- Optional 4110-62G thick hub shoe for blade stop clearance



4110-3049CNS
HCUSH arm
- Non-handed
- Provides hold-open function with templated stop/ hold-open points.
- Handle controls hold-open function



4110-3077SCNS
Spring CUSH arm
- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Optional



4110-3049SCNS
Spring HCUSH arm
- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Handle controls hold-open function
- Optional

Installation accessories



4110-18
Plate
- Required for push side mount where top rail is less than 5 1/8″ (130 mm), measured from the stop
- Requires minimum 2″ (51 mm) minimum top rail



4110-30
CUSH shoe support
- Provides anchorage for fifth screw used with CUSH arm, where reveal is less than 3 1/16″ (78 mm)



4110-61
Blade stop spacer
- Lowers parallel arm shoe to clear 1/2″ (13 mm) blade stop



4110-419
PA flush panel adapter
- Provides horizontal mounting surface for CUSH shoe on single rabetted or flush frame

Fasteners

Self-reaming and tapping screws included standard

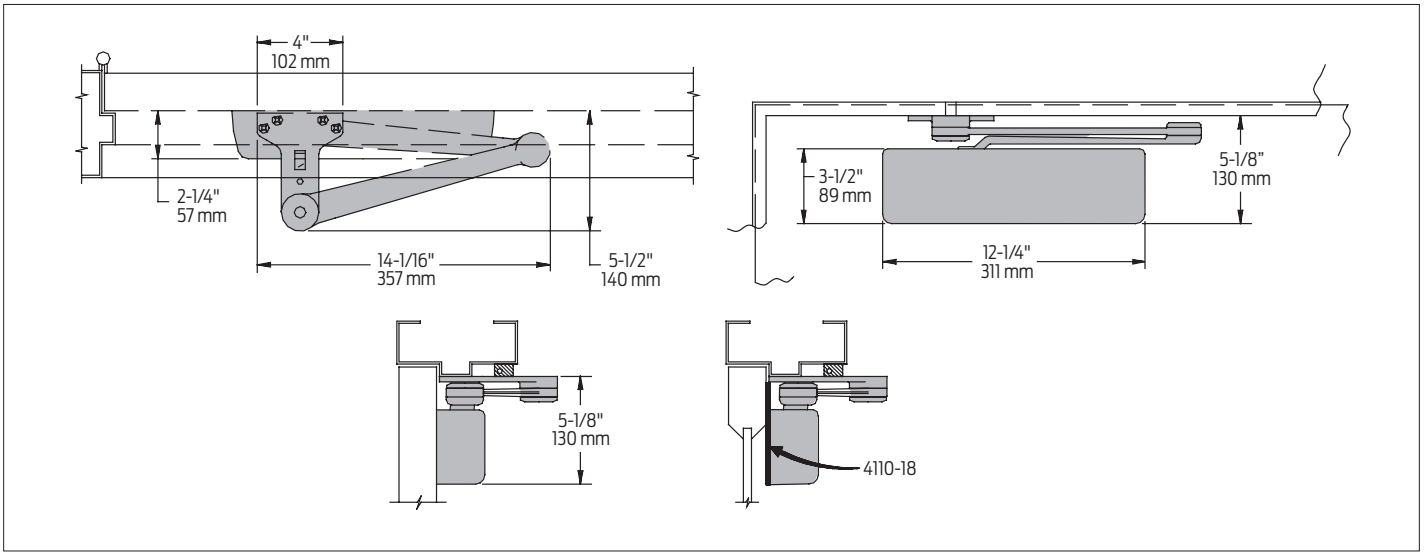
Fastener pack options

TBSRT	TB[1] with self-reaming and tapping screws
WMS	Wood and machine screw
TBWMS	TB[1], wood and machine screw
TORX	TORX machine screw
TBTRX	TB[1] and TORX machine screw

1 Specify door thickness if other than 1 3/4"

Dimensions and mounting

Parallel arm (push side) mounting



Specifications

Accessibility	Available with less than 5.0 lbs. opening force on 36" door
Certifications/ approvals	▪ Grade 1 - ANSI A156.4 ▪ UL 10C ▪ Meets BAA - Buy American Act
Degree of operation	EDA Max opening: 180° Hold open: 180° Cush Max opening: 110° Hold open: 110°
Environmental conditions	▪ Approved for interior use ▪ Approved for exterior use (SRI coated only) ▪ LCN's standard all weather fluid performs to temperature ranges from 120°F (49°C) to -30°F (-35°C) ▪ LCN's powder coat finish surpasses 100 hours of salt spray which is over four times the ANSI standard for corrosion resistance.
Warranty	30 years
Standard features	▪ Cast iron body ▪ Full complement bearing ▪ 1 1/2" diameter piston ▪ 11/16" diameter double heat treated pinion journal

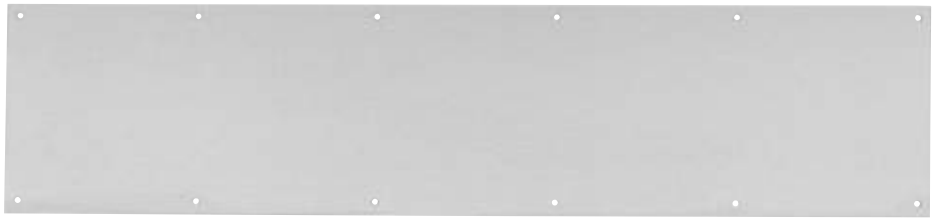
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ALLEGION™

8400 Series Protection Plates

- Door protection plates are available in .050" thick brass, stainless steel or aluminum; and 1/8" thick high impact polyethylene in clear or black.
- Bevel edge options; specify B4E for all four edges.
- Mounting screw pack furnished standard, 16 screws per pack. Optional screw packs are available for TEK or TORK screw heads. Refer to the following chart for ordering.
- Specify NMH for no mounting holes. (Not available on 8402)
- Specify NMH-A for no mounting holes with adhesive. (Not available on 8402)
- Specify CS for counter sunk mounting holes.
- Specify ERS prepped with extra row of screws.

Kickplate Gasket Tape Tape is recommended when using a brass plate on a metal door to reduce tarnishing from electrolytic oxidation. One tape pack will cover an the perimeters of a 8" x 34" kickplate. Order 8401 Gasket Tape.



8400 Protection Plate
8402 (UL)* Protection Plate

**UL mark appears in upper right corner. Factory supplied screws must be used.*

Number of screw packs required by plate size (specify TEK Screws or TORK screws).

	22"-25"	26"-33"	34"-41"	42"-48"
4"-8"	1	1	1	1
9"-16"	1	1	1	1
17"-24"	1	1	1	2
25"-32"	1	1	2	2
33"-40"	1	2	2	2
41"-48"	2	2	2	2

Finishes *brass 24" x 48" max. size*

US Number	US3	US4	US10	US10B	US15	US26	US26D
BHMA	605	606	612	613	619	625	626

Finishes *stainless steel*

US Number	US32	US32D
BHMA	629	630

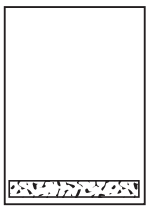
Finishes *aluminum*

US Number	US28
BHMA	628

Finishes *plastic*

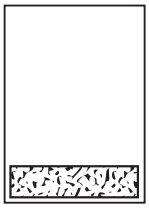
Clear and Black

Residential Grade Kickplates available Carded only, finishes PA28, PA3, PA619, PA716, B3, B505, B619, B716



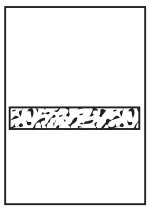
Mop Plates

- Protect the bottom of the pull side of door subject to cleaning and mopping procedures.
- Size Ranges:4" to 6" high, 22" to 48" wide



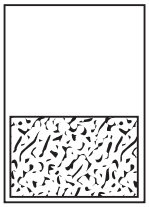
Kick Plates

- Protect the bottom of the push side of doors subject to scuffing from foot traffic.
- Recommended for all doors subject to normal use (especially doors using a closer).
- Size Ranges: 8" to 24" high, 22" to 48" wide



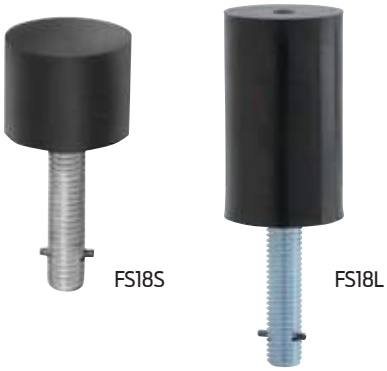
Stretcher Plates

- Protect doors at specific areas where consistent contact is made by stretchers, service carts or other equipment.
- Usually applied to push side of doors.
- Specify "B4E" Option for beveled edges.
- Size Ranges: 6" to 8" high, 22" to 48" wide



Armor Plates

- Protect lower half of doors from abuse by hard carts, trucks and rough usage.
- Usually applied to push side of single doors and both sides of double acting doors.
- Size Ranges: 26" to 48" high, 22" to 48" wide



FS18S
FS18L Floor Stops

- Security Door Stops designed for use in high vandalism areas.
- Molded from black flame resistant, resilient material around a heavy-duty stud.
- Once grouted in concrete, leaves no exposed fasteners to be tampered with or removed.
- Ideal for jail or security cell areas where floor mounted stops are required.
- FS18L also ideal for concrete wall applications.

Dimensions

FS18S Height: 1-1/2”
FS18S Diameter: 2”
FS18S Stud Length: 2-1/2”

FS18L Height: 3-1/2”
FS18L Diameter: 2”
FS18L Stud Length: 2-1/2”



FS434 Floor Stop

- Burnished wrought steel.
- For undercut doors up to 1-1/2”.
- Packed with screws and plastic anchors.
- Replaceable soft, resilient gray rubber.

Dimensions

Overall Height: 2-5/8”
Base Size: 1-1/2” W x 2-3/4” L

Finishes

Ives Number	USC
BHMA	604



430 Floor Door Stop

- Burnished wrought steel.
- For undercut doors up to 1-1/2”.
- Packed with screws and plastic anchors.
- Replaceable soft, resilient gray rubber.

Dimensions

Overall Height: 1-5/16”
Base Diameter: 1-1/4”

Finishes *brass*

Ives Number	B3	B4	B5	B10B	B15	B26	B26D
BHMA	605	606	609	613	619	625	626

Finishes *aluminum*

Ives Number	A3*	A5	A14	A92
BHMA	666		669	673

** only available in Slim-Pak of 25*



WS406CVX & WS407CVX
Meets ANSI/BHMA 156.16 L22201 for brass, and L52101 for stainless steel.

WS406CCV & WS407CCV
Meets ANSI/BHMA 156.16 L22251 for brass and and L52251 for stainless steel.

WS406CVX Wall Bumpers
WS406CCV
WS407CVX
WS407CCV

- Constructed in sturdy yet economical wrought base of brass or stainless steel construction.
- Feature concealed tamper-proof mounting.
- Shipped factory preassembled backplate to reduce installation cost.
- Easy installation by inserting screwdriver through small hole in rubber.

WS406CVX (406) – convex rubber bumper, packed with wood screw and plastic anchor.
WS406CCV (406-1/2) – concave rubber bumper, which avoids damage to locks with projecting buttons, packed with wood screw and plastic anchor.
WS407CVX (407) – convex rubber bumper packed with screw and drywall anchor.
WS407CCV (407-1/2) – concave rubber bumper which avoids damage to locks with projecting buttons and is packed with screw and drywall anchor.

Dimensions

Base Diameter: 2-1/2"
Base Thickness: 3/8"
Overall Projection: 1"

Finishes *brass*

Ives Number	US3	US4	US5*	US10	US10B	US15	US15A**	US26	US26D	B716**
BHMA	605	606	609*	612	613	619	620	625	626	

Finishes *stainless steel*

Ives Number	US32D
BHMA	630

** only available on WS407CVX Slim-Pak of 15*

*** available on WS407CCV or WS407CVX Slim-Pak of 15*



FS436
Meets ANSI/BHMA 156.16, L12141 for brass or bronze and L32141 for aluminum.



FS438
Meets ANSI/BHMA 156.16, L12141 for brass or bronze and L32141 for aluminum.

FS436 Dome Stop
FS438 Dome Stop

- FS436 for doors without threshold.
- FS438 for doors with threshold or undercut doors.
- Heavy-Duty Cast Dome Stops constructed of brass, bronze or aluminum.
- Packed with wood screw and plastic anchor.

Replaceable gray, non-marring rubber bumper.

Dimensions

FS436
Overall Height: 1"
Base Height: 3/16"
Base Diameter: 1-3/4" x 2" Oval

FS438
Overall Height: 1-3/8"
Base Height: 9/16"
Base Diameter: 1-3/4" x 2" Oval

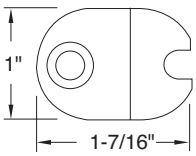
Finishes *brass*

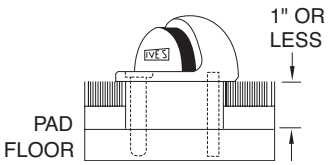
Ives Number	US3	US4	US5	US10	US10B	US15	US26	US26D	B716
BHMA	605	606	609	612	613	619	625	626	

Finishes *aluminum*

Ives Number	US28
BHMA	628







R435 Riser for FS436 Dome Stop
R437 Riser for FS438 Dome Stop

- Extruded aluminum, mill finish.
- R435 for conversion of FS436 Dome Stop to carpet installation.
- R437 For conversion of FS438 Dome Stop to carpet installation.
- Packed with wood screws, lead shield and stud.
  Specify Tampin (TPN) if required.

Dimensions

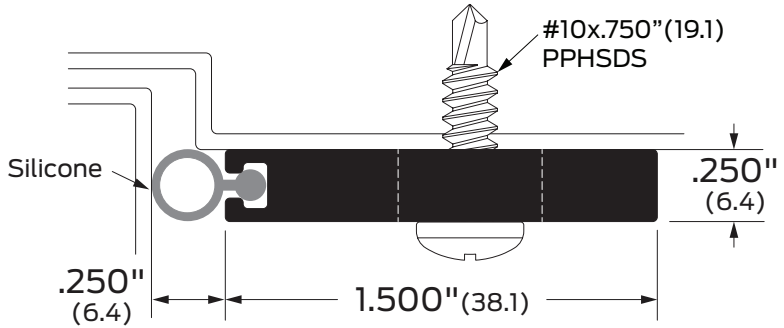
Available in 1/4", 3/8", 1/2", 5/8", 3/4" and 1" height.

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Part No:	Part description:
429	Head & jamb gasketing

Notes:	Provided by:	
Customer name:	Job no:	Date:

Image may not be shown to scale



Notes:
Gasketing protection for closer bracket or door coordinator.

Certifications:

- Fire rated-UL10c
- Smoke and draft control

ANSI/BHMA:

429AA, 429BK, 429D, 429G R3E164

BHMA CERTIFIED

Finishes:

AA	Aluminum clear anodized
BK	Aluminum black anodized
D	Aluminum dark bronze anodized
G	Aluminum gold anodized

Options:

S	Order as a set
SEC	Security screws

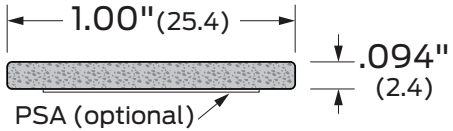
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Part No:	Part description:
8780N	Self-adhesive weatherstripping

Notes:	Provided by:	
Customer name:	Job no:	Date:

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Notes:
Mullion seal

Certifications:
- Fire rated-UL10c
- Smoke and draft control

ANSI/BHMA:
8780N R0C155

BHMA CERTIFIED

Finishes:
BK Black

Options:
PSA Pressure-sensitive adhesive
ZAG Ligature resistant gasketing

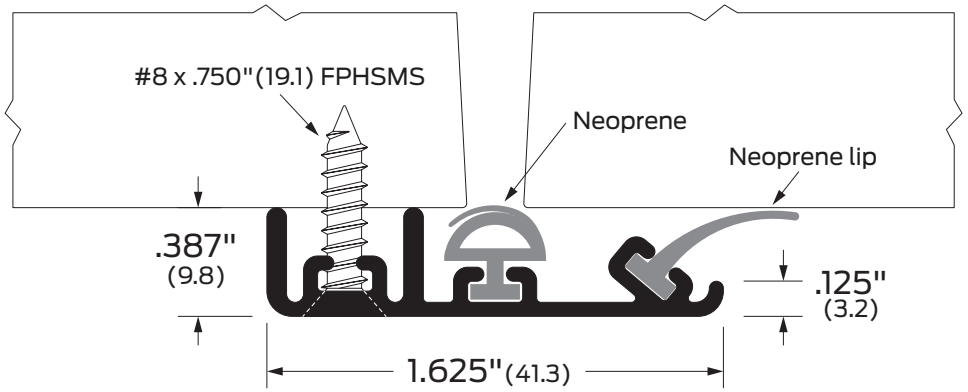
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Part No:	Part description:
383	Meeting stile

Notes:	Provided by:	
Customer name:	Job no:	Date:

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Notes:
90 minute max fire rating

Certifications:

- Fire rated-UL10c
- Sound

ANSI/BHMA:

383AA, 383BK, 383D, 383G R3B634

BHMA CERTIFIED

Finishes:

AA	Aluminum clear anodized
BK	Aluminum black anodized
D	Aluminum dark bronze anodized
G	Aluminum gold anodized

Options:

SEC	Security screws

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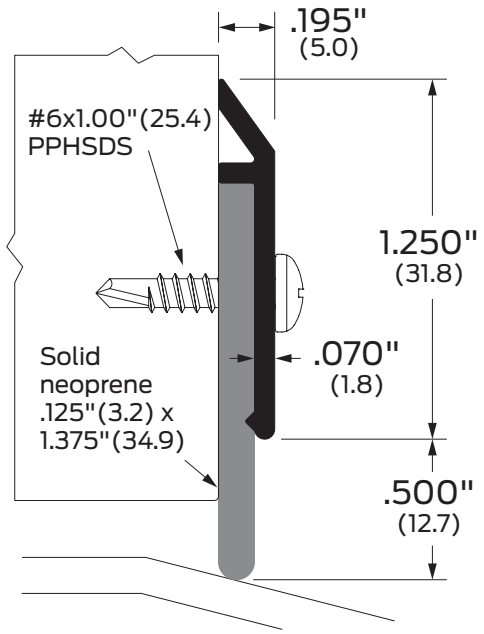
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Part No:	Part description:
39	Door sweep

Notes:	Provided by:	
Customer name:	**Job no:**	**Date:**

Image may not be shown to scale



Certifications:

Fire rated-UL10c

ANSI/BHMA:

39A, 39BK, 39D, 39G R3B434

BHMA CERTIFIED

Finishes:

A	Aluminum mill finish
BK	Aluminum black anodized
D	Aluminum dark bronze anodized
G	Aluminum gold anodized

Options:

S	Order as a set
SEC	Security screws

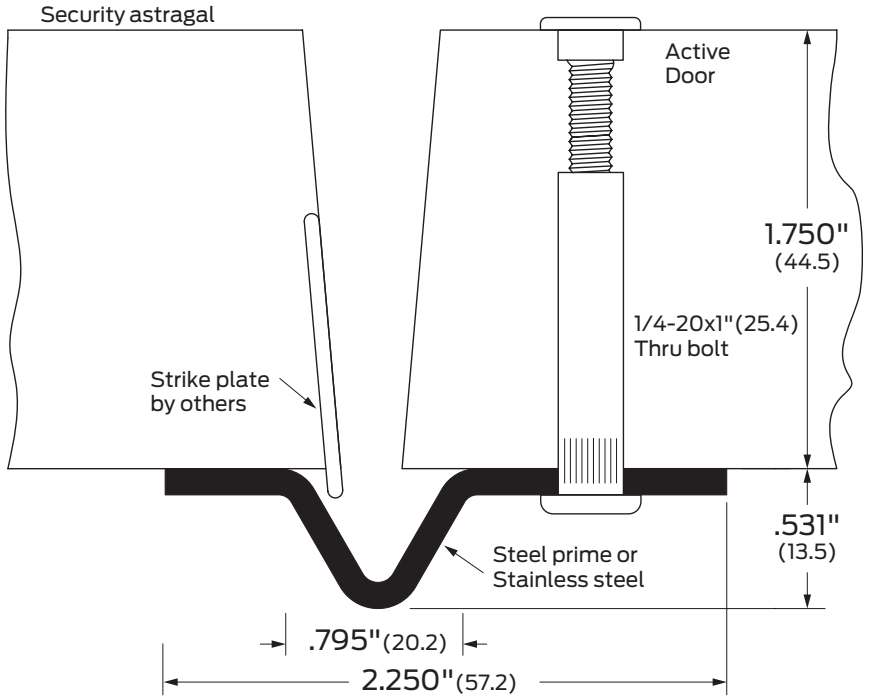
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Part No:	Part description:
43	Meeting stile

Notes:	Provided by:	
Customer name:	Job no:	Date:

Image may not be shown to scale



Certifications:

Fire rated-UL10c

Finishes:

SP Steel primed
STST Stainless steel

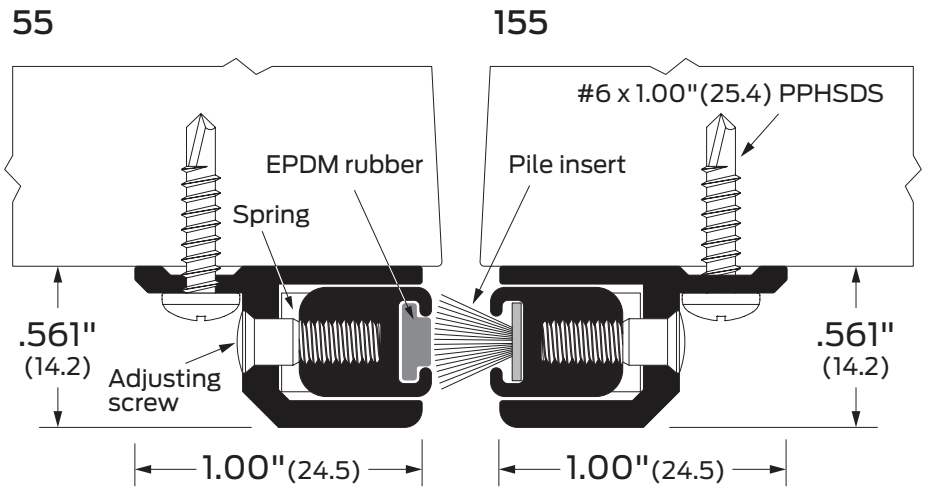
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Part No:	Part description:
55/155	Meeting stile

Notes:	Provided by:	
Customer name:	Job no:	Date:

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Notes:
Fire-rated as a set--both components required. Order components separately.

Certifications:

Fire rated-UL10c

ANSI/BHMA:

55AA/155AA, 55BK/155BK, 55D/155D, 55G/155G

R3F836

BHMA CERTIFIED

Finishes:

AA	Aluminum clear anodized
BK	Aluminum black anodized
D	Aluminum dark bronze anodized
G	Aluminum gold anodized

Options:

SEC	Security screws

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Part No:	Part description:
547	Saddle threshold

Notes:

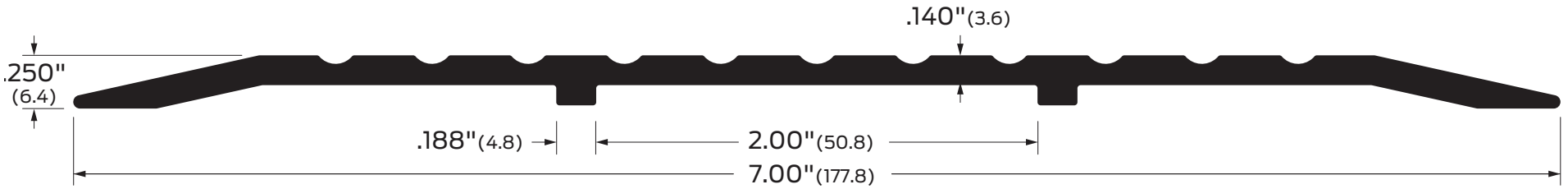
Provided by:

Customer name:

Job no:

Date:

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Notes:
Supplied without mounting holes.

Certifications:

- Fire rated-UL10c
- ADA Accessible

ANSI/BHMA:

547A, 547BK, 547D, 547G	J32100, J32130
547A-E, 547BK-E, 547D-E, 547G-E	J32200, J32230

BHMA CERTIFIED

Finishes:

A	Aluminum mill finish
BK	Aluminum black anodized
D	Aluminum dark bronze anodized
G	Aluminum gold anodized

Options:

E	Epoxy abrasive tread
EL	Photoluminescent and abrasive epoxy tread
V3	Full body strength fill
EV3	Epoxy and full body strength fill
ELV3	Photoluminescent and abrasive epoxy tread, full body strength fill

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SECTION 088000
GLASS AND GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Windows.

2. Doors.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 and the most recent addition of the California Building Code by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: As indicated on Structural Drawings.

2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.

3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.4 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.

C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Preconstruction adhesion and compatibility test report.

1.5 QUALITY ASSURANCE

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual".

2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use".

B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

1.6 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified and as indicated in manufacturer's published test data.

2.2 GLASS PRODUCTS

A. Tempered Glass.

B. Insulating Glass: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AFG Industries, Inc.; Krystal Klear.
b. Guardian Industries Corp.; Ultrawhite.
c. Pilkington North America; Optiwhite.
d. PPG Industries, Inc.; Starphire.

C. Laminated Safety Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.

3. Interlayer Color: Clear unless otherwise indicated.

2.3 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.

2. EPDM complying with ASTM C 864.

3. Silicone complying with ASTM C 1115.

4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

2.4 GLAZING SEALANTS

A. General:

1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.

4. Colors of Exposed Glazing Sealants: As indicated by manufacturer's designations.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

C. Glazing Sealants for Fire-Rated Glazing Products: 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.

2.5 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.

2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.

2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.7 GLASS TYPES

A. Vision Glass Components:

1. Clear (interior Glazing):

a. Strength: Tempered.

b. Thickness: ¼-inch thick, unless otherwise indicated.

c. Locations: Provide at single glazed interior openings and as scheduled.

1) Provide at interior vision glass locations, and as scheduled.

d. Performance Values:

1) Visible Light Transmittance: 88 percent.

2) Shading Coefficient: 0.94

3) Winter U-Value: 1.09.

B. Coated Solar Control Types

1. Low-E2 (Exterior Glazing):

a. Type: PPG Solarban 60 (3). Provide insulated glass in accordance with dual-glazed assembly type specified above with low emissivity (low-E2) pyrolytic coating conforming to ASTM C 1376, tempered or heat strengthened where required by code. Locate coating on surface designated by number in parenthesis starting form exterior surface.

b. Thickness: ¼-inch thickness, or as required by code.

c. Locations: Provide at exterior vision glass locations, and as scheduled.

d. Performance Values:

1) Visible Light Transmittance: 52 percent.

2) Shading Coefficient: 0.35.

3) Winter U-Value: 0.29.

C. Special Purpose Types

1. Laminated:

a. Type: Tinted laminated glass with two plies of fully tempered float glass.

b. Thickness of Each Glass Ply: 1/4”

c. Interlayer Thickness: 1/4"

d. Provide safety glazing labeling.

e. Locations: Provide at all exterior glazing.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. 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 buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION

SECTION 092900
GYPSUM BOARD

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 this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Interior gypsum board.

2. Tile backing panels.

B. Related Sections include the following:

1. Division 6 Section "Rough Carpentry" for wood framing and furring that supports gypsum board.

2. Division 9 painting Sections for primers applied to gypsum board surfaces.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.4 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

a. Each level of gypsum board finish indicated for use in exposed locations.

b. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.

3. Simulate finished lighting conditions for review of mockups.

4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

A. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of percent by weight.

B. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum Co.

b. National Gypsum Company.

c. USG Corporation.

B. Type X:

1. Thickness: 5/8", or as indicated.

2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

C. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.

1. Thickness: 1/2 inch (12.7 mm).

2. Long Edges: Tapered.

D. Abuse-Resistant Type: Manufactured to produce greater resistance to surface indentation, through-penetration (impact resistance), and abrasion than standard, regular-type and Type X gypsum board.

1. Core: 5/8 inch (15.9 mm), Type X, USG VHI Abuse-Resistant or approved equal.

2. Long Edges: Tapered.

E. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.

1. Core: as indicated (15.9 mm), Type X.

2. Long Edges: Tapered.

2.3 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

2. Products: Subject to compliance with requirements, provide one of the following:

   a. Custom Building Products; Wonderboard.

   b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.

   c. USG Corporation; DUROCK Cement Board.

3. Thickness: 1/2 inch (12.7 mm).

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:

   a. Cornerbead.

   b. Bullnose bead.

   c. LC-Bead: J-shaped; exposed long flange receives joint compound.

   d. L-Bead: L-shaped; exposed long flange receives joint compound.

   e. U-Bead: J-shaped; exposed short flange does not receive joint compound.

   f. Expansion (control) joint.

   g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Fry Reglet Corp.

   b. Approved equal.

3. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.

4. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.

2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.

4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.

5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 1002 for fastening panels to wood members.

2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

2. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.

E. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants."

1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. Thermal Insulation: As specified in Division 7 Section "Building Insulation."

G. Vapor Retarder: As specified in Division 7 Section "Building Insulation."

2.7 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Polystyrene Aggregate Ceiling Finish: Water-based, job-mixed, polystyrene aggregate finish with flame-spread and smoke-developed indexes of not more than 25 when tested according to ASTM E 84.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

2. Products: Subject to compliance with requirements, provide one of the following:

a. G-P Gypsum; Georgia-Pacific Regency Ceiling Textures/Polystyrene.

b. National Gypsum Company; Perfect Spray.

c. USG Corporation; SHEETROCK Ceiling Spray Texture, QT.

3. Texture: Fine.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.

2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: As indicated on Drawings and Where required for fire-resistance-rated assemblies.

2. Flexible Type: Apply in double layer at curved assemblies.

3. Ceiling Type: Ceiling surfaces.

4. Abuse-Resistant Type: As indicated on Drawings.
5. Moisture and mold resistant type: as indicated on drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.

2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

E. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- (300-mm-) long straight sections at ends of curves and tangent to them.

2. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c.

3.4 APPLYING TILE BACKING PANELS

A. Water-Resistant Gypsum Backing Board. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

C. Areas Not Subject to Wetting: Install type-x gypsum wallboard panels to produce a flat surface.

D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.

2. Bullnose Bead: Use at outside corners.

3. LC-Bead: Use at exposed panel edges.

4. L-Bead: Use where indicated.

5. U-Bead: Use at exposed panel edges.

6. Curved-Edge Cornerbead: Use at curved openings.

C. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

A. General: 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.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.

2. Level 2: Not used.

3. Level 3: Not Used.

4. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

   a. Primer and its application to surfaces are specified in other Division 9 Sections.

5. Level 5: Where indicated on Drawings.

   a. Primer and its application to surfaces are specified in other Division 9 Sections.

E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

F. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

A. 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.

B. 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.

C. 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 recommendations.

3.8 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 093000
CERAMIC TILE

PART 1 – GENERAL

1.1 REFERENCE

A. Requirements in Addenda, Alternates, Conditions, and Division 1 collectively apply to this work.

1.2 DESCRIPTION

A. Principal Work Items Are:

1. Ceramic Tile:

a. Unglazed ceramic tile floors – full mortar bed.

b. Glazed walls – thin set.

2. Waterproof membrane at showers and other locations where indicated.

3. Patching, repairing and modifications to existing work wherever damaged or modified by construction operations.

B. Related Work Specified Elsewhere:

1. Demolition: Section 024119.

2. Salvage of existing tiles for reuse at areas of patching and repair: Section 024119.

3. Concrete: Section 033000.

4. Gypsum Board: Section 092900.

5. Plumbing fixtures/work: Division 22.

1.3 SUBSTITUTIONS

A. Only written approval of Architect will permit substitutions for materials specified; See General Conditions for procedure.

1.4 QUALITY ASSURANCE

A. Standards: In general, Work shall conform to latest edition of the following standards as applicable, and as modified herein:

1. Installation: Tile Council of American "Handbook for Ceramic Tile Installation".

2. Materials: Applicable ANSI standards, and Tile Council of America standards.

B. Requirements Of Regulatory Agencies; Codes: Conform to CCR Title 24, 2013 CBC and UBC.

C. Job Sample Panels For Ceramic Tile: When requested by Construction Manager.

1. Construct a 3' x 3' sample area of each pattern.

2. Obtain Architect's approval prior to proceeding with further tile work.

3. Approved sample may be incorporated into the finished work.

1.5 SUBMITTALS

A. Samples; 3 Copies:

1. For New Tile Areas: Mfr.'s full color range.

2. For Patching and Repairing of Existing Tile: Style and color to match existing tile.

3. Color for Mortar: Mfr.'s full color range, minimum 15 colors.

B. Certificates: Furnish Tile Council of America "Master Grade Certificate" for each type of tile, signed by manufacturer and Contractor. Deliver with tile to site.

C. Maintenance Materials; Spare Tile: In addition to tile required for installation, Contractor shall furnish the following to District's Inspector for delivery to District.

1. Floor Tile: 1 box of each color of new ceramic floor tile.

2. Wall Tile: 1 box of each color of new wall "field" tile and min. 1/2 box of each color of "accent" tile.

1.6 PRODUCT DELIVERY, STORAGE & HANDLING

A. Deliver tile to site in sealed containers with Grade Seals Intact. Store all materials in a dry location.

1.7 JOB CONDITIONS

A. Sequencing, Scheduling: Coordinate this work with demolition, concrete, framing, plumbing, lathing, plaster scratch coats, gypsum board, and/or backing furnished under other Spec. Sections and related work of other Spec. Sections.

B. Protection: DO NOT PERMIT hammering on stud walls or floors supporting tile until 7 days min. after tile installation.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Ceramic Tile:

1. General: Conform to ANSI A137.1-1980 "Standard Specification for Ceramic Tile". Tile to be Standard Grade. ALL Floor tile shall have a 0.6 min. coefficient of friction for interior location, per ASTM C-1028.

a. Tile patterns and price groups listed are according to Dal-tile "2001 Commercial Products" Catalog.

2. Acceptable Mfrs.:

a. Dal-Tile Corporation, Dallas, TX., 714-521-5224; as a standard of quality.

b. Equivalent products by American Olean Tile Co., Lansdale, PA..

c. Other Manufacturers: See Article 1.03, Substitutions.

3. Ceramic Mosaic Tile For Floors: Unglazed, dust pressed, square-edged 1/4” thick porcelain tile. Min. coefficient of friction of 0.6 for interior and 0.8 for exterior per ASTM C1028.

a. Types:

(1) Dal-Tile Keystone Unglazed Ceramic Mosaics.

(2) American Olean Unglazed Porcelain Ceramic Mosaics.

b. Size For Floor Tile: 2" x 2".

c. Colors: Two colors as selected by Architect in any combination from mfr.'s standard range of colors within the following color/price groups (30 colors min. range):

(1) Dal-Tile Keystone Price Groups 1, 2, and 3.

(2) American Olean Color/Price Groups 1, 2, and 3.

4. Glazed Tile For Walls, Base, & Wainscots: Glazed, dust pressed, machine made, white body, cushion edge, solid-color glaze, matte and high gloss.

a. Types:

(1) Dal-Tile Glazed Wall Tile; "Matte", "Semi-Gloss" and “Kohler Coordinates”; Price Groups 1, 2, and 3.

(2) American Olean Glazed Wall Tile; "Bright" and "Matte"; Price Groups 1, 2, and 3.

b. Size: 4-1/4" x 4-1/4" square, unless noted otherwise.

c. Colors: As selected by Architect in any combination or quantity from Mfr.'s. standard range of colors within Price Groups listed above (36 colors min. range).

d. Trimmer Shapes:

(1) Provide all trimmer shapes as required for complete work; some trim is listed herein.

(2) Outside Corners And At Tops And Edges Of Wainscots:

(a) At full mortar bed: Radius integral bull-nose tile, 4-1/4” x 4-1/4”, typical. (Dal-Tile A-4402, ACR-4402, ACR-4402).

(b) At thin-set applications: Integral bull-nose tile 4-1/4” x 4-1/4”, typical (Dal-Tile S-4449, SCR-4449, SCL-4449).

(3) Inside Corners:

(a) At wall tile on full mortar bed: 4-1/4” x 4-1/4” typical wall tile square butt to adjacent tile, typical.

(b) At thin-set applications: Integral bull-nose tile 4-1/4” x 4-1/4”, typical (Dal-Tile A-3401, SBL-4449, SBR-4449).

(4) Base at tile floors:

(a) At tile floors and walls/wainscots, full mortar bed: 4-1/4” x 4-1/4”, coved base, square top (Dal-Tile A-3401).

(i) At outside corners, full mortar bed: 4-1/4”, coved base, square top, integral radius corner (Dal-Tile ACR-3401 or ACL-3401).

(ii) At inside corners, full mortar bed: Square butt coved base (A-3401) to adjacent tile, cut to fit.

(b) At tile floors and walls/wainscots, thin-set application: 4-1/4” x 4-1/4”, coved base, square top (Dal-Tile A-3401).

(i) At outside corners, thin-set: 4-1/4”, coved base, square top, integral radius corner (Dal-Tile SCR-3401 or SCL-3401).

(ii) At inside corners, full mortar bed: Square butt coved base (A-3401) to adjacent tile, cut to fit.

(c) At tile floors and no wall tile, thin set: 4-1/4” x 4-1/4” coved base, round top (Dal-tile S-3419T).

(i) At outside corners, thin set: Dal-Tile SCR-3419T, SCL-3419T.

(ii) At inside corners, thin set: Square butt coved base (S-3419T) to adjacent tile, cut to fit.

B. Patching, Repairing & Modifications To Existing:

1. MATCH EXISTING: Field verify type, size, color, etc.

2. Coordinate work with demolition and salvage, Spec. Section 024119, Demolition.

3. Acceptable Materials:

a. New tile, only if exactly matching existing tile and approved by Architect a minimum of 2 weeks prior to installation.

C. Installation Materials:

1. Portland Cement:

a. For Ceramic Tile: ASTM C150, Type 1, portland cement for grouting and pointing mortar; Trinity, Atlas, or Medusa; white color. Typical:

(1) At existing tile flooring and base, match existing grout.

2. Sand: Washed, graded natural sand or screening, durable, free from deleterious substance; conforming to ASTM C144.

3. Water: Domestic source, clean and potable.

4. Hydrated Lime: High calcium type: ASTM C206 or C207, Type S.

5. Color For Grout: Pure synthetic iron oxide, limeproof, nonfading mineral pigments:

a. Colors as selected by Architect from full color range including white and black.
b. Match existing color at patching, repair and modifications of existing work.

6. Dry-Set Portland Cement Mortar: Conform to ANSI A118.1-1999; Custom Building Products Custom Thin Set Mortar, Mapei Kerabond, or acceptable equal.

7. Latex-Portland Cement Mortar: Conform to ANSI A118.4-1999.

a. For Porcelain Floor Tile: Laticrete #3030 Mega-Bond.

b. For White-Body Wall Tile: Laticrete #4237 with #211 Crete Filler Powder.

8. Sealer; For Sealing Grout Joints: Ameritone $7101 Clear Concrete Sealer.

9. Waterproofing Membrane (where required):

a. Acceptable Mfrs./Products:

(1) W.R. Grace & Co., (800) 444-6459, ext. 5364, Laguna Niguel, CA, as a standard of quality.

(2) Other Mfrs.: Comply with Art. 1.03.

b. Sheet Membrane Waterproofing:

(1) Type: Bituthene #3000, by W.R. Grace.

(2) Properties: 60 mil thick factory-made, self-adhesive, cold-applied composite sheet consisting of: 56 mils thickness of rubberized asphalt; 4 mils of cross-laminated, high-density, polyethylene film specially formulated for use with water-based surface conditioner. Membrane shall be covered with release paper, which is removed during installation. (No special adhesive or heat shall be required to form laps).

(a) Tensile Strength: 250 psi for membrane; 5000 psi for polyethylene film.

(b) Elongation Of Rubberized Asphalt: 300% to failure.

(c) Peel Adhesion: 9.0 lbs/inch of width.

(d) Permeance: 0.05 grains/sq. ft./hr./in. Hg.

(e) Water Absorption: 0.1% max.

c. Primer: Bituthene Low VOC Content Primer; a rubber-based primer in solvent conforming to APCD requirements.

d. Mastic: Bituthene rubberized asphalt-based mastic.

e. Liquid Membrane: Bituthene 2-component elastomeric, cold-applied, trowel-grade material.

f. Miscellaneous Materials: Tape and other accessories as recommended by sheet membrane mfr.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine surfaces scheduled to receive tile work, lath and plaster scratch coats and all other substrates. Report any unsatisfactory conditions. Ensure that substrates are firm, clean and free of oily film or other unsuitable conditions. Verify substrates do not exceed the following max. variation from required plane.

1. Floors: 1/4” in 10’-0” from every direction.

2. Walls: 1/4” in 10’-0” from every direction.

B. Do not start work until unsatisfactory conditions are corrected. Starting work constitutes acceptance of surfaces.

3.2 INSTALLATION, GENERAL

A. All work by skilled mechanics and in accordance with the applicable provisions of the Handbook for Ceramic Tile Installation, By Tile Council of America.

B. Bring each tile to true level and plane by uniformly applied pressure. Lay tile to straight edges, accurately set to lines established to keep joints parallel over entire area. Space joint widths evenly to accommodate the tile in the given space with a minimum of cutting and to maintain maximum joint width of 1/8”, unless noted or Architect-approved otherwise.

C. After setting tiles, sound tile; remove and replace hollow sounding units.

D. Allow tile to set a minimum of 48 hours prior to grouting.

3.3 INSTALLATION; TILE WORK WITH FULL PORTLAND CEMENT MORTAR BED

A. Scope: Install tile work with full portland cement mortar bed at the following locations:

1. At all new tile work on concrete sub-floors.

B. Application:

1. Mortar Bed: Full portland cement. At concrete subfloor, direct to concrete. At walls (masonry, concrete and wood-framed), apply over plaster scratch coat and metal lath by other Spec. Sections.

2. Bond Coat: One of the following.

a. Conventional portland cement mortar per ANSI A108.1-1976.

b. Dry-set or latex portland cement mortar per ANSI A108.5-1976.

3. Grout:

a. Colored, typically as selected by Architect. For work at existing tile, colored to match existing grout.

b. Mix: approved factory-prepared mix.

4. Pattern: Stack bond, typical for new. Match existing pattern at patching and repairs to existing.

3.4 INSTALLATION; TILE WORK THIN-SET OVER CEMENTITIUOS BACKER UNIT

A. Scope: Install tile work thin-set over cementitious backer unit, ANSI A118.9 at the following locations:

1. At all new tile work on walls.

B. Installation: Lay tile in thin set mortar in accordance with ANSI A118.4 & TCA Method W244.

1. Bond Coat: Dry-set or latex portland cement mortars per ANSI A118.4.

2. Grout: Colored as selected by Architect. Mix: approved factory-prepared mix.

3.5 PATCHING & MODIFICATIONS TO EXISTING WORK

A. General:

1. See Article 1.7 C herein regarding hazardous materials.

2. Conform to same standards as specified for all-new work.

3. Patches to be in-plane with adjoining existing work.

4. Small holes; 3/8" max. size: Patch with grout, tint to match tile color.

5. Preparation: Clean existing holes and tile backing surfaces to provide a proper bond to new work. Brush and clean surfaces free of dirt, paint, damaged mortar or grout, and all loose material. Repair and patch backing surfaces.

6. Large Holes: Replace with full tile to match existing, and regrout to match existing. Re-use matching existing tile from demolished areas. Do not use any materials/tiles containing lead.

7. Missing, Damaged, Or Chipped Tiles: Cut out and replace with matching tile; regrout.

8. Pointing: Cut out defective joints and repoint.

9. At patching and repair, match existing tile pattern and construction; if existing tile is thin-set, then thin-set the new tile with bond coat; if existing tile is full mortar bed, then use full portland cement mortar bed as required for new tile to match existing. Replace or repair metal lath and plaster scratch coat, or other backing materials, as required for proper installation of wall tile to match existing conditions.

10. Coordinate work with Demolition, Section 024119.

3.6 ADJUSTMENT & CLEANING; TILE WORK

A. Protection:

1. Protect finish hardware and adjacent material surfaces with Vaseline in cases where acid solutions are used.

2. Protect exposed work against staining, droppings, or defacement.

3. Do not permit any hammering on stud walls or floors supporting tile for 7 days min. after tile installation.

B. Cleaning:

1. Clear surface as work progresses.

2. Remove mortar droppings and stains as soon as possible.

3. Upon completion of any portion of tile work, remove all rubbish and unused materials incidental to the installation, and give the finished surfaces a thorough cleaning in an approved manner. Remove all traces of cement and dust accumulations.

4. DO NOT use acid solutions on glazed tile work.

5. Mix acid solution where required to clean unglazed tile and all terrazzo surfaces, in proportions of 10% muriatic (HCL) acid to 90% water. Rinse with clear water to eliminate the acid salts precipitating from interaction with the cement particles. Do not allow the acid solution to dry on the face of the tile and terrazzo.

C. Correction Of Defective Work:

1. General: Work not conforming to Contract requirements shall be removed and replaced; except where patching or other remedial work is specifically permitted by Construction Manager. Contractor shall bear all costs of correction of defective work.

2. Pointing: Cut out defective joints and repoint.

3. Cut out and replace chipped and damaged tile.

4. Replace all tiles that sound hollow when tapped.

3.7 SEALING TILE WORK

A. General: Materials and application shall conform to Health Department requirements to provide an approvable sanitary condition.

B. Scope: Seal all grout joints at all new tile work. Do not apply sealer to tiles.

C. Material: Ameritone #7101 Clear Concrete Sealer.

D. Application: Apply 2 coats at a rate of 500 sq. ft. max./gal/coat.

END OF SECTION

SECTION 095113
ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: Drawn to scale and coordinating acoustical panel ceiling installation with hanger attachment to building structure and ceiling mounted items:

C. Samples: For each exposed finish.

D. Product test reports.

E. Research/evaluation reports.

F. Maintenance data.

1.3 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.

B. Fire-Test-Response Characteristics:

1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

a. Identify materials with appropriate markings of applicable testing and inspecting agency.

2. Surface-Burning Characteristics: Acoustical panels complying with ASTM E 1264 for Class A materials, when tested per ASTM E 84.

a. Smoke-Developed Index: 450 or less.

C. Seismic Standard: Comply with the following:

1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.

2. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."

3. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site

1.4 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.

2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANEL CEILINGS, GENERAL

A. Acoustical Panel Standard: Comply with ASTM E 1264.

B. Metal Suspension System Standard: Comply with ASTM C 635.

C. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

1. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

D. Seismic perimeter stabilizer bars, seismic struts, and seismic clips.

E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

A. Products: Subject to compliance with requirements:

1. Armstrong World Industries, Inc. or equal.

B. Model: OPTIMA VECTOR 24 x 48 factory finish.

2.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Basis-of-Design Product: Subject to compliance with requirements, provide USG Interiors, Inc., Fineline DXF/DXLF or approved equal.

B. Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished 9/16-inch- (15-mm-) wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.

2. End Condition of Cross Runners: Override (stepped) or butt-edge type.

3. Cap Material: Steel cold-rolled sheet.

4. Cap Finish: Painted in color as selected from manufacturer's full range

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with UBC Standard 25-2 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook".

B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders.

C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counters playing, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.

1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.

2. Do not attach hangers to steel deck tabs.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

END OF SECTION

SECTION 096519
RESILIENT FLOORING

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Resilient quartz tile flooring.

B. Resilient top set base.

1.2 REFERENCES

A. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

B. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

C. ASTM D2047 - Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.

D. ASTM E648 - Test Method for Critical Radiant Flux of Floor-Covering Systems using a Radiant Energy Source.

E. ASTM E662 - Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

F. ASTM F710 - Practice for Preparing Concrete Floors and other Monolithic Floors to Receive Resilient Flooring.

G. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

1.3 REGULATORY REQUIREMENTS

A. Resilient flooring to comply with the following fire performance characteristics as determined by testing products per ASTM test method indicated below:

1. Critical Radiant Flux: 0.45 watts per sq cm or more per ASTM E648.

2. Smoke Density: Less than 450 per ASTM E662.

B. Products supplied for tile installation shall comply with local regulations controlling use of volatile organic compounds (VOC).

C. Resilient flooring products shall have a coefficient of friction when tested according to ASTM D2047 of 0.60 for flat floors and 0.80 for ramped surfaces.

D. Conform to CBC, California Building Code, (CCR) Title 24, Part 2, and ADAAG for accessibility requirements

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 013323.

B. Provide seaming and pattern plan.

C. Submit samples under provisions of Section 013323.

D. Submit two samples 3 x 3 inches in size, illustrating color and pattern for each floor material specified.

E. Submit two 2-inch-long samples of base material for each material specified.

F. Submit Owner's written acceptance of final floor finish of vinyl composition tile to Architect under provisions of Section 017720.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit cleaning and maintenance data under provisions of Section 017823.

B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Concrete subfloor to be allowed to cure for a minimum of 90 days to achieve acceptable dryness.

B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

C. Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

D. Subfloor Moisture Conditions: Moisture emission rate of no more than 3 lb/1000 sq. ft./24 hours when tested by Quantitive Anhydrous Calcium Chloride Test, ASTM F1869, with subfloor temperature not less than 65 degrees F.

E. Subfloor Alkalinity Conditions: A pH range of between 5 to 9 when subfloor is wetted with potable water and pHdrion paper is applied.

1.7 EXTRA MATERIALS

A. Provide 120 sq ft of flooring and 40 lineal feet of base of each material specified under provisions of Section 017720.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - RESILIENT QUARTZ TILE FLOORING

A. Altro, Altro Quartz Tile, www.altrofloors.com.

B. Substitutions: Under provisions of General Conditions.

2.2 RESILIENT QUARTZ TILE FLOORING MATERIALS

A. Quartz Tile: Versa Quartz Tile, 24 x 24 inch size, 1/8 inch thick; marbleized design. Colors as selected by Architect from manufacturer's full range of colors.

2.3 ACCEPTABLE MANUFACTURERS - BASE MATERIALS

A. Altro Flooring, www.altrofloors.com.

B. Substitutions: Under provisions of General Conditions.

2.4 BASE MATERIALS

A. Base: Type TPR rubber; coved; 4 inch high; 0.125 inch thick; top set, in maximum practical lengths.

B. Manufacturer: Burke

2.5 ACCESSORIES

A. Subfloor Filler: White premix Portland Cement latex type as recommended by flooring material manufacturer.

B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer. Shall meet South Coast Air Quality Management District (SCAQMD) Rule #1168.

C. Edge Strips: Rubber.

D. Sealer and Wax: Types recommended by flooring manufacturer. Coordinate selection of floor wax with Owner's maintenance program.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that concrete slabs comply with ASTM F710 and are as specified herein.

B. Verify concrete floors exhibit acceptable moisture emission rate; exhibit negative alkalinity, carbonization, or dusting.

C. Verify that surfaces are smooth and flat and are ready to receive Work.

D. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.

B. Apply, trowel, and float filler to leave a smooth, flat, hard surface.

C. Prohibit traffic from area until filler is cured.

D. Vacuum clean substrate.

E. Apply primer to concrete slab surfaces if recommended by flooring manufacturer.

3.3 INSTALLATION - TILE MATERIAL

A. Install in accordance with manufacturer's instructions.

B. Mix tile from container to ensure shade variations are consistent.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Set flooring in place, press with heavy roller to attain full adhesion.

E. Install tile to pattern indicated on drawings.

F. Pattern grain parallel for all units and parallel to length of room. Allow minimum 1/2 full size tile width at room or area perimeter.

G. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.

H. Install edge strips at unprotected or exposed edges, and where flooring terminates.

I. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

J. Install flooring under movable partitions and under cabinetry without interrupting floor pattern.

K. Install flooring in open cabinet recesses.

3.4 INSTALLATION - BASE MATERIAL

A. Fit joints tight and vertical.

B. Install material in maximum practical lengths.

C. Maintain minimum measurement of 18 inches between joints.

D. Miter internal corners.

E. Field wrap external corners with longest practical lengths. "V" cut back surface to 2/3 its thickness.

F. Install base on solid backing. Bond tight to wall and floor surfaces.

G. Scribe and fit to door frames and other interruptions.

3.5 CLEANING

A. Remove excess adhesive from floor, base and wall surfaces without damage.

B. Sweep or vacuum floor thoroughly.

C. Damp mop with a neutral detergent solution.

D. Carefully remove black marks with a scrubbing pad or brush.

3.6 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Protect floor finish until final completion with a non-asphaltic building paper.

C. Maintain protective covering until final completion.

3.7 COMPLETION

A. At final completion, remove floor protection and correct any damage.

B. Apply 2 coats of sealer to vinyl composition tile.

C. Apply 4 coats of wax to vinyl composition tile.

D. Each coat of sealer and wax to be thoroughly dry before installing subsequent coats.

E. Final coat of wax to be burnished in accordance with manufacturer's recommendations.

F. Floor finish with 1844 Buckeye (buckeyeinternational.com).

G. Obtain Owner's written acceptance of final floor finish at completion of sealer and wax application.

H. Submit copy of Owner's acceptance of floor finish to architect.

END OF SECTION

SECTION 098400
Tectum® Direct-Attached ACOUSTICAL Interior Panels
(CEMENTITIOUS WOOD FIBER CEILINGS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

PART 2 Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

PART 3

1.2 SUMMARY

A. Section Includes:

1. Cementitious wood fiber plank acoustical wall and ceiling system

1.

B. Related Sections:

1. Section 09 29 00 – Gypsum Board
2. Divisions 23 – HVAC Air Distribution
3. Division 26 – Electrical

C. Alternates

1. Prior Approval: Unless otherwise provided for in the Contract documents, proposed product substitutions may be submitted no later than TEN (10) working days prior to the date established for receipt of bids. Acceptability of a proposed substitution is contingent upon the Architect's review of the proposal for acceptability and compliance with the basis of design.
2. Submittals that do not provide adequate data for the product evaluation will not be considered. The proposed substitution must meet all requirements of this section, including but not necessarily limited to, the following: Single source materials suppliers (if specified in Section 1.5); Panel design, size, composition, color, and finish; Suspension system component profiles and sizes; Compliance with the referenced standards.

Tectum Direct Attached Wall Panels
Item 8182T10_ _ _
Item 8181T10_ _ _
Item 8180T10_ _ _

Accessories
Item 8187L16 #6 X 1-5/8" Painted Head – Sharp Point screws
Item 8186L16 #6 X 1-5/8" Painted Head – Drill Point screws
Item 8189L22 2-1/4" Painted Head – CMU Screws

1.3 REFERENCES

1. American Society for Testing and Materials (ASTM)
2. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
3. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
4. ASTM E2768-11(2018) Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials
5. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
6. ASTM C636 / C636M - 19 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
7. ASTM C 754 Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board
8. ASTM E 1264 Classification for Acoustical Ceiling Products
9. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

B. International Building Code

C. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

D. NFPA 70 National Electrical Code

E. California Department of Public Health CDPH/EHLB Emission Standard Method Version 1.1 2010

F. L.E.E.D. - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

G. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

H. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

I. International Well Building Standard

J. Mindful Materials

K. Living Building Challenge

L. U.S. Department of Agriculture BioPreferred program (USDA BioPreffered).

B.

1.4 SYSTEM DESCRIPTION

Direct attached acoustical (Wall or ceiling) systems manufactured from domestic cementitious wood fiber.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of Tectum® Direct-Attached™ ceilings or walls required.

B. Samples: Minimum 6 inch x 6 inch samples of specified Tectum® Direct-Attached interior panels.

C. Shop Drawings: Layout and details of Tectum® Direct-Attached interior panels show locations of items that are to be coordinated with the installation as required.

D. Certifications: UL certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. Acoustical performance, products must be tested to the A, D-20, C-20, or C-40 method.

E. Country of Origin: Submittals must be accompanied by letter, label or certification indicating the manufacturing country of origin. Comply with Made in USA requirements as applicable for the project.

F. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance as specified in Section 2.2, subcontractor shall be required to send material from every production run appearing on the job, finished as intended to be installed, to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.6 SUSTAINABLE MATERIALS

A. Transparency: Manufacturers will be given preference when they provide third party verified documentation to support sustainable requirements for the following: Material ingredient transparency, Removal of Red List Ingredients per LBCV3, Life Cycle impact information, Low-Emitting Materials, and Clean Air performance.

B. Health Product Declaration. The end use product has a published, complete third party verified Health Product Declaration with disclosure at a minimum of 1000ppm of known hazards in compliance with the Health Product Declaration open Standard.

C. Declare Label. The end use product has a published third party verified Declare label by the International Living Future Institute with disclosure of 100 ppm with a designation of Red List Free or Compliant (less than 1% proprietary ingredients).

D. Low Emitting products with VOC emissions data. Preference will also be given to manufacturers that can provide third party verified emissions data showing their products meet CDHP Standard Method v1.1 (Section 01350).

E. Life cycle analysis. Products that have communicated lifecycle data through Environmental Product Declarations (EPDs) will be preferred.

F. End of Life Programs/Recycling: Where applicable, manufacturers that provide the option for recycling of their products into new products at end-of-life through take-back programs will be preferred.

G. Products meeting LEED V4 requirements including:

1. **Storage & Collection of Recyclables**
2. **Construction and Demolition Waste Management Planning**
3. **Building Life-Cycle Impact Reduction**
4. **Building Product Disclosure and Optimization Environmental Product Declarations**
5. **Building Product Disclosure and Optimization Sourcing of Raw Materials**
6. **Building Product Disclosure and Optimization Material Ingredients**
7. **Construction and Demolition Waste Management**

PART 4

1.7 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate UL markings.

1. Surface Burning Characteristics: Tested per ASTM E 84 and complying with ASTM E 1264 Classification.

C. Tectum® Direct-Attached, as with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

D. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.8 DELIVERY, STORAGE & HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Provide labels indicating brand name, style, size and thickness.

C. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

D. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

A.

1.9 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

B. Do not install ceiling panels until building is closed in and HVAC system is operational.

C. Locate materials onsite at least 72 hours before beginning installation to allow materials to reach temperature and moisture content equilibrium.

D. Maintain the following conditions in areas where acoustical materials are to be installed 72 hours before, during and after installation:

1. Relative Humidity: 25 - 85%.
2. Uniform Temperature: 32 - 120 degrees F (0 - 49 degrees C).

1.10 WARRANTY

A. Tectum® Direct-Attached Wall and Ceiling Panels: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:

1. Defects in materials or factory workmanship.

B. Tectum® Direct-Attached Wall and Ceiling Panels warranty - Thirty (30) years from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.11 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Tectum® Direct-Attached Wall and Ceiling Panels: Furnish quality of full-size units equal to 5.0 percent of amount installed.

B.

PART 5 - PRODUCTS

2

2.1 Manufacturer

A. Tectum® Direct-Attached Wall or Ceiling Panels:
1. Tectum® by Armstrong World Industries, Inc.

B. Suspension System and Accessories:

PART 6 **1. Armstrong World Industries, Inc.**

PART 7

2.2 Tectum® Direct-Attached CEILING PANELS

A. Acoustical Panels Type AP-1:
1. Surface Texture: Coarse
2. Composition: Aspen wood fibers bonded with inorganic hydraulic cement
3. Finish: Surface appearance shall be consistent from panel to panel
4. Color: (Standard Selection: Natural or White) (Custom: Coloration or Sherwin Williams colors available as specials)
5. Size: Standard (23 ¾" x 48", 23 ¾" x 96", 47 ¾" x 96") Custom Sizes (width 23 ¾" – 48"; length

12” – 144” – Ceilings are limited to 12” -96” lengths if touching adjacent panels)
6. Thickness: (Standard 1”)(Custom 1-1/2” or 2”)
7. Edge Profile: (long edge/short edge – Bevel, Square)
8. UL Classified Noise Reduction Coefficient (NRC): ASTM C 423 ; (Mounting; C-40(0.85) Classified with UL label.
9. UL Classified Flame Spread: ASTM E 1264; Class A. Product must be able to meet this criteria after being painted six times.
10. Light Reflectance (LR) White Panel: ASTM E 1477; (Light Reflectance)
11. Dimensional Stability/Mold Resistance: HumiGuard Plus and no significant mold growth when tested by ASTM D3273.
12. Sustainable: Third party verified EPD (Environmental Product Declaration) and HPD (Health Product Declaration) and Living Product Imperative Certification.
13. USDA Certified Biobased Product, 98%
14. Acceptable Product: Tectum® Direct-Attached (Standard Items 8182T10 _ _ _, 8181T10 _ _ _, 8180T10 _ _ _ as manufactured by Armstrong World Industries

2.3 METAL SUSPENSION SYSTEMS

A. Accessories:
    1. #6 x 1-5/8” Painted Head Sharp Point Screws, item 8187L16
    2. #6 x 1-5/8” Painted Head Drill Point Screws, item 8188L16
    3. 2-1/4” Painted Head CMU Screws, item8189L22
B. Suspension Components for Alternative Direct Attach – by Method of Armstrong Drywall Suspension
    1. Drywall Grid main beam item HD8906
    2. Drywall Grid cross tees item XL8945
    3. Perimeter angle item KAM 12
    4. 1-5/8" sharp point screws item 8187L16
C. Attachment Component for Direct Attached to Heavy gauge metal steel
    1. 1-5/8" drill point screws item 8188L16

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer’s printed recommendations.

3.2 PREPARATION

A. Measure each wall area and establish layout of wall units. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

A. Install Tectum® Direct-Attached Panels in accordance manufacturer’s installation instructions.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken Tectum® Direct-Attached Panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove any Tectum® Direct-Attached Ceiling Panels that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.

END OF SECTION

SECTION 099000
PAINTING

1.00 GENERAL

1.01 SUMMARY

A. This Section Includes Paints and Coatings as follows:

1. Painting and finishing all interior and exterior exposed surfaces throughout the Project, except as excluded in Paragraph B below.

2. Surface preparation, priming and coats of paint specified herein are in addition to shop priming and surface treatment specified in other Sections.

3. Paint all exposed surfaces whether or not colors are designated, except where natural finish of the material is obviously intended or specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas.

B. Painting Specified Elsewhere:

1. Shop priming of ferrous metal items included under miscellaneous metal fabrications, hollow metal work, and similar work.

2. Finished (not primed) mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets, except as specified in Article 3.04 herein.

3. Pavement Markings and Wheel Stops

4. Signage: Section 101400.

5. Piping Identification: Division 22.

C. Painting not Included: Do not paint the following surfaces.

1. Concrete Paving or Flatwork (unless indicated paint).

3. Insulation and its facing.

4. Roofing.

5. Finish hardware, except those items noted USP.

6. Finished metal surfaces such as anodized aluminum, stainless steel, chromium-plating, copper, bronze, brass and similar finished materials will not require finish painting.

7. Painting is not required (unless noted paint), on walls or ceilings in concealed and inaccessible areas such as furred areas, pipe spaces, duct shafts and elevator shafts.

8. Operating Parts, Labels and Nameplates:

a. Do not paint moving parts of operating units, mechanical and electrical parts, such as valve and damper operator linkages, sinkages, sensing devices, motor and fan shafts.

b. Do not paint over any nameplates, Code required labels, such as UL and FM, or any equipment identification, performance rating, name, or nomenclature plates.

1.02 SUBMITTALS

A. Procedure: In accordance with Section 013323.

B. Materials:

1. Copies of complete materials list, identified by manufacturer's name and product label or stock number.

2. Prepare list in the form of a repetition of the specified paint finishes, with the addition of the specific product intended for each coat.

C. Color Samples:

1. 8-1/2 in. x 11 in. samples of each color for painted finishes.

2. For transparent finishes, prepare the samples on wood specie, which will be used for the Project; 12 in. for lumber; 12 in. square for veneered panels.

D. Certification: Duplicate copies of manufacturer's affidavit with each shipment of materials delivered to the jobsite certifying that each material furnished complies with specified requirements.

1.03 QUALITY ASSURANCE

A. Compliance with Air Quality Regulations: VOC of coatings used for this work shall not exceed limits prescribed by law.

B. Sample Panels:

1. Apply sample paint finishes (approximately 10 ft. square) of each color scheme to wall areas, as directed by the Architect. Refer to this section for painting cement plaster sample panel and also for painting gypsum board mock-up.

2. Obtain Architect's approval of sample panels before proceeding further. Approved sample panels will be used as a standard for the Project, and if properly identified may remain a part of the Work.

3. Final acceptance of colors will be from job-applied samples.

1.04 JOB CONDITIONS

A. Environmental Requirements:

1. Comply with paint manufacturer's recommendations for environmental conditions regarding paint application. Provide adequate heating and ventilating to maintain environmental conditions recommended by paint manufacturer.

2. Do not apply finish in areas where dust is being generated.

B. Provide drop cloths, shields, barricades and other protection necessary to safeguard adjacent surfaces not to be painted.

1. Post signs immediately after painting.

2. Provide and maintain protection as required to protect finished work from damage until its acceptance.

C. Illuminate work area during installation to provide the same or greater level of illumination, as required to properly perform the work, as will occur in the room or space after the building is in operation.

1.05 HANDLING

A. Procedure: In compliance with Section 016600.

B. General: Take all necessary precautions to prevent fire. Remove soiled rags and other waste items from premises at the end of each day's work.

1.06 WARRANTY

A. Color of exterior surfaces painted as part of the Work of this Section shall, at the end of one year, have remained free from serious fading when compared to a control sample of the original paint.

B. Paint shall have its original adherence at the end of one year and there shall be no evidence of blisters, running, peeling, scaling, chalking, streaks, or stains at the end of this period.

C. Washing painted surfaces with alkali-free soap and water shall remove surface dirt from painted surfaces without producing deteriorating effects.

1.07 MAINTENANCE MATERIAL

A. With closeout submittals deliver one identified unopened gallon of each type and color of paint material used on the Project to the District for future paint touch-up.

B. In addition to manufacturer’s label, identify with room number, floor of area, type of paint, color and sheen, as applicable, for future identification.

2.00 PRODUCTS

2.01 PAINT

A. Definition: The term "paint" as used in this Section means all coating system components, including primers, emulsions, enamels, varnishes, stains, lacquers, sealers, fillers, and other applied materials whether used as prime, intermediate or finish coat.

B. Quality and Manufacture: Insofar as practicable each paint shall be factory-mixed to match approved samples and colors, and be of a consistency permitting immediate application. Use best quality grade regularly manufactured by PPG Paints, except as may be specified below.

C. Paint Uniformity and Compatibility:

1. Paint shall be boxed at the job site or factory-batched to ensure color uniformity and consistency. This includes the required maintenance materials.

2. Provide finish coats compatible with prime coats used.

a. Review other Sections of these Specifications, in which prime coats are specified, and manufacturer's data for shop-primed surfaces to be painted.

b. Be responsible for compatibility of the total coating system.

3. Provide barrier coats over incompatible primer or remove and reprime.

4. Products of more than one approved manufacturer may be used, except that all products applied on a surface shall be by the same manufacturer.

2.02 COLOR SCHEDULES

A. The Architect will prepare a color schedule with samples for guidance in painting.

B. The Architect may select, allocate, and vary colors on different surfaces throughout the Work, subject to the following:

1. Exterior Work: A maximum of 5 different colors will be used, with variations for trim, doors, miscellaneous work, and metal work.

2. Dark Tones: A maximum of 10 dark tones will be used as accent colors for interior.

3.00 EXECUTION

3.01 INSPECTION

A. Examine surfaces to be painted for conditions that would adversely affect the permanence and quality of this work. Make sure that unsuitable conditions are corrected before proceeding with painting.

3.02 SURFACE PREPARATION

A. Prepare surfaces to receive specified finishes in compliance with paint manufacturer's printed instructions and the following:

1. Galvanized Steel:

a. Clean with commercial phosphoric acid solution or prepared product approved by the paint manufacturer for pretreatment.

b. Then recoat within the time limit recommended by the primer manufacturer.

2. Shop-Coated Metal: Remove oil, grease, dirt and foreign matter. Spot prime abraded surfaces with compatible primer.

3. Shop-Finished Metal: Sand to provide a mechanical bond with field applied finishes, or use a commercial preparation specifically formulated to improve paint bond.

4. Unprimed Ferrous Metal: Remove rust, mill scale, oil and other foreign matter.

5. Factory-Primed Equipment: Repair damaged primer; remove rust and clean to bright metal where appropriate. Sand or etch primer to permit bonding of finish coats. Clean surfaces thoroughly before applying additional coats.

6. Plaster:

a. Clean surfaces of dirt, laitance, encrustations and foreign matter.

b. Patch cracks, holes, pits and other imperfections, not patched under other Sections, flush and smooth with adjacent surfaces.

c. Do not apply sealer or paint when the moisture content of the surfaces to be painted exceeds 8%. Touch-up suction spots after priming with an additional prime coat until all surfaces show a uniform coating.

7. Gypsum Board:

a. Remove dust, loose particles or other matter that would prevent proper paint adhesion.

b. Check to see that joints and screw heads are properly covered with joint compound and sanded smooth and flush with adjacent surfaces.

8. Wood:

a. Sandpaper smooth and dust clean. Remove handling marks and raised grain.

b. Fill nail holes, cracks and depressions with wood filler, colored to match finish for wood scheduled to receive a transparent finish. Use a tack cloth on wood to receive a transparent finish to remove sanding dust.

9. Other Materials not Covered Above: Prepare to receive paint in compliance with the paint manufacturer's printed instructions.

B. Hardware:

1. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in place and not to be painted, or provide surface- applied protection prior to surface preparation and painting.

2. Following completion of painting each space or area, reinstall the removed item by workmen skilled in the trades involved.

C. Phasing: Program cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

3.03 PAINT PREPARATION

A. Open paint containers only as required for use. Mix paint in designated areas.

B. Thoroughly stir and agitate paint to uniformly smooth consistency suitable for proper application.

C. Do not reduce, change or use any materials except in compliance with manufacturer's printed instructions.

D. In all cases, prepare and handle paint to prevent deterioration and inclusion of foreign matter.

3.04 APPLICATION

A. General:

1. For doors scheduled to receive a transparent finish, seal top and bottom with a heavy coat of spar varnish immediately after trimming.

2. Where the 2 faces differ in color or finish, finish the edges to match the door face visible when the door is open.

3. Apply paint only under conditions that will insure finishes free from blemishes and defects. Leave corners with no undue amount of paint buildup.

4. Use a slightly different shade for each coat of paint so that it may be readily identified.

5. Primer and intermediate coats shall be unscarred and completely integral when succeeding coats are applied. Sand and dust between each coat to remove defects visible from a distance of 5 ft.

6. Remove paint spillage and spatters on adjacent surfaces so as not to damage the surface being cleaned.

a. Perform patching and repairs required because of painting operations.

b. Refinish entire panel or assembly where portion of finish has been damaged or is not acceptable to the Architect.

7. Paint interior surfaces of ducts, where visible thru registers and grilles, with a flat non-specular black paint.

8. Unless otherwise directed by the Architect, spray-paint exposed surfaces of ceiling diffusers, air return grilles, speakers and other electrical and mechanical items, except smoke detectors and sprinkler heads, in painted ceilings to match the ceilings, whether these items are primed or factory-finished.

9. Number of Coats:

a. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried.

b. The number of coats specified is the minimum required for complete coverage and uniformity of color.

c. Apply additional coats when undercoats, stains, or other conditions show through the final finish until the finish is of uniform color and appearance.

10. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.

11. Paint interior surfaces, which are a continuation of exterior surfaces, subject to exterior exposure (such as an out-swinging door), with the applicable exterior coating system.

12. For opaque finishes, completely cover surfaces to be painted to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Painted surfaces with cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other imperfections will not be acceptable.

13. For transparent finishes, apply multiple coats to produce a glass-smooth surface film of even luster, free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, and other surface imperfections.

14. Completed work shall match approved samples, as determined by the Architect. Remove, refinish, or repaint work not complying with specified requirements.

B. Application Method: In general the application method, brush, roller or spray, is the Contractor's option.

C. Priming:

1. Prime bare metal scheduled to be painted, and not embedded in concrete and masonry, immediately upon delivery to the site.

2. Time lapse between priming and application of second coat shall be as short as possible.

D. Shop Primed Metal:

1. Apply 2 finish coats of paint to match adjoining surfaces, as directed by the Architect, to shop primed mechanical equipment. This work includes but is not limited to interior of fire hose cabinets, air grilles, ceiling diffusers, electrical and telephone panels, and access panels.

2. Paint conduits, outlets and pull boxes, and mechanical equipment exposed to view, such as covered and uncovered piping and ductwork, pumps, compressors, air conditioning equipment and tanks as specified in this Section.

3. Paint the back side of access panels, removable or hinged covers to match the exposed surfaces.

E. Miscellaneous Painting: Surfaces to be painted and not specifically described herein, shall be painted with a product specifically manufactured or prepared for the material and surface to be painted with a prime and 2 finish coats.

3.05 PAINT FINISH SCHEDULE

A. Finish all surfaces in compliance with the following schedule. Catalog names and numbers refer to product as manufactured by Dunn Edwards Corp., except as otherwise specified.

B. Exterior Surfaces:

1. Concrete, Concrete Masonry Units, Portland Cement Plaster, and Stucco:

1st Coat - PPG 4-503 Perma-Crete Concrete & Stucco Primer, Alkali Resistant
2nd & 3rd Coats - PPG 6-901xi Speedhide Ext 100% Acrylic Semi-Gloss.

2. Steel, Iron, Galvanized, Copper:

1st Coat - PPG 90-709 Pitt-Tech Acrylic Industrial DTM Primer.
2nd & 3rd Coats - 90-374 (Gloss) 90-474 (Satin) Pitt-Tech Acrylic Industrial DTM Enamel.

3. Exterior Wood Surfaces:

1st Coat - PPG 17-921xi Seal Grip Int/Ext Universal Sealer/Primer.
2nd & 3rd Coats - PPG 6-901xi Speedhide Ext 100% Acrylic Semi-Gloss.

4. Metal Doors & Frames:

1st Coat (pre-primed surface) - PPG 17-921xi Seal Grip Int/Ext Universal Sealer/Prime (bare metal) PPG 90-709 Pitt-Tech Acrylic Industrial DTM Primer.
2nd & 3rd Coats - PPG 6-901xi Speedhide Ext 100% Acrylic Semi-Gloss.

5. Ferrous Metal - Extreme Corrosion Protection for Industrial Applications:

1st Coat - PPG Amercoat 68 HS VOC 3 Component Zinc Rich Epoxy Primer
2nd Coat - PPG Amerlock 2 Two Component High Solids Epoxy
3rd Coat - PPG Amershield VOC Two Component Polyester Acrylic Polyurethane

C. Interior Surfaces:

1. Gypsum Board, Plaster, & Concrete:

   1st Coat - PPG 6-2 Speedhide Interior Latex Sealer
   2nd & 3rd Coats - PPG 6-500 Speedhide Interior Latex Semi-Gloss

2. Steel, (ferrous) Iron, Galvanized & Copper:

   1st Coat - PPG 90-709 Pitt-Tech Acrylic Industrial DTM Primer
   2nd & 3rd Coats - 90-374 (Gloss) 90-474 (Satin) Pitt-Tech Acrylic Industrial DTM Enamel

3. Wood, Painted:

   1st Coat - PPG 17-921xi Seal Grip Int/Ext Universal Sealer/Primer
   2nd & 3rd Coats - PPG 6-500 Speedhide Interior Latex Semi-Gloss

4. Wood, Finished:

   Stain if Desired
   Finish - PPG Deft Acrylic Polyurethane

END OF SECTION

SECTION 099623
ANTI-GRAFFITI COATING - CLEAR

PART 1 – GENERAL

1.1 DESCRIPTION

A. Anti-graffiti coating as indicated on the drawings and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Painting.

B. Masonry Waterproofing.

1.3 SUBMITTALS

A. Samples and materials list in conformance with Section 013323.

1.4 QUALITY ASSURANCE

A. The Contractor shall be a trained and certified applicator, and shall be approved in writing by the manufacturer.

PART 2 - MATERIALS

2.1 COATING

A. Two part, non-sacrificial, clear coating system, consisting of a barrier/sealer and flat top coat.

B. Remover shall be supplied to the District, in sealed containers, sufficient to clean 200 square feet of surface.

C. Manufacturer: American Polymer, Inc. "GSS Barrier, GSS-10 Topcoat and GSS Erosol Remover".

PART 3 - EXECUTION

3.1 PREPARATION

A. The Contractor, in company with the Architect, shall examine the surfaces required to receive work of this Section.

B. The Contractor shall determine the porosity of the material surfaces to which his materials are to be supplied.

C. Coating shall be formulated to provide a uniformly clear ant-graffiti coating on each surface as indicated.

D. The Contractor shall test all surfaces for moisture content. Coating shall not be applied until optimum moisture content is obtained.

E. Surfaces shall be clean and shall conform to the manufacturer's written instructions for preparation.

F. Adjacent surfaces shall carefully masked and protected.

3.2 APPLICATION

A. Coating shall be applied in strict conformance with the manufacturer's written instructions.

B. Equipment used shall be clean, capable of providing precise control and shall provide uniform coverage, gloss and finish.

3.3 APPROVAL

A. The Contractor shall demonstrate the anti-graffiti performance of the coating, using spray paint in an inconspicuous location.

END OF SECTION

SECTION 101400
SIGNAGE

1.00 GENERAL

A. Requirements of Division 1 apply to this Section.

1.01 SCOPE

A. Signage as shown on the drawings and as specified, including but not limited to the following major items:

1. Disabled access parking signs and gate signs.

2. Building identification signs.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Paint finish

1.03 SUBMITTALS

A. Type face and colors - submit per Section 013323.

1.04 DESIGN

A. Work shall conform to Americans with Disabilities Act, ANSI A-117.1.\

B. Raised characters shall comply with 11B-703.2

C. Braille shall comply with 11B-703.3

D. Visual characters shall comply with 11B-703.5

E. Approved Systems (Manufacturers):

1. ASI/Modulex, Inc. (213) 645-1400.

2. Kroy, (800) 733-5769.

3. Mowhawk Sign Systems, Inc. (518) 370-3433.

4. California Contract, (818) 503-7241.

2.00 MATERIALS

2.01 PLAQUE SIGNS

A. Number Signs: Mount on a base - 1 1/8" inch high x 5 inches long. Type face - modified Helvetica. Number size 9/16 inch high. Provide Braille symbols. Secure adjacent to door, where indicated. Similar to: ASI infinity; SPE-SA.

B. Text Signs: Mount on a base - 1 1/8-inch-high x varying lengths. Type face - modified Helvetica. Letter size - 9/16" inch high, supper and lower case. Provide Braille symbols. Secure adjacent to door, where indicated. Similar to: ASI infinity; SPE-SA.

C. Occupancy Sign: Where required and noted on the drawings. Header 2 1/2-inch-high with letters 1 1/4 inches high. Text letter size 9/16 high. Type faces modified Helvetica upper and lower case. Mount to a common base. Similar to: ASI infinity; SPG-SA.

2.02 PERMANENT TEXT SIGNS

A. Directional and informational signs required by Title 24 CCR and the ADA as shown on the drawings shall have the test silver or vinyl die cut in signs as noted. Similar to ASI infinity SOG-SA.

2.03 PERMANENT TEXT - EXTERIOR

A. Size as required to provide text stated using 1-inch-high letters, upper and lower case modified Helvetica, and other text.

B. Material: Fiberglass base, with urethane finish and silk screened graphics, protected with a transparent matte finish. Similar to ASI GOF series.

C. Mounting: Screws 1/4-inch diameter, corrosion and vandal resistant, self drilling.

2.04 Not Used

2.05 DISABLE ACCESS SIGNS, OCCUPANCY SIGNS

A. Header 1 3/4" high with silk screened baked enamel letters 1" high. Type face": - modified Helvetica upper and lower case.

B. Header shall slide into an aluminum frame with a smooth panel base of a size required to accommodate the text indicated. Text letter size - 9/16", upper and lower case. Mounting of the base - vandalproof wood screws into solid backing. Provide locking type clear plastic cover. Modulex System "Interior 10".

C. Free-standing exterior disabled signs, traffic control and other exterior signs: Traffic Control Service, Inc. (800) 222-8274, Zumar Industries (323) 724-8450 or Western Highway Products, Inc. (714) 761-4811.

2.06 EXTERIOR BUILDING IDENTIFICATION SIGNS

A. Non-illuminated, reverse channel, brushed aluminum where and as shown on the drawings. Contact Innerface Sign Systems, Inc. 5320 Webb Parkway, Lilburn (Atlanta), GA 30047, (800) 445-4796.

3.00 EXECUTION

3.01 PERMANENT TEXT

A. Permanent text not indicated in Contract Drawings will be furnished at the time that submittals are returned.

3.02 INSTALLATION

A. Install where indicated. Signs shall be a complete vandal resistant installation. Fasteners shall be concealed, in drilled holes, counter sunk where indicated. Signs shall align with adjacent lines and edges, be level, flat on the mounting surface.

B. Free-standing information/direction exterior signs: Shall be mounted on a 2” x 2” galvanized tube steel post that has pre-drilled with mounting holes. The post shall be anchored into a 12” x 18” deep concrete footing.

C. Building Wall Signs: Install as recommended by the manufacturer. Fasteners shall be concealed, in drilled holes, counter sunk where indicated. Signs shall align with adjacent lines and edges, be level, flat on the mounting surface.

END OF SECTION

SECTION 102113
TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Floor-mounted overhead-braced high density polyethylene (HDPE) toilet compartments.

2. Wall mounted HDPE urinal screens.

3. Supplementary parts and components, such as inserts, clips, fasteners, anchors, and other miscellaneous supports required for a complete installation.

A. Related work:

1. Toilet Accessories: Section 102816.

1.2 SUBMITTALS

A. Procedure: In accordance with Section 013323.

B. Data: Manufacturer's data for partitions and screens. Supplement with shop drawings showing plan layout, attachment to adjacent construction.

C. Samples:

1. 6 in. square of each color of selected panel material.

2. Full size samples of hardware.

1.3 HANDLING

A. Procedure: In accordance with Section 016600.

B. Protection: Maintain manufacturer's protective covers on panels as long as possible to protect them from damage.

1.1 WARRANTY

A. Warrant materials against breakage, corrosion and delamination for 10 years after Substantial Completion. Repair defective materials, at no cost to District, within warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Hiny Hiders by Scranton Products.

2.2 MATERIALS

A. General:

1. Provide materials selected for surface flatness and smoothness.

2. Exposed surfaces which exhibit defects, discolorations, and other imperfections are not acceptable.

B. Solid plastic: High density, solid polymer resin, either monolithic polyethylene or polymer resin, with homogenous color throughout, of color(s) selected by Architect.

1. Provide monolithic material not less than 1 in. thick. Ease edges uniformly.

C. Pilaster shoes and caps: Formed one-piece plastic.

D. Panel brackets: Manufacturer's full length standard design for attaching panels to walls and pilasters, extruded anodized aluminum.

E. Hardware and accessories: Manufacturer's standard design, heavy duty operating hardware and accessories of chromium plated, non-ferrous cast alloy (Zamac).

F. Anchorages and fasteners: Manufacturer's standard exposed fasteners of stainless steel, chromium-plated steel, or brass, finished to match hardware, with theft-resistant type heads and nuts.

1. Concealed anchors: Hot-dip galvanized, cadmium-plated or other rust-resistant protective coated steel.

2.3 FABRICATION

A. Fabricate units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated.

B. Floor-supports: Furnish galvanized steel anchorage devices complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters to permit structural connection at floor.

1. Provide shoe at each pilaster to conceal anchorage.

C. Wall-hung screens: Furnish panels of same construction and finish as partition system panels.

D. Hardware: Provide for each compartment complying with ANSI A117.1 for disabled accessibility and as follows.

1. Hinges: Cutout inset type, adjustable to hold door open at any angle up to 90 deg. Provide gravity type, spring-action cam type, or concealed torsion rod type to suit manufacturer's standards.

2. Latch and keeper: Manufacturer's standard surface mounted latch unit, designed for disabled accessibility, with combination rubber-faced door strike and keeper.

3. Coat hook: Manufacturer's standard unit, combination hook and rubber-tipped bumper, sized to prevent door hitting mounted accessories. Mount on back side of door, at 48 in. height.

4. Door pull: Manufacturer's standard unit for out-swinging doors. Provide pulls on both faces of disabled compartment doors.

E. Disabled Access Law Compliance:

1. Layouts of enclosures designated as enclosures for the disabled and hardware provisions therefore shall comply with current disabled access requirements in the California Code of Regulations, Title 24 and ADA Accessibility Guidelines for Buildings and Facilities.

2. Toilet compartments for the disabled shall be provided with the following, together with all other requirements:

a. Doors shall be not less than 36” wide.

b. Coat hooks shall be mounted at 48” high, maximum.

c. Door latches shall be flip-over style, sliding, or other hardware not requiring the user to grasp or twist.

d. Inside and outside of enclosure doors for the disabled shall be equipped with a loop or U-shaped handle immediately below the latch. The latch shall be flip-over style, sliding, or other hardware not requiring the user to grasp or twist. Model No. RP100S-P by MSI (805.375.6599).

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify conditions and measurements affecting the work of this Section at site. Make sure thatdetrimental conditions are corrected before proceeding with installation.

3.2 INSTALLATION

A. Set compartments and screens plumb, level, and space uniformly in compliance with their manufacturer's printed instructions and the following.

B. Set pilasters with anchorages having not less than 2 in. penetration into structural floor, unless otherwise recommended by compartment manufacturer.

1. Level, plumb, and tighten installation with devices furnished.

2. Hang doors and adjust so that tops of doors are level with tops of pilasters when doors are in closed position.

C. Secure panels to panels, and panels to walls with continuous extruded aluminum angles.

1. Anchor panels to studs or backing plates only, with tamper-proof bolts or screws; fastening components to walls with toggle bolts will not be allowed.

D. Install hardware as recommended by manufacturer. Conceal evidence of drilling in finished work.

3.3 ADJUSTING/CLEANING

A. Adjust brackets and hardware to provide uniform clearances not exceeding the following dimensions:

1. Pilasters and walls: 1 in.

2. Panels and walls: 1 in.

3. Pilasters and panels: 2 in.

4. Pilasters and doors: 3/16 in.

B. Adjust hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30 deg. from closed position when unlatched, except set hinges on out-swinging doors (and entrance swing doors) to return to fully closed position.

C. After completion of installation, clean and polish exposed surfaces and touch-up minor scratches.

END OF SECTION

SECTION 102816
TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Toilet room accessories, including framed mirrors.

2. Supplementary parts and components, such as inserts, clips, anchors, fasteners, and other miscellaneous supports required for a complete installation.

B. Related work:

1. Cut-outs, openings and recesses for installation of accessories.

1.2 SUBMITTALS

A. Data: Manufacturer catalog cuts and data sheets, complete parts list, and installation requirements for each accessory specified.

B. Schedule: Indicate types, quantities, sizes, and installation locations (by room) for each toilet accessory item to be provided for Project.

C. Closeout: Furnish to the District operating instructions and keys for equipment and locks.

1.3 QUALITY ASSURANCE

A. Compliance with ADA requirements for accessories and their attachments is the Contractor's responsibility.

1.4. HANDLING

A. Protection: Keep protective covers on accessories until their installation is complete, then remove at final clean-up.

1.5. WARRANTY

A. Provide the District the manufacturer warranty protecting mirrors against silver spoilage for 5 years after Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless steel: AISI Type 302/304 complying with ASTM A167.

B. Sheet steel: Cold-rolled commercial quality, complying with ASTM A336, 20 gage minimum.

1. Galvanized steel: ASTM A527, G60 zinc coating, 20 gage minimum.

C. Mirrors: 1/4 in. "Silvering Quality" float glass with silver coating, copper protective coating and 2 mil thick protective paint; complying with CS 27.

D. Mounting devices: Galvanized steel.

E. Fasteners: Stainless steel where exposed; may be galvanized steel where concealed. Provide spanner head design where exposed.

2.2 FABRICATION

A. Fabricate units with seamless one piece flanges on exposed faces.

1. Miter corners, weld and grind smooth and flush with parent metal so that welds are invisible on exposed surfaces.

2. Open joints (not fully welded) on exposed surfaces are not acceptable.

3. Conceal anchoring devices.

B. Hang doors or panels on continuous stainless steel piano hinges.

C. Master-key locked dispensing units. Key coin boxes of coin-operated dispensing units separately from the lock on the unit.

D. Grind smooth all edges, both inside and out.

E. Finishing:

1. Finish exposed surfaces with bright, directional polish, NAAMM No. 4 finish so grain direction is parallel with the length of the component (horizontal or vertical) for all accessories, except where a knurled surface is specified for grab bars.

2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect adjacent construction and supports.

B. Make sure that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface, and that other conditions detrimental to the proper or timely completion of this work are corrected before proceeding with installation.

3.2 INSTALLATION

A. Drill holes to correct size and location. Install accessories plumb, level and equally spaced (when applicable).

B. Attach accessories securely with screws or bolts to steel studs or backing plates. Do not use Molly or toggle bolts in gypsum board.

C. Adjust accessories for proper operation. After completion of installation, clean and polish exposed surfaces after removal of protective coverings.

3.3 ACCESSORY SCHEDULE:

A. As indicated on the drawings.

END OF SECTION

SECTION 104416
FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Operation and maintenance data.

C. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.

b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amerex Corporation.

b. Ansul Incorporated; Tyco International Ltd.

c. Badger Fire Protection; a Kidde company.

d. Buckeye Fire Equipment Company.

e. Fire End & Croker Corporation.

f. J. L. Industries, Inc.; a division of Activar Construction Products Group.

g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.

h. Larsen's Manufacturing Company.

i. Moon-American.

j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.

k. Potter Roemer LLC.

l. Pyro-Chem; Tyco Safety Products.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Clean-Agent Type in Steel Container: UL-rated 1-A:10-B:C, 10-lb (4.5-kg) nominal capacity, with HFC blend agent and inert material in enameled-steel container; with pressure-indicating gage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

END OF SECTION

SECTION 114000
FOODSERVICE EQUIPMENT

1.0 RELATED DIVISIONS / SECTIONS:

A. Refer to Interior Design Divisions for applicable provisions and sections regarding decor finishes, applications, details, and special instructions relating to items specified in this Section. Applicable to Projects with items specified in this Section, with décor finishes and/or construction.

B. Refer to Mechanical/Plumbing Divisions for applicable provisions and sections regarding mechanical services, including, but not limited to, rough-ins, grease traps, steam traps, drain traps, atmospheric vents, valves, pipes and pipe fittings, ductwork, and other materials necessary to complete final connections to individual items as specified in this Section. Not work of this Section.

C. Refer to Electrical Divisions for applicable provisions and sections regarding electrical services, including, but not limited to, rough-ins, wiring, conduit, disconnects and other materials necessary to complete final connections to individual items as specified in this Section. Not work of this Section.

D. Work included in other Divisions - Provision of all wall, floor, and/or ceiling/roof openings, recesses, sleeves, and/or conduits; and equipment pads, and sealing thereof, as necessary for installation of items included in this section. Not work of this Section.

2.0 DEFINITIONS:

A. Furnish - Supply and deliver to Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

B. Install (set in place) - Operations at Project Site including actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, finishing, curing, protecting, cleaning and similar operations; ready for final utility connections by other Divisions as appropriate.

C. Provide - Furnish and install complete, ready for intended use.

D. Contractor - Refers to the Kitchen Equipment (Sub) Contractor in this Section. References to any other Contractor or Division, will be specific; such as General Contractor, Plumbing (Sub) Contractor / Division, Electrical (Sub) Contractor / Division, Architect designated, etc.

3.0 LAWS, ORDINANCES, REGULATIONS AND STANDARDS:

A. Comply with the following:

1. Air Conditioning and Refrigeration Institute (A.R.I): applicable regulations and references of the latest edition of standards for remote refrigeration system(s), components and installation.

2. American Gas Association (A.G.A.): standards for gas heated equipment, and provide equipment with the A.G.A. seal. Automatic safety pilots to be provided on all equipment, where available. (Canadian Gas Association or alternate testing lab's seals accepted if acceptable to local code jurisdictions.)

3. American National Standards Institute (A.N.S.I.): Z21-Series for gas-burning equipment. Provide labels indicating name of testing agency.

4. American National Standards Institute (A.N.S.I.): B57.1 for compressed gas cylinder connections, and with applicable standards of the Compressed Gas Association for compressed gas piping.

5. American National Standards Institute (A.N.S.I.): A40.4 and A40.6 for water connection air gaps and vacuum breakers.

6. American Society of Heating, Refrigeration and Air Conditioning Engineers (A.S.H.R.A.E.): applicable regulations and references of the latest edition of standards for remote refrigeration system(s), components and installation.

7. American Society of Mechanical Engineers (A.S.M.E.): Boiler Code requirements for steam generating and steam heated equipment, and provide A.S.M.E. inspection stamp and registration with National Board.

8. American Society for Testing and Materials (A.S.T.M.): C1036 for flat glass.

9. American Society for Testing and Materials (A.S.T.M.): C1048 for heat-treated flat glass - Kind HS, Kind FT coated and uncoated glass.

10. American Society for Testing and Materials (A.S.T.M.): F232-03 for pre-rinse spray units, and in compliance with Energy Policy Act of 2005 (EPAct).

11. American Welding Society (A.W.S.): D1.1 structural welding code.

12. Energy Policy Act of 2005 (EPAct 2005): water savings pre-rinse spray valves.

13. National Electric Code (N.E.C.): N.F.P.A. Volume 5 for electrical wiring and devices included with foodservice equipment, A.N.S.I. C2 and C73, and applicable N.E.M.A. and N.E.C.A. standards.

14. National Electrical Manufacturers Association (N.E.M.A.): LD3 for high-pressure decorative laminates.

15. National Fire Protection Association (N.F.P.A.): applicable sections for exhaust hoods, ventilators, duct and fan materials, hoods fire suppression systems, construction and installation; in addition to local codes and standards.

16. National Sanitation Foundation (NSF): latest Standards and Revisions, and as accredited by ANSI, IAS, NELAC, ISO, OSHA and SCC. Provide NSF Seal of Approval on all standard manufactured items included in this Project and listed in any NSF Certified Food Equipment Products Category, and on all items of custom fabricated work included in this Project. (UL Sanitation approval and seal accepted if acceptable to local code jurisdictions.)

17. Sheet Metal and Air Conditioning Contractor's National Association (S.M.A.C.N.A.): latest edition of guidelines for seismic restraint of kitchen equipment, as applicable to project location.

18. Underwriters Laboratories (U.L.): as applicable for electrical components and assemblies. Provide either U.L. labeled products or, where no labeling service is available, “recognized markings” to indicate listing in the U.L. “Recognized Component Index”. (Canadian Standards Association or alternate testing lab's seals accepted if acceptable to local code jurisdictions.)

19. UL 300 Standard: for wet chemical fire suppression systems for exhaust hoods/ventilators.

20. American with Disabilities Act (ADA): as applicable to this Project.

21. Refrigeration Service Engineers Society (R.S.E.S.): applicable regulations and references of the latest edition of standards for remote refrigeration system(s), components and installation.

22. All refrigerants used for any purpose is to comply with the 1995 requirements of the Montreal Protocol Agreement, and subsequent revisions and amendments. No CFC refrigerants will be permitted on this Project.

23. All refrigeration components installation, repairs, and/or associated work on any refrigeration system, is to be performed by a Certified Refrigeration Mechanic.

24. ETL and other national and international recognized Testing and Listing Agencies labels and certifications are acceptable in lieu of Listing Agencies indicated in these documents, if acceptable to the local code jurisdictions.

25. All applicable local codes, standards and regulations.

26. All special local codes, standard, and regulations; such as (examples only) California Energy Commissions Regulations, McCarran County requirements for walk-in cooler(s) and/or freezer(s).

27. For detention facilities projects (as applicable): applicable Correctional Standards. Verify the level of security and construction required with the Architect, and provide all items in compliance.

4.0 SUBMITTALS:

A. Provide two (2) sets of all Submittals for review by the Design Team. After review process, one (1) set will be returned for copying and distribution.

B. Contractor to review all submittals for compliance with the Contract Documents, prior to submitting to the Design Team for review.

C. Contractor is responsible for the accuracy of the information on their submittals.

D. Contractor’s use of any Design Team’s AutoCAD contract drawings for basis of producing their submittal drawings is with the following conditions and understanding:

1. Contractor assumes total liability and responsibility for accuracy, and for conformance and verification with the latest Architectural and Engineering drawings, actual field conditions, and all equipment provided.

2. Contractor further assumes responsibility for coordination of their submittals with those of other Contractors and Sub-Contractors, as required.

3. Submittals to have Contractor's title block and information.

E. Equipment Plan and Rough-In Drawings:

1. Submit 1/4" (1:50) scale drawings. These drawings are to include complete information on the work included in this Contract, with references to equipment as provided by others; and are to provide sufficient information for associated trades, contractors, and/or sub-contractors to complete their division of work associated with food service equipment included in this Contract. They are to be dimensioned; showing locations of ducts, stubs, floor and wall sleeves, for ventilation, plumbing, steam, electrical, refrigeration lines, and concrete base and curb dimensions, as required for equipment so supported, and any additional information pertinent to the installation of this equipment

2. Drawings to also include equipment plan(s) with detailed equipment list, similar to Food Service Equipment Plans included in the Contract Drawings. Item numbers are to be the same as shown in the Contract Documents, and are to include Spare Numbers and associated items as provided by others.

3. In the event rough-ins have been accomplished before award of this contract, Contractor is to examine the existing facility and make adjustments to their equipment to suit building conditions and utilities, where possible. If not possible, so state in a letter, with reasons and an alternate method and pricing for their equipment, to the Architect.

F. Shop Drawings:

1. Submit shop drawings for items of custom fabrication included in this contract. Shop drawings are to be submitted at 3/4" (1:20) and/or 1-1/2" (1:10) scale and are to show dimensions, materials, details of construction, installation and relation of adjoining work requiring cutting or close fitting. Shop drawings are to also indicate reinforcements, anchorage and related work required for the complete installation of fixtures.

2. Submit shop drawings for any equipment requiring field assembly, including but not limited to, Waldorf cooking assemblies, pulper/extractor assemblies, remote refrigeration systems, walk-in coolers and/or freezers, exhaust hoods/ventilators, fire suppression system, utility distribution systems, pot/utility/ware washing assemblies/machines, and conveyors.

3. Before proceeding with the fabrication or manufacture of any item, Contractor is responsible for verifying and coordinating all dimensions and details, with site dimensions, conditions, and adjacent equipment.

G. Product Data Submittal Manuals:

1. Product Data submittals will include a cover sheet and detailed information on every item included in this Section. Detailed information is to include, but not be limited to, item number, description, quantity, model numbers, options and accessories provided, N.E.M.A. plug and receptacle configuration for applicable items, exact utility requirements, manufacturer's cut-sheets, reference to specific shop drawings, and etc. Distribute one additional copy of installation and start-up instructions to the Installer. Every cover sheet and associated detailed submittal is to provide sufficient and complete information for the Design Team to verify that the Contractor understands the Contract requirements, and is providing each item in compliance with the Contract documents. Cover sheets to also include associated items as listed on the Equipment Plan, but provided by others; and are to be noted as "Not In Section 11400 Contract Division".

2. Reproduction of any part of the Contract Specifications will not be acceptable as part or total of Contractor's Product Date Submittal Manuals. These Manuals are to be produced and assembled entirely by the Contractor.

H. Design Team's review of submittal drawings, shop details, product data brochures, and operation and maintenance manuals is for general conformance with the design concept and contract documents. Review markings or comments are not to be construed as relieving Contractor from compliance with the contract documents, or departures there from. Contractor remains responsible for details and accuracy, confirming and correlating all quantities and dimensions, selecting fabrication processes, techniques of assembly, and performing their work in a safe, satisfactory, and professional manner.

I. Commencement of purchasing or fabrication by the Contractor, of any item(s) included in this Contract, prior to receipt of reviewed Submittals from the Design Team, shall be at the Contractor's own risk; unless specifically instructed to do so in writing by the Owner, including the specific item numbers requested.

5.0 OPERATION AND MAINTENANCE DATA MANUALS:

A. Two (2) bound sets of manuals are to be furnished for items of standard manufacture on/or before the date of the first event to occur of the following: demo/start-up, start-up for intended use by the Owner/Operator, completion of installation of kitchen equipment contract package, or final acceptance of installation by Owner. Manuals are to be in alphabetical order according to manufacturer. Manufacturer's info is to include Tech Services telephone number, email, and web site address, where available.

B. Provide a complete list of local service agencies for included manufacturers, complete with address and telephone numbers. Also provide email and web site addresses, where available.

C. Provide video tapes and/or CD's for maintenance, training, operation, etc, where available.

6.0 AS-BUILT/ RECORD DOCUMENTS:

A. Maintain one record set of Foodservice Equipment Plans with any related corrections, revisions, additions, deletions, changes, etc. noted during construction and installation. Provide an "as-built" set in reproducible transparency form and electronic computer disk form.

B. Provide one (1) final set of Product Data Submittal Manual with any related corrections, revisions, additions, deletions, changes, etc. noted during construction and installation as a specifications record set.

C. These documents are to be provided at the same time as the O & M Data Manuals.

7.0 SCHEDULE:

A. Time is of the essence and acceptance constitutes assurance that the Contractor can and will obtain materials, equipment and manpower, to permit installation of the items included in this Section, on schedule. Contractor is to coordinate their work with the progress schedule, as prepared and updated periodically by the General Contractor or Construction Manager.

B. Anticipated delays, not within the control of the Contractor, are to be noted in a written notification to the Architect, immediately upon the Contractor's realization that delays are imminent.

C. Failure of manufacturers to meet promised delivery dates will not grant relief to the Contractor for failure to meet schedules; unless the Contractor can establish, in writing, that orders were received by the manufacturer, with reasonable lead times.

D. Extra charges resulting from special handling or air shipment in order to meet the schedule will be paid by the Contractor, if insufficient time was allowed in placing factory orders.

8.0 CONTRACTOR COORDINATION RESPONSIBILITY:

A. Contractor is responsible for coordinating with all applicable Design Team members, General Contractor, other Contractors and/or Sub-Contractors and Trades involved in this Project and associated with any items or work provided under this Section; as required for the successful provision, installation, completion, and functioning of these items and/or work, and the Project in general. This is to include, but not be limited to, exchange of shop drawings, details, and manufacturer’s information, supplying templates or actual components to be installed in or on items provided by other Sections, for coordination; and coordinating with and between their own internal staff, sub-contractors, trades, manufacturers, fabricators and installers, for compliance with the Contract Documents.

B. Contractor responsible for obtaining any documents referenced in this Section and on any associated drawings, which contains information relative to the performance of this Contract; and disseminating and coordinating the pertinent information contained in them, with the appropriate subcontractors, manufacturers, fabricators, and/or installers.

9.0 PRODUCT HANDLING:

A. Deliver materials (except bulk materials) in manufacturer's containers, fully identified with manufacturer's name, trade name, type, class, grade, size, color, item number, area, etc.

B. Contractor is responsible for receiving and warehousing equipment and fixtures, until ready for installation. Store materials, equipment and fixtures in sealed containers, where possible. Store off the ground and under cover, protected from damage.

C. Contractor to verify and coordinate conditions at the building site, particularly door and/or wall openings, and passages, to assure access for all equipment. Pieces too bulky for existing facilities are to be hoisted or otherwise handled with apparatus as required. All special handling equipment charges will be arranged for and paid for by Contractor.

10.0 PRODUCT PROTECTION:

A. To the best of their abilities, Contractor is to protect their equipment against theft or damage, until final acceptance by the Owner.

B. Use all means reasonable to protect the materials of this Section before, during, and after installation; and to protect the associated work and materials of the other trades.

C. Pre-fabricated walk-in coolers/freezers are not to be used as general storage; and should be locked before leaving the site daily. Damage and theft resulting from failure to secure units will be repaired or replaced at Contractor's expense.

11.0 WARRANTY:

A. Unless otherwise noted in Related Divisions, items furnished are to be fully guaranteed against defects in workmanship, materials, and functionality for one full year from the date of the start-up for intended use by the Owner/Operator.. Contractor or their service agent will make necessary repairs and replacements without charge to the Owner, and within a reasonable time.

B. Additional Refrigeration Warranty: in addition to the one-year warranty requirements as stated above, provide start-up, and parts and labor for the first year; plus additional four-year extended warranty on compressors. Extended warranty is for provision of replacement compressor, determined to be defective by a certified refrigeration mechanic. However verification of defective compressor, installation of replacement compressor, recharging and repairs of system will be the responsibility of the Owner. This includes all items with built-in or remote refrigeration system.

C. Periodic routine maintenance, servicing, adjustments, cleaning, etc., as required by the manufacturers included in this Project, are the responsibility of the Owner.

D. Any and all parts or requirements for manufacturer’s warranties to be in effect, whether or not noted in the itemized specifications, are to be provided or complied with by the Contractor. This is to include, but not be limited to, particular parts, accessories, or installation; installation supervision, start-up, and/or follow-up inspections required by factory trained, Certified, and/or authorized personnel. Factory training, Certification, and/or authorization are to be in effect at the time of bidding, installation, start-up, and warranty period of this Project.

12.0 EQUIPMENT:

A. Refer to schedule on Foodservice Drawings and Itemized Specifications for equipment included in this Section.

13.0 MATERIALS:

A. Metals:

1. Stainless Steel: AISI Type 201 or 302/304, hardest workable temper, and No.4 directional polish. Unless otherwise noted or specified, or required by the manufacturer, 201 may be used wherever 302/304 is listed.

2. Galvanized Steel Sheet: ASTM A526, except ASTM A527 for extensive forming; ASTM A525, G90 zinc coating, chemical treatment.

   a. Where painted finish is indicated, provide mill phosphatized treatment in lieu of chemical treatment.

3. Galvanized Steel Pipe: ASTM A53 or ASTM A120, welded or seamless, schedule 40, galvanized.

4. Steel Structural Members: Hot rolled or cold formed, carbon steel unless stainless steel is indicated.

   a. Galvanized Finish (G.I.): ASTM A123 hot-dipped zinc coating, applied after fabrication.

5. Aluminum: ASTM B209/B221 sheet, plate and extrusions (as indicated); alloy, temper and finish as determined by manufacturer/fabricator, except 0.40-mil natural anodized finish on exposed work unless another finish is indicated.

B. Insulation:

1. For low temperature applications, such as ice bins, cold pans, or fabricated under counter freezers, use urethane, rigid board foam or foamed-in-place; not less than 2” (50 mm) thick, except that vertical surfaces of cold pans and ice bins may be 1” (25 mm) thick. Insulation to be bonded at joints, to prevent condensation on exterior.

2. For refrigerated applications such as fabricated under counter refrigerators, use urethane rigid board foam or foamed-in-place, or Styrofoam rigid board foam 2” (50 mm) thick, bonded at joints. No fiberglass insulation will be permitted.

3. For heated type applications, such as plate warmers, use block type rock wool, minimum 1” (25 mm) thick.

4. At counters subject to direct or indirect heat from heating or cooking equipment, use 1” (25 mm) thick BNZ Materials, Inc. (303-978-1199) Marinite I, or equal, to insulate between counter and heat source. In addition, provide a 1” (25 mm) minimum air space between the heat source and the insulation.

5. All insulation is to be fully encased or enclosed in 16 gauge (1.6 mm) stainless steel.

C. Joint Materials:

1. Sealants: 1-part or 2-part, polyurethane or silicone based, liquid elastomeric sealant, non-solvent release type, Shore A hardness of 30, except 45 if subject to traffic. Sealants to be N.S.F. Listed for use in food zones. Surfaces cleaning and sealants installation to comply with applicable requirements of N.S.F. Standards, and accepted foodservice installation practices.

2. Backer Rod: For 3/8” (9.5 mm) or larger joints, to be polyurethane rod stock, larger than joint width.

3. Gaskets: Solid or hollow (but not cellular) neoprene or polyvinyl chloride; light grey, minimum of 40 Shore A hardness, self-adhesive or prepared for either adhesive application or mechanical anchorage.

14.0 FABRICATED PRODUCTS:

A. Casters:

1. Type and size as recommended by caster manufacturer, N.S.F. approved for the type and weight of equipment supported; normally 5” (127 mm) diameter heavy-duty, ball-bearing, solid or disc wheel with non-marking grease proof rubber, neoprene or polyurethane tire; unless otherwise specified. Minimum width of tread to be 1-3/16” (30mm). Minimum capacity per caster to be 250 pound (113.4kg), unless otherwise noted in itemized specifications.

2. Solid material wheels to be provided with stainless steel rotating wheel guard.

3. To be sanitary, have sealed wheel and swivel bearings and polished plated finish per N.S.F.

4. Unless otherwise indicated, equip each item with two (2) swivel-type casters and two (2) fixed casters, with foot brakes on two (2) casters.

5. Unless item is equipped with another form of all-around protective bumper, provide circular rotating bumper above each caster, 5” (127 mm) diameter tire of light grey synthetic rubber (hollow or closed-cell) on cadmium-plated disc.

B. Plumbing Fittings, Trim and Accessories:

1. General: Where exposed or semi-exposed, provide bright chrome plated brass or polished stainless steel units. Provide copper or brass where not exposed.

2. Vacuum Breakers: Provide with foodservice equipment as listed in the itemized specifications.

3. Water Outlets: At sinks and at other locations where water is supplied (by manual, automatic or remote control), furnish commercial quality faucets, valves, dispensers or fill devices, of the type and size indicated, and as required to operate as indicated.

4. Waste Fittings: Except as otherwise indicated, furnish 2” (50 mm) remote-lever waste valve, and 3-1/2” (89 mm) strainer basket.

C. Electrical Materials:

1. General: Provide standard materials, devices and components as recommended by the manufacturer or fabricator, selected and installed in accordance with N.E.M.A. standards and recommendations; and as required for safe and efficient use and operation of the foodservice equipment, without sanitation problems.

2. Components to bear the U.L. label or be approved by the prevailing authority.

3. Custom fabricated refrigerated/freezer units to be provided with vapor tight light receptacles, shatterproof lamps and automatic switches. Wiring to be concealed.

4. Where light fixtures are specified or detailed as part of counters, cases or fixtures; light fixtures with lamps to be furnished and installed. Warm white lamps to be provided, unless otherwise specified. If fluorescent light fixtures are specified, ballasts and tubes to be provided. Shields to be provided for all light fixtures.

5. Convenience and Power Outlets: Make cutouts and install appropriate boxes or outlets in fabricated fixtures, complete with wiring, conduit, outlet and stainless steel cover plate. Outlets and plugs to conform to N.E.M.A. standards. Electrical outlets and devices to be first quality "Specification Grade". GFCI outlets to be furnished where adjacent to sink compartments, as per the National Electrical Code.

6. Plugs and Cords: Where cords and plugs are provided, they are to comply with National Electrical Manufacturer's Association (N.E.M.A.) requirements. Indicate N.E.M.A. configuration for each applicable item.

7. Power Characteristics: Refer to Electrical Divisions specifications for project power characteristics. Also, refer to individual equipment requirements, for loads and ratings.

15.0 FABRICATION OF METALWORK:

A. General Fabrication Requirements:

1. Remove burrs from sheared edges of metalwork, ease the corners and smooth to eliminate cutting hazard. Bend sheets of metal, at not less than the minimum radius required to avoid grain separation in the metal. Maintain flat, smooth surfaces, without damage to finish.

2. Reinforce metal at locations of hardware, anchorages and accessory attachments wherever metal is less than 14 gauge (2 mm), or requires mortised application. Conceal reinforcements to the greatest extent possible. Weld in place, on concealed faces.

3. Exposed screws or bolt heads, rivets and butt joints made by riveting straps under seams and then filled with solder, will not be accepted. Where fasteners are permitted, provide Phillips head, flat or oval head machine screws. Cap threads with acorn nuts, unless fully concealed in inaccessible construction; and provide nuts and lockwashers unless metal for tapping is at least 12 gauge (2.5 mm). Match fastener head finish with finish of metal fastened.

4. Where components of fabricated metal work are indicated to be galvanized, and involve welding or machining of metal heavier than 16 gauge (1.6 mm), complete the fabrication and provide hot-dip galvanizing of each component, after fabrication, to the greatest extent possible (depending upon available dip-tank sizes). Comply with ASTM A123.

5. Welding And Soldering:

   a. Materials 18 gauge (1.3 mm), or heavier, to be welded.

   b. Seams and joints to be shop welded or soldered as the nature of the material may require.

   c. Welds to be ground smooth and polished to match original finish.

   d. Where galvanizing has been burned off, the weld is to be cleaned and touched up with high grade aluminum paint.

6. Provide removable panels for access to mechanical and electrical service connections, which are concealed behind or within foodservice equipment, but only where access is not possible and not indicated through other work.

7. Where ends of fixtures, splashbacks, shelves, etc., are open, fill by forming the metal or welding sections, if necessary, to close entire opening flush to walls or adjoining fixtures.

8. Rolled edges are to be as detailed, with corners bullnosed, ground and polished.

9. Equipment to have 1/2” (12.7 mm) or larger radius coves in horizontal and vertical corners, and intersections, per N.S.F. standards.

B. Metal And Gauges:

1. Except as otherwise indicated, fabricate exposed metalwork of stainless steel; and fabricate the following components from the gauge of metal indicated, and other components from not less than 20 gauge (1 mm) metal:

   a. Table and counter tops: 14 gauge (2 mm)

   b. Sinks and drainboards: 14 gauge (2 mm)

   c. Shelves: 16 gauge (1.6 mm)

   d. Front drawer and door panels: 18 gauge (1.3 mm) (double-pan type)

   e. Single pan doors and drawer fronts: 16 gauge (1.6 mm)

   f. Enclosed base cabinets: 18 gauge (1.3 mm)

   g. Enclosed wall cabinets: 18 gauge (1.3 mm)

   h. Exhaust hoods and ventilators: 18 gauge (1.3 mm)

   i. Pan-type insets and trays: 16 gauge (1.6 mm)

   j. Removable covers and panels: 18 gauge (1.3 mm)

   k. Skirts and enclosure panels: 18 gauge (1.3 mm)

l. Closure and trim strips over 4" (102 mm) wide: 18 gauge (1.3 mm)

m. Hardware reinforcement: 12 gauge (2.5 mm)

n. Gusset plates: 10 gauge (3.4 mm)

C. Work-Surface Fabrication:

1. Fabricate metal work surfaces by forming and welding, to provide seamless construction; using welding rods matching sheet metal, grinding and polishing. Where necessary for disassembly, provide waterproof gasketed draw-type joints with concealed bolting.

2. Reinforce work surfaces 30” (762 mm) on center both ways, with galvanized or stainless steel concealed structural members. Reinforce edges, which are not self-reinforced, by formed edges.

D. Metal Top Construction:

1. Metal tops to be one-piece welded construction, including field joints. Secure to a full perimeter galvanized steel channel frame cross-braced not farther than 30" (762 mm) on center. Fasten top with stud bolts or tack welds. If hat sections are used in lieu of channels, close ends.

2. Properly designed draw fastening, trim strip, or commercial joint material to suit requirement is to be used, only if specified.

E. Structural Framing:

1. Except as otherwise indicated, provide framing of minimum 1” (25 mm) pipe-size round pipe or tube members, with mitered and welded joints and gusset plates, ground smooth. Provide 14 gauge (2 mm) stainless steel tube for exposed framing, and galvanized steel pipe for concealed framing.

2. Where indicated, flange rear and end edges up to form splashes integrally with top, with vertical and horizontal corners coved of not less than 1/4” (6 mm) radius, die formed. Turn back splashes 1” (25 mm) to wall across top and ends with rounded edge on break, unless otherwise specified.

3. For die-crimped edges, use inverted "V" 1/2” (13 mm) deep inside and 2” (50 mm) deep on outside, unless otherwise shown. For straight down flanges, make 1-3/4” (45 mm) deep on outside. For bullnose edges, roll down 1-3/4” (45 mm).

4. Edges: die-formed, integral with top. For rounded corners, form to 1” (25 mm) radius, weld, and polish to original finish.

F. Pipe Bases: Construct pipe bases of 1-5/8” (41 mm) diameter 18 gauge (1.3 mm) stainless steel tubing. Fit legs with polished stainless steel sanitary adjustable bullet feet to provide for adjustment of approximately 1-1/2” (37 mm), without exposing threads. Space legs to provide ample support for tops, precluding any possibility of buckling or sagging, and in no case more than 6'-0" (1829 mm) centers.

G. Legs and Crossrails

1. Equipment legs and crossrails to be 1-5/8” (41 mm), 16 gauge (1.6 mm) stainless steel tubing.

2. Welds at cross rails to be continuous and ground smooth. Tack welds will not be acceptable.

3. Components:

   a. Stainless Steel Gusset: Stainless steel exterior to fit 1-5/8” (41 mm) tubing, with Allen screw for fastening and adjustment. Not less than 3” (76 mm) diameter at top and 3-3/4” (95mm) long. Outer shell 16 gauge (1.6 mm) stainless steel, reinforced with 12 gauge (2.5 mm) mild steel insert welded interior shell, or approved equal.

   b. Stainless Steel Low Counter Legs: Stainless steel exterior 5-3/4” (146 mm) minimum, 7” (178 mm) maximum length with stainless steel 3-1/2” (89 mm) square plate with four counter-sunk holes, welded to top for fastening.

   c. Stainless Steel Adjustable Foot: Stainless steel 1-1/2” (37 mm) diameter tapered at bottom to 1” (25 mm) diameter, fitted with threaded cold rolled rod for minimum 1-1/2” (37 mm) diameter x 3/4” (19 mm) threaded bushing plug welded to legs, or approved equal. Push-in foot not acceptable.

4. Legs to be fastened to equipment with gussets, as follows:

   a. Sinks: Reinforced with bushings and set screw.

   b. Metal Top Tables and Dish Tables: Welded to galvanized steel channels, 14 gauge (2 mm) or heavier, anchored to top with screws through slotted holes.

   c. Wood Top Tables: Welded to stainless steel channels, 14 gauge (2 mm) or heavier, anchored to top with screws through slotted holes.

H. Shelves:

1. Construct solid shelves under pipe base tables of 16 gauge (1.6 mm) stainless steel, with 1-1/2” (37 mm) turned down and under edges on exposed sides, and 2” (50 mm) turn up against walls or equipment. Fully weld to pipe legs.

2. In fixtures with enclosed bases, turn up shelves on back and sides with 1/4” (6 mm) (minimum) radius and feather slightly to ensure a tight fit to enclosure panels.

I. Sinks:

1. Construct sinks of 14 gauge (2 mm) stainless steel with No.4 finish inside and outside.

2. Form back, bottom and front of one piece, with ends and partitions welded into place. Partitions: double thickness, 2” (51 mm) minimum space between walls. Multiple compartments to be continuous on the exterior, without applied facing strips or panels.

3. Cove interior vertical and horizontal corners of each tub not less than 1/4” (6 mm) radius, die formed. Outer ends of drainboards to have roll rim risers not less than 3” (76 mm) high.

4. Drill faucet holes in splashes 2-1/2” (63.5 mm) below top edge. Verify center spacing with faucet specified.

J. Workmanship:

1. Best quality in the trade. Field verify dimensions before fabricating; conform all items to dimensions of building; neatly fit around pipes, offsets and other obstructions.

2. Fabricate only in accordance with approved shop drawings, showing pipes, obstructions to be built around, and location of utilities and services.

K. Casework:

1. Enclosure: except as otherwise indicated, provide each unit of casework (base, wall, overhead and free-standing) with a complete-enclosure metal cabinet, including fronts, backs, tops, bottoms, and sides.

2. Bases to be made of 18 gauge (1.3 mm) stainless steel sheets reinforced by forming the metal.

3. Ends, partitions and shelves to be stainless steel.

4. Unexposed backs and structural members to be galvanized, unless otherwise noted.

5. Vertical ends and partitions to be single wall, with a 2” (50 mm) face.

6. Sides and through partitions are flush with bottom rail, welded at intersections.

7. Shelves: Provide adjustable standards for positioning and support of shelves in casework; except bottom shelf of cabinet mounted on legs or as specified. Turn back of shelf units up 2” (50 mm) and hem. Turn other edges down to form open channel. Reinforce shelf units to support 40 pounds per square foot (195 kgs/sq meter) loading, plus 100 percent impact loading.

8. Bottom front rail of bases set on masonry platform to be continuously closed and sealed to platform.

L. Doors:

1. Metal doors to be double-cased stainless steel. Outer pans to be 18 gauge (1.3 mm) stainless steel with corners welded, ground smooth and polished. Inner pan to be 20 gauge (1 mm) stainless steel fitted tightly into outer pan with a sound deadening material such as Celotex or Styrofoam used as a core. The two pans to be tack welded together and joints solder filled. Doors to finish approximately 3/4” (19 mm) thick, and be fitted with flush recessed type stainless steel door pulls; or full length pulls as per individual itemized specifications and shown on Standard Detail FSD1-24.

2. Wood doors to be fabricated as detailed.

3. Hinged doors to be mounted on heavy-duty N.S.F. approved hinges, or as noted on plans or specifications.

M. Drawer Assemblies:

1. Assemblies to consist of removable drawer body mounted in a ball bearing slide assembly with fully enclosed housing.

2. Slide assembly consists of one pair of 200 pound (90 kilograms) capacity stainless steel roller bearing full extension slides, with side and back enclosure panels, front spacer angle, two drawer carrier angles, secured to slides and stainless steel front.

3. Drawers intended for tools and general non-food products storage are to have 20” x 20” x 6” deep (508 mm x 508 mm x 152 mm), 18 gauge (1.3 mm) minimum stainless steel drawer pans.

4. Drawers intended to hold food products are to have 12” x 20” x 6” deep (305 mm x 508 mm x 152 mm) stainless steel food pans.

5. All drawer pans to be easily removable without tools or disassembly of any drawer assembly components.

6. Drawer fronts are double cased, 3/4” (19 mm) thick, with 18 gauge (1.3 mm) stainless steel welded and polished front pan. Steel back pan is tightly fitted and tack welded. Sound deaden with rigid insulation material.

N. Closed Base: Where casework is indicated to be located on a raised-floor base, prepare casework for support without legs, and for anchorage and sealant application, as required for a completely enclosed and concealed base.

O. Support from Floor: Equip floor supported mobile units with casters, and equip items indicated as roll-out units, with manufacturer's standard one-directional rollers. Otherwise, and except for closed-base units, provide pipe or tube legs, with adjustable bullet-design feet for floor supported items of fabricated metalwork. Provide 1-1/2” (37 mm) adjustment of feet (concealed threading).

16.0 REFRIGERATION EQUIPMENT:

A. General:

1. Furnish either single or multiple compressor units, as specified or recommended by the manufacturer for the sizes and variations between connected evaporator loads as indicated.

2. Furnish units of the capacities indicated, arranged to respond to multiple-evaporator thermostats and defrosting timers. Include coils, receivers, compressors, motors, motor starters, mounting bases, vibration isolation units, fans, dryers, valves, piping, insulation, gauges, winter control equipment and complete automatic control system.

3. Refrigerant: Precharge units with type or types recommended by manufacturer for services indicated, with quick-disconnect type connections only where specified, ready to receive refrigerant piping runs to evaporators and (where remote) to condensers. All refrigerant and associated components to comply with the requirements of the Montreal Protocol Agreement. No CFC refrigerants or associated components will be permitted on this Project. HFC refrigerants and components to be used where available. HCFC refrigerants and components, with a minimum 2010 phase-out date, and intermediate replacement refrigerants are to be used only when HFC refrigerants are not available. Contractor is responsible for coordinating these requirements with manufacturers.

4. Foodservice equipment items included in this Section, with remote refrigerated systems, are to include interconnecting refrigeration lines, sizing, and insulation between components, as per manufacturer's installation instructions, and as determined by this Contractor's Certified Refrigeration Sub-Contractor; and only after a thorough examination of actual site conditions and obstacles which might affect the routing. Routing should be as direct and short as possible and practical. Refer to additional requirements listed in this Section 11400, Laws, Ordinances And Standards.

5. The minimum outdoor operating ambient temperature for design of units is -10 degrees Fahrenheit (-23 Centigrade), or lower as applicable for extreme low local conditions. The maximum indoor design temperature for operation of compressor units is 95 degrees Fahrenheit (35 Centigrade). The maximum outdoor ambient design temperature is to be determined by Contractor with prevailing conditions at mounting location of compressor, such as sun exposure, limited ventilation, high fences/walls, roof color and materials, local climatic extremes, etc.; but in no case is it to be less than 100 degrees Fahrenheit (37.8 Centigrade).

B. Components:

1. Coils for fabricated refrigerators to have vinyl plastic coatings, stainless steel housings; and be installed in such a manner as to be replaceable.

2. Remote refrigeration system to be complete with thermostatic expansion valves at the evaporator.

3. Fabricated refrigerated compartments to be fitted with flush dial thermometers, with chrome plated bezels. Thermometers to be adjustable, and shall be calibrated after installation. Thermometers to have an accuracy of + 2 degrees Fahrenheit (1 degree Centigrade).

4. Doors and drawers for walk-in coolers/freezers, and reach-in refrigerated compartments, both fabricated and standard, to be fitted with cylinder locking type latches, and provided with master keys.

C. Cold Pans: Ice pans, refrigerated pans and cabinets to be provided with breaker strips, where adjoining top or cabinet face materials, to prevent transfer of cold.

D. All mechanically cooled custom fabricated or standard buy-out refrigerators with openings in the top for cooling pans, and/or all built-in or drop-in mechanically cooled cold pans are to comply with, and be listed by N.S.F. Standard #7. Contractor is to verify that the specified unit complies with this requirement.

E. Ventilation of Refrigerated Equipment:

1. Adequate ventilation to be provided for custom fabricated equipment with integral refrigeration condensing units, both built-in and drop-in. If flow through ventilation cannot be provided, provide flow direction partitions and an additional fan capable of cooling the condensing unit.

2. If, in the opinion of the Contractor, additional room ventilation is required to ensure correct operating temperatures of standard buy-out, custom fabricated, or remote refrigeration condensing units, or compressor rack assemblies, they are to so state in a letter to the Architect, for evaluation and decision.

17.0 MISCELLANEOUS MATERIALS AND FABRICATION:

A. Manufactured Equipment Items: Furnish items as scheduled or herein specified. Verify dimensions, spaces, rough-in and service requirements, and electrical characteristics, before ordering. Provide trim, accessories and miscellaneous items for complete installation.

B. Insert Pans:

1. General: Cut-outs, openings, drawers, or equipment specified or detailed to hold stainless steel insert pans to be provided with a full complement of pans as follows:

a. One (1) stainless steel, 20 gauge (1 mm) minimum, solid insert pan for each space, sized per plans, details, or specifications.

b. Where pan sizes are not indicated in plans, details, or specifications, provide one full-size pan for each opening.

c. Provide maximum depth pan to suit application and space.

2. Provide 18 gauge (1.3 mm) removable stainless steel adapter bars where applicable.

3. All cut-outs and openings, or equipment specified or detailed to hold stainless steel insert pans, shall be provided with a hinged stainless steel removable night cover.

C. Tray Slides: Before fabrication of counters with tray slides, verify:

1. Size and shape of tray with Owner/Operator. Edge of tray should not overhang outer support/ slider by more than 2" (50 mm). If edge of tray exceeds this dimension, notify Architect, in writing, for evaluation and adjustment, if necessary.

2. Configuration of corners, turns, and shape of tray slides for proper support and safe guidance of trays.

3. Tray slide to be capable of supporting 200 pounds per linear foot (298 kgs/meter), live load.

D. Reasonable quietness of operation of equipment is a requirement, and Contractor will be required to replace or repair any equipment producing out-of-the-ordinary intolerable noise. This also includes providing and installing bumpers and gaskets for doors and drawers on fabricated and standard manufactured items, and sound insulation where feasible.

18.0 SITE EXAMINATION:

A. Verify site conditions under the provisions of the General Conditions, Supplementary Conditions and applicable provisions of Division 1 Sections. Notify the Architect, in writing, of unsatisfactory conditions for proper installation of foodservice equipment.

B. Verify wall, column, door, window, and ceiling locations and dimensions. Fabrication and installation should not proceed until dimensions and conditions have been verified and coordinated with fabrication details.

C. Verify that wall reinforcement or backing has been provided, and is correct for wall supported equipment. Coordinate placement dimensions with wall construction Section.

D. Verify that ventilation ducts are of the correct characteristics, and in the required locations.

E. Verify that utilities are available, of the correct characteristics, and in the required locations.

19.0 INSTALLATION:

A. Sequence installation and erection to ensure correct mechanical and electrical utility connections are achieved.

B. Install items in accordance with manufacturer's instructions.

C. Set each item of non-mobile and non-portable equipment securely in place, leveled and adjusted to correct height. Anchor to supporting substrate where indicated, and where required for sustained operation and use without shifting or dislocation. Conceal anchorages wherever possible. Adjust counter tops and other work surfaces to a level tolerance of 1/16” (1.6 mm) (maximum offset, and plus or minus on dimension, and maximum variation in 24" (610 mm) run from level or indicated slope). Provide anchors, supports, bracing, clips, attachments, etc., as required to comply with the local seismic restraint requirements. The Guidelines For Seismic Restraint Of Kitchen Equipment, as prepared for the Sheet Metal Industry Fund of Los Angeles and endorsed by S.M.A.C.N.A., is to be followed.

D. Provide closure plates and strips where required, with joints coordinated with units of equipment.

E. Provide sealants and gaskets all around each unit to make joints airtight, waterproof, vermin-proof, and sanitary for cleaning purposes.

F. Insulate to prevent electrolysis between dissimilar metals.

G. Cut and drill components for service outlets, fixtures, piping, conduit, and fittings.

H. Verify and coordinate the mounting heights of all wall shelves and equipment, with equipment located below them, for proper clearances.

I. Coordinate with the Plumbing and Electrical Divisions, and provide holes in food service equipment for plumbing and electrical service to and through the fixtures, as required. This includes welded sleeves, collars, ferrules, or escutcheons. These services are to be located so that they do not interfere with intended use and/or servicing of the fixture.

20.0 TESTING, START-UP AND INSTRUCTIONS:

A. Delay the start-up of equipment until service lines have been tested, balanced, and adjusted for pressure, voltage and similar considerations; and until water and steam lines have been cleaned and treated for sanitation.

B. Make arrangements for demonstration of foodservice equipment operation and maintenance, in advance with the Owner/Operator. Demonstrate foodservice equipment, to familiarize the Owner and the Operator on operation and maintenance procedures, including periodic preventative maintenance measures required. Include an explanation of service requirements and simple on-site service procedures, as well as, information concerning the name, address and telephone number of qualified local source of service. The individual(s) performing the demonstration are to be knowledgeable of operating and service aspects of the equipment.

C. Provide a written report of the demonstration, to the Owner, outlining the equipment demonstrated and malfunctions or deficiencies noted. Indicate individuals present at demonstration.

D. Final Cleaning: After testing and start-up, clean the foodservice equipment, and leave in a condition ready for the Owner to sanitize and use.

21.0 STANDARD DETAILS:

A. Refer to the individual Standard Details included in the Foodservice Equipment contract documents, for general fabrication information; as referenced in the custom fabricated Itemized Specifications.

22.0 ITEMIZED SPECIFICATIONS:

A. Refer to the cut sheets for specific specification information on each item.

SECTION 210000
FIRE SPRINKLERS

PART 1 – GENERAL

A. SCOPE.

1. WORK INCLUDED

a) Provide a complete hydraulically calculated automatic fire sprinkler system for the new building extending from the point of connection as indicated on the drawings to all areas of the building, including all necessary piping, devices, controls, labor, etc.

B. CODES AND STANDARDS

1. All work and materials shall conform with current rules and regulations of applicable codes. 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.

2. Applicable codes and standards shall include but are not necessarily limited to:

a) California Code of Regulations, Title 19, Public Safety, State Fire Marshal.

b) National Fire Protection Association Standards, 13, 13A, and 24.

c) Development Department, Inspection Division, County of Kern.

d) California Fire Code as amended and adopted by the City of Bakersfield.

e) California Building Code.

f) American Water Works Association (AWWA)

g) Cast Iron Soil Pipe Institute (CISPI)

h) National Electrical Code (NEC)

i) National Electrical Manufacturers Association (NEMA)

j) National Fire Protection Association (NFPA)

k) National Sanitation Foundation (NSF)

l) Occupational Safety and Health Act (OSHA)

m) Plumbing and Drainage Institute (PDI)

n) Underwriters' Laboratory (UL)

o) Requirements of local, state, and federal enforcing authorities codes and amendments to preceding codes shall be applicable to work performed under this specification.

p) These Codes and Standards shall be considered to supersede the drawings. Include necessary sums for any work required by these codes.

C. PERMITS AND FEES

1. The Contractor shall take out all permits and arrange for all tests in connection with such work as required. All charges are to be included in the work. All charges or fees for service connections, meters, etc., shall be included in the work.

D. COORDINATION OF WORK

1. Before starting any work, thoroughly examine all existing and newly completed underlying and adjoining work and conditions upon which the installation of this work is in any way dependent for the workmanship required by the Contract Documents. Report to the Architect and Engineer in writing any and all conditions which might adversely affect this work and limit ability to perform the required workmanship.

2. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc., shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements.

3. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Carefully investigate the mechanical, electrical, structural, architectural drawings and field conditions that could affect the work to be performed and arrange such work accordingly. Provide the required piping offsets, fittings, and accessories to meet such conditions.

4. Spaces provided in the design of the building shall be utilized and the work shall be kept within walls or furring lines established on the drawings. Any discrepancy between Architectural or Fire Sprinkler drawings with respect to wall or furring locations and dimensions shall be brought to the Architect's attention for resolution before proceeding with installation.

5. Any work which is done as an addition, expansion, or remodel of and existing system shall be compatible with that system.

E. DAMAGES BY LEAKS

1. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping or mechanical systems prior to completion of work and during the period of the guarantee.

F. OPENINGS, CUTTING AND PATCHING

1. 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 or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Restoration of all 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 and Engineer.

G. EXCAVATION AND BACKFILLING

1. Excavation and backfilling for work to be done under this Specification Section shall be done under this Section. All underground lines outside buildings shall be 2'-0" minimum backfill cover unless a greater depth of cover is recommended by the pipe manufacturer for the particular application. Width at top of pipe shall be 16" plus the outside width of pipe. Provide all shoring where required by site conditions.

2. Backfill

   a) 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.

   b) 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.

3. Compaction. Compact to density of 90% within building and under walkways, driveways, traffic areas, paved areas, etc. Demonstrate proper compaction by testing at 8" above top of pipe. Perform test at every 100' of trench. If a test fails, the compaction shall be re-worked in both directions back to test points that passed, before re-testing.

4. Electrical conduit shall not be run in excavations provided for mechanical systems.

5. Excavation and backfilling in a public right-of-way shall be done in strict accordance with the agency having jurisdiction.

H. HANGERS AND SUPPORTS.

1. Provide all hangers and supports for the proper installation of equipment and materials under this Section of the Specification.

2. Any structural element required to properly hang, brace, or support piping, etc., and not shown on the Architectural or Structural Drawings shall be provided under this Specification Section. All black steel structural elements shall be painted with two coats of primer.

3. Fire sprinkler pipes shall be supported and seismically braced in compliance with HCAI Pre-Approval No. OPM-00542 the "nVent CADDY Seismic Bracing for MEP Systems". Copies of the above publication and details shall be provided by the Contractor and maintained at the project site until final acceptance

I. CONTINUITY OF SERVICES

1. All existing services and systems shall be maintained except for short intervals when connections are to be made. The contractor shall be responsible for any interruptions of services and shall repair damage done to any existing service caused by the work.

2. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the architect immediately for further instructions.

J. ELECTRICAL CONNECTIONS

1. Provide under Specification Division 210000 all required control conduit, wiring, controls and control panels as indicated on the drawings or as may be required for system operation.

2. No control device shall be mounted with rigid connections on vibration isolated mechanical equipment. No field furnished control device shall be mounted on any piece of equipment so that it interferes with physical access of air or water flow, or covers any portions of nameplates or access doors.

K. FLASHING

1. Whenever any part of the Pipingl System(s) must penetrate the roof or outside wall, the openings shall be flashed and counter-flashed absolutely water tight with minimum 22 gauge galvanized sheet metal, prime coated. Flashing aprons shall extend not less than eight inches (8") from the pipe or supporting member in all directions unless detailed otherwise. All penetrations shall be flashed following the procedures of the National Roofing Contractor's Association.

L. PAINTING

1. Paint all black iron supports, hangers, anchors, etc., and all uninsulated black iron pipe work installed in weather exposed locations with one coat of rust resisting primer.

M. ACCESS DOORS AND PANELS

1. 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 or as required to match wall construction. 16-gauge steel frame and 14-gauge steel panel with paintable finish, except in ceramic tile, where panel shall be 16-gauge stainless steel with satin finish. Continuous hinge. Screwdriver latch. Deliver panels to the General Contractor for installation. Provide Zurn Z-1460-4 for square doors and Z-1460-5 for rectangular doors, Karp, or equivalent. Unless otherwise noted , the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12"x12"
1 valve up to 3"	16"x16"

N. SYSTEM IDENTIFICATION

1. Below Grade Piping. Bury a continuous, pre-printed, bright colored plastic ribbon marker with each underground pipe. Locate directly over buried pipe, 6" to 8" below grade

O. PROTECTIVE COATING FOR UNDERGROUND PIPING

1. All ferrous pipe below grade (except cast iron) shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, such as X-Tru-Coat or Scotchkote. All fittings and areas of damaged coating shall be covered with two layers of double wrap 10 mil polyvinyl tape to total thickness of 40 mils. Johns-Manville. Protective coating shall be extended 6" above surrounding grade.

P. DEFINITIONS

1. Provide. The term "provide" as used in these specifications or on the Drawing shall mean furnish and install.

2. Piping. The term "piping" as used in these Specifications or on the Drawings shall mean all pipe, fittings, nipples, valves, unions, hangers, and thermal insulation, etc., as may be required for a complete and functional system.

3. Wiring. The term "wiring" shall include the provision of all necessary products which are required for a complete installation and shall include products such as conduit, electrical boxes, connections, transformers, relays and switches.

Q. SUBMITTALS

1. Calculations

   a) If other than a pipe schedule is to be provided, submit PDF email copy following procedures outlined in Specification section 013323, Submittals. The hydraulic calculation shall use no more than 90% of the available pressure at the connection to the sprinkler riser.

2. Shop Drawings

   a) Complete working shop drawings of the sprinkler system shall be submitted to the engineer prior to installation for preliminary review and comment. Subsequent to the engineer's initial review and before commencing with any work, forward six (6) sets of Sprinkler Drawings to the City of Bakersfield Building & Safety Department and obtain approval of the Shop Drawings from these agencies.

   b) One (1) copy of the approved Sprinkler Plan shall be filed with the City of Bakerfield Building & Safety Department and two (2) copies returned to the engineer.

   c) Shop Drawings shall indicate the location of the existing street main water supply (including pressure and flow rate), system riser with the number of sprinkler heads served, distribution mains, effect of existing sprinkler system, etc.

R. TESTS

1. All testing shall be done in accordance with NFPA Standard 13 and under the observation of an inspector from the authority having jurisdiction. Work to be concealed shall not be enclosed until prescribed tests are satisfactorily completed and accepted.

S. PROJECT CLOSE-OUT

1. Record Drawings

   a) Provide in accordance with general conditions of the specifications.

2. Operation and Maintenance Manual

   a) Provide three (3) copies of Operation and Maintenance Manuals to the Engineer for review and acceptance. Provide the Owner's designated representative with one copy of the approved O & M manual.

   b) Bind Operation and Maintenance Manuals for each Mechanical System (Plumbing, Air Conditioning, etc.) in a hard-backed binder. Cover of each binder shall have the following lettering:

OPERATION
AND
MAINTENANCE
MANUAL
ROSAMOND HIGH SCHOOL
CAFETERIA BUILDING
SOUTHERN KERN UNIFIED SCHOOL DISTRICT
ROSAMOND, CA

c) Provide a master index at the beginning of Manual showing items included. Use plastic tab indexes for the sections of the Manual. Provide a sub-section with manufacturer's descriptive literature for each item of installed equipment with model, capacities, and all other pertinent information highlighted.

1. Maintenance Instructions. Provide:

   a) Summary list of equipment used indicating name, model and nameplate date of each item together with number and name associated with each system item.

   b) Manufacturer's maintenance instructions for each piece of equipment installed in project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment and maintenance and lubrication instructions.

2. Section 5, Warranties. Provide:

   a) A copy of each manufacturer's warranty statement, completely filled out and indicating date forwarded to the respective manufacturer.

PART 2 - MATERIALS

A. PIPE AND FITTINGS

1. Outside Building to 5'-0" from Building Wall (under ground).

   a) Class 150 polyvinyl chloride (PVC) pressure pipe with integral bell and spigot joints with an elastomeric ring, meeting the requirements of AWWA C900, DR18, and shall be listed and approved by Underwriters Laboratories and Factory Mutual, respectively. Sealing ring shall comply with the requirements of ASTM D-1896 and E-477.

2. From 5'-0" Outside Building (underground) to Inside Building +6" Above Floor at Riser.

   a) Ductile iron, AWWA C151, 150 PSIG, bituminous coated exterior. Provided flanged anchors connected to interior piping.

3. Inside Building From 6" Above Floor

   a) 2" & smaller Pipe Size: Schedule 40 black steel ASTM A53 or A120. Joints shall be threaded malleable iron, ANSI B16.3, Class 125.

   b) 2-1/2" & Larger Pipe Size: Schedule 10 black steel pipe, ASTM A135. Joints shall be UL and FM approved mechanical couplings and shall not be welded. Couplings may be of the bolted rolled groove type or the mechanical locking push-on type. Groves for the rolled grooves type shall be rolled only. Pipe end preparations for the mechanical coupling shall be as follows.

      1) Group components shall be of one manufacturer.

2) Utilized grooving tools shall be acceptable to fitting manufacturer and shall be limited to Victaulic, Ridge Tool Company, or Pace without substitution.

B. PIPING PROTECTIVE WRAP

1. All steel piping buried below shall be factory coated with "Scotchkote" 101 epoxy resin as manufactured by 3-M Company, or "X-Tru-Coat" as Manufactured by Pipe-Line service Corp. Field joints shall be wrapped with "Scotchwrap" #50 or coated with "Scotchkote" 302.

2. Provide a continuous test of all pipe covering, including field joints, prior to backfilling. This test shall be made using a “Holiday Detector” as manufactured by Tinker and Rascor Co., or approved equal. Test at an electrical voltage of 10,000 volts D.C.. Any wrap holiday found shall be patched and retested. This test shall be done in the presence of the owner’s inspector.

C. VALVES

1. Control Valves for Sprinkler Systems

   a) Solid wedge gate, rising stem, O.S.&Y., 175 psi w.p., U.L. Listed, provided with tamper switches.

2. Globe Valves

   a) Bronze union bonnet, renewable composition disc, 175 psi w.p., U.L. Listed, provided with tamper switches.

3. Check Valves

   a) 2" and Smaller: All bronze swing check. 175 psig WOG. U.L. Listed

   b) 2-1/2" and Larger: Iron body, bronze mounted swing check. 175 psig WOG. U.L. Listed

4. Gate Valves

   a) 2" and Smaller: All bronze, rising stem. 200 psi WOG. U.L. Listed, provided with tamper switches.

   b) 2-1/2" and Larger: Iron Body, bronze mounted, outside screw and yoke. 175 psi WOG. U.L. Listed. (U.L. Listed butterfly valves may be substituted for 4" and larger gate valves). Provide with tamper switch.

D. SPRINKLER HEADS

1. Automatic spray sprinkler heads of suitable operating temperature shall be provided.

2. Up-right, pendant, or flush type shall be provided, as required.

3. In all areas with ceilings such as offices, work rooms, and corridors, etc., provide flush type heads. Heads installed in areas with finished ceilings shall have metal escutcheons with same finish as heads (Chrome Plated).

4. Provide side wall heads where indicated on the drawing or required by job condition. Escutcheons for side wall heads shall have finish to match color of wall.

5. Temperature ratings shall be in accordance with NFPA Pamphlet 13. Heads shall have chrome finish in areas with finished ceilings, standard finish in areas with exposed piping, lead coating on outdoor areas.

6. Heads installed lower than eight feet above the floor shall have wire guards.

7. Provide extra heads (of each type installed) in accordance with code requirements.

E. TEST AND DRAIN CONNECTION

1. Install horizontal piping graded to low points and in a manner to make it possible to test and empty the entire system. Provide valves and piping of size as approved on accordance with NFPA Pamphlet 13.

PART 3 - INSTALLATION

A. GENERAL

1. The Sprinkler Drawings are schematic and indicate generally the system and equipment to be used. Architectural and structural conditions or drawings and existing conditions shall govern the exact location for all piping and sprinkler heads. Lay out and coordinate the sprinkler work with the work of other trades and confirm the locations of and install sleeves and hangers so that work of other trades is not impeded. Care shall be taken to secure best possible head room in location of sprinkler heads. Coordinate installation of sprinkler piping to avoid interference with adjacent air conditioning, plumbing, etc. Sprinkler piping must clear all overhead equipment.

2. All sprinkler heads shall be located on center-line of, corridor, light fixtures, air conditioning outlets ceiling panels as generally indicated and whenever possible to present a neat organized appearance.

3. Fire caulk all piping penetrations per a U.L. approved caulking assembly, at all piping penetrations of walls aand floors.

B. PIPING

1. All piping shall be seismically braced and shall be done on compliance with NFPA 13, latest edition.

2. Run in line with the building walls. Turns and bends shall be made with standard fittings.

3. On branch line piping, provide at least one hanger between every two sprinkler heads and a maximum of 12' apart. End Sprinklers more than thirty inches (30") from any hanger shall be supported by a hanger not less than 12" from the sprinkler head.

C. SLEEVES

1. Non-Rated Assemblies

a) Sleeves for pipe passing through concrete floors or walls shall be schedule 40 galvanized steel pipe of size sufficient to permit the pipes to pass through with a minimum clearance of 1" between sleeves and pipe for pipe up to 3-1/2" and 2" clearance for pipe larger than 4". Sleeves shall have square ends cut flush with surface and shall be caulked tight. Sleeves through floors shall extend 1" above finished floor surface.

2. Rated Assemblies

a) Same as for non-rated assemblies except that sleeves shall be packed for its entire length with UL listed system three hour classification such as a 3M FireDam 160 caulk at ends and mineral wool batt material stuffer in middle of penetration.

D. ESCUTCHEONS

1. Chrome plated, brass. Crane, with set screw.

E. DRAINAGE OF SYSTEM

1. All sprinkler pipe and fittings shall be installed so that the sprinkler system can be completed drained. Piped shall be pitched at 1/4" per foot.

F. FLUSHING CONNECTION

1. Shall be installed on the sprinkler system where necessary.

G. VALVE SUPPORTS

1. All piping carrying fire valves shall be securely fastened to the building structure and each valve to prevent movement of valves because of manual pressure to the valves.

H. CLEANING

1. All cement, plaster, etc., shall be removed with an approved solvent. All foreign mater shall be thoroughly flushed from inside if pipes before fabrication.

I. TESTS

1. General: At various stages and upon completion the system shall be tested in the presence of a representative of the enforcing authority.

2. Tests Shall Include

   a) Flushing Test in accordance with NFPA 13, Paragraph 8-2.1.

   b) Hydrostatic Test in accordance with NFPA 13. Paragraph 8-2.2.

   c) System Operational Tests in accordance with NFPA 13, Paragraph 8-2.4.

J. CERTIFICATION

1. At the completion of the installation a certificate of inspection from the authority having jurisdiction indicating that the installation and testing is in accordance with reference standards, shall be delivered to the owner.

2. Along with the certificate of inspection furnish the owner with a copy of NFPA Pamphlet 13A, Care and Maintenance of Sprinkler Systems. Also provide a copy of Title 19, California Code of Regulations, Article 4, Maintenance and Service, Paragraphs 904.1 and 904.2.

END OF SECTION

SECTION 220000
PLUMBING

PART 1 – GENERAL

A. DIVISIONS 00 AND 01 ARE A PART OF THIS SECTION

B. SCOPE.

1. Work 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:

    a. A complete system of sanitary soil, waste and vent piping including connection to site utility, waste, grease waste, and drain connections to all fixtures and equipment.

    b. A complete system of hot and cold water piping including connection to site utility, and connections to fixtures and equipment.

    c. A complete system of natural gas fuel piping including to site main and connections to all gas utilizing equipment.

    d. Condensate drains from air conditioning and refrigeration units.

    e. Area drains, roof drains, and rainwater leaders.

    f. Furnishing, mounting and final connections to fixtures and equipment as shown or scheduled on the plumbing and architectural drawings that is part of any system listed above.

    g. Final connections to equipment provided in other sections of these specifications or indicated as furnished by owner and installed by the contractor.

    h. Demolition of all plumbing fixtures, equipment and piping systems indicated or required to be removed or modified.

    i. Acceptance testing as required under California Building Energy Efficiency Standards, Title 24.

    j. Coordination with acceptance testing technician (ATT) and / or commissioning agent. Acceptance testing and / or commissioning required where noted in construction documents or per code requirements.

C. CODES AND STANDARDS

1. All work and materials shall conform with current rules and regulations of applicable codes. 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.

    a. Applicable codes and standards shall include but are not necessarily limited to:

        i. California Code Of Regulations:

            1. Title 8, Industrial Relations
            2. Title 17, Public Health
            3. Title 19, Public Safety
            4. Title 21, Public Works
            5. Title 24, Energy Regulations

        ii. California Building Code.

        iii. California Mechanical Code

        iv. California Plumbing Code

        v. American Society for Testing and Materials (ASTM)

        vi. American Water Works Association (AWWA)

        vii. Cast Iron Soil Pipe Institute (CISPI)

        viii. National Electrical Code (NEC)

        ix. National Electrical Manufacturers Association (NEMA)

        x. National Fire Protection Association (NFPA)

        xi. National Sanitation Foundation (NSF)

        xii. Occupational Safety and Health Act (OSHA)

        xiii. Plumbing and Drainage Institute (PDI)

        xiv. Americans with Disabilities Act. Accessibility Guidelines for Buildings and Facilities. (ADAAG).

D. COORDINATION OF WORK

1. Before starting any work, thoroughly examine all existing and newly completed underlying and adjoining work and conditions upon which the installation of this work is in any way dependent for the workmanship required by the Contract Documents. Report to the Architect and Engineer in writing any and all conditions which might adversely affect this work and limit ability to perform the required workmanship.

2. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc., shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements. Verify the proper voltage and phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment.

3. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Carefully investigate the mechanical, electrical, structural, architectural drawings and field conditions that could affect the work to be performed and arrange such work accordingly. Provide the required piping and ductwork offsets, fittings, and accessories to meet such conditions.

4. Spaces provided in the design of the building shall be utilized and the work shall be kept within walls or furring lines established on the drawings. Any discrepancy between Architectural or Mechanical drawings with respect to wall or furring locations and dimensions shall be brought to the Architect's attention for resolution before proceeding with installation.

5. Any work which is done as an addition, expansion, or remodel of and existing system shall be compatible with that system

E. MANUFACTURER'S RECOMMENDATIONS

1. All material, equipment, and devices, etc., shall be installed in a manner meeting approval of the manufacturer of the particular item. The Contractor shall make himself available of all installation manuals, brochures, and procedures that the manufacturer issues for the equipment and material. Contractor shall be held responsible for all installations contrary to the manufacturer's recommendations. Contractor shall make all necessary changes and revisions to achieve such compliance.

F. GUARANTEE

1. 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.

G. QUIETNESS

1. Piping of all types, ductwork, and equipment shall be arranged and supported so that the vibration is at a minimum and is not transmitted to the building structure.

H. DAMAGES BY LEAKS

1. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping or mechanical systems prior to completion of work and during the period of the guarantee.

I. SUBMITTALS

1. Shop Drawings. Within 30 days of contract award, the Contractor shall submit PDF email copy of shop drawings for all materials, equipment, etc., proposed for use on this project. 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:

    a. 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 contract documents. Descriptive literature shall be current manufacturer's brochures and submittal sheets.

    b. All shop drawings shall be submitted with title sheet including Project Title, Architect, Engineer, 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 the are proposed. All equipment shall also be identified by the mark number as indicated on drawings. Submittals shall bear the stamp of certification by the Contractor as evidence that the Contract Documents (Specifications and Drawings) have been thoroughly checked.

    c. 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. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.

2. 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.

a. 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. Submittals for products and equipment offered as an alternate to that specified will require, if accepted by the Engineer, resubmission of the Title 24 Energy Compliance Calculations if the specified product or equipment was included within the scope of the approved calculations on file with the reviewing authority. The cost of preparing resubmission will be the responsibility of the Contractor.

J. OPENINGS, CUTTING AND PATCHING

1. 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 or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Restoration of all 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 and Engineer.

K. DEMOLITION

1. Existing equipment, ducts, piping, valves, fittings, devices, etc., requiring removal shall be removed and delivered to the Owner at a location on the job site to be determined by the Owner. Those items determined by the Owner to be of no value shall become the property of the Contractor and shall be removed from the job site by the Contractor at the Contractor's expense.

2. Existing piping, ducts, and services, etc., requiring capping or plugging shall be capped or plugged below floors, behind walls, above ceilings or above roof unless otherwise noted.

L. EXCAVATION AND BACKFILLING

1. Excavation and backfilling for work to be done under this Specification Section shall be done under this Section. All underground lines outside buildings shall be 2'-0" minimum backfill cover unless a greater depth of cover is recommended by the pipe manufacturer for the particular application. Width at top of pipe shall be 16" plus the outside width of pipe. Provide all shoring where required by site conditions.

2. Backfill

a. 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.

b. 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.

3. 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 8" above top of pipe. Perform test at every 100' of trench. If a test fails, the compaction shall be re-worked in both directions back to test points that passed, before re-testing.

4. Electrical conduit shall not be run in excavations provided for mechanical systems.

5. Excavation and backfilling in a public right-of-way shall be done in strict accordance with the agency having jurisdiction.

M. HANGERS AND SUPPORTS.

1. Provide all hangers, bracing, and supports for the proper installation of equipment and materials under this Section of the Specification.

2. Any structural element required to properly hang or support piping, ducts, or equipment, etc., provided under this Specification Section and not shown on the Architectural or Structural Drawings shall be provided under this Specification Section.

3. All plumbing piping shall be supported and seismically braced in compliance with HCAI Pre-Approval No. OPM-00542 the "nVent CADDY Seismic Bracing for MEP Systems". Copies of the above publication and details shall be provided by the Contractor and maintained at the project site until final acceptance

N. PAINTING

1. Paint all black iron supports, hangers, anchors, etc., and all uninsulated black iron pipe work installed in weather exposed locations with one coat of rust resisting primer.

O. CONTINUITY OF SERVICES

1. All existing services and systems shall be maintained except for short intervals when connections are to be made. The contractor shall be responsible for any interruptions of services and shall repair damage done to any existing service caused by the work.

2. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the architect immediately for further instructions.

P. ELECTRICAL CONNECTIONS

1. Provide under Specification Division 23 00 00 all required control conduit, wiring, controls and control panels as indicated on the drawings or as may be required for system operation.

2. No control device shall be mounted with rigid connections on vibration isolated mechanical equipment. No field furnished control device shall be mounted on any piece of equipment so that it interferes with physical access of air or water flow, or covers any portions of nameplates or access doors.

Q. Electrical Coordination

1. Prior to commencing construction arrange a conference with the electrical and mechanical trades as well as equipment suppliers and verify types, sizes, locations, voltage requirements, controls and diagrams of all equipment furnished by them. In writing, inform the Architect that all phases of coordination of this equipment have been covered and if there are any unusual conditions or problems they shall be enumerated at this time.

R. FLASHING

1. Whenever any part of the Mechanical System(s) must penetrate the roof or outside wall, the openings shall be flashed and counter-flashed absolutely water tight with minimum 22 gauge galvanized sheet metal, prime coated. Flashing aprons shall extend not less than eight inches (8") from the duct, pipe, or supporting member in all directions unless detailed otherwise. All penetrations shall be flashed following the procedures of the National Roofing Contractor's Association.

S. DEFINITIONS

1. Provide. The term "provide" as used in these specifications or on the Drawing shall mean furnish and install.

2. Piping. The term "piping" as used in these Specifications or on the Drawings shall mean all pipe, fittings, nipples, valves, unions, hangers, and thermal insulation, etc., as may be required for a complete and functional system.

3. Wiring. The term "wiring" shall include the provision of all necessary products which are required for a complete installation and shall include products such as conduit, electrical boxes, connections, transformers, relays and switches.

T. ACCESS DOORS AND PANELS

1. 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 or as required to match wall construction. 16-gauge steel frame and 14-gauge steel panel with paintable finish, except in ceramic tile, where panel shall be 16-gauge stainless steel with satin finish. Continuous hinge. Screwdriver latch. Deliver panels to the General Contractor for installation. Provide Zurn Z-1460-4 for square doors and Z-1460-5 for rectangular doors, Karp, or equivalent. Unless otherwise noted , the minimum sizes shall be as follows:

    a. 1 valve up to 1-1/2" 12"x12"

    b. 1 valve up to 3" 16"x16"

    c. Fire damper, VAV box, coil 16"x16"

U. SYSTEM IDENTIFICATION

1. 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, by stenciled marking or decals, and include arrows to indicated direction of flow. Locate markers at end 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 of equipment connections are not required. Decals pasted, glued, or adhered to piping or insulation shall be Seton "Setmark", or equivalent. Decals or stencils shall be applied after the painting of all piping systems is complete and after preliminary acceptance of piping system. Decals and stencils shall comply with ANSI and OSHA specifications with respect to marker size, color, and legend.

2. Below Grade Piping. Bury a continuous, pre-printed, bright colored plastic ribbon marker with each underground pipe. Locate directly over buried pipe, 6" to 8" below grade

3. Equipment. All equipment shall be identified with a plastic laminated engraved nameplate which bears the unit number marked as indicated on the drawings (e.g. WH-1) Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the unit.

V. PROTECTIVE COATING FOR UNDERGROUND PIPING

1. All ferrous pipe below grade (except cast iron) shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, such as X-Tru-Coat or Scotchkote. All fittings and areas of damaged coating shall be covered with two layers of double wrap 10 mil polyvinyl tape to total thickness of 40 mils. Johns-Manville. Protective coating shall be extended 6" above surrounding grade.

W. CONCRETE ANCHORS

1. Steel bolt with expansion anchor requiring a drilled hole - powder driven anchors are not acceptable. Minimum concrete embedment shall be 4½ diameters. Minimum spacing shall be 10 diameters center to center and 5 diameters center to edge of concrete. Maximum allowable stresses for tension and shear shall be 80% of the ICBO test report values. Hilti, Phillips. Wej-it.

X. PROJECT CLOSE-OUT

1. Record Drawings

    a. Provide in accordance with general conditions of the specifications.

2. Operation and Maintenance Manual for Mechanical Systems

    a. Provide three (3) copies of Operation and Maintenance Manuals to the Engineer for review and acceptance. Provide the Owner's designated representative with one copy of the approved O & M manual. Bind Operation and Maintenance Manuals for each Mechanical System (Plumbing, Air Conditioning, etc.) in a hard-backed binder. Cover of each binder shall have the following lettering:

OPERATION
AND
MAINTENANCE
MANUAL
ROSAMOND HIGH SCHOOL
CAFETERIA BUILDING
SOUTHERN KERN UNIFIED SCHOOL DISTRICT
ROSAMOND, CA

Provide a transmittal letter at the beginning of the manual on the Contractor's letterhead. Letter shall be signed by a contractor principal (Owner or Corporate Officer) and shall be countersigned by the Owner's designated representative and shall indicate the date when the mechanical systems were shown and explained in detail to the Owner's designated representative. (The Engineers office shall be notified 48 hours minimum prior to the owner-contractor meeting.)

Provide a master index at the beginning of Manual showing items included. Use plastic tab indexes for the sections of the Manual.

Section 1, General. Provide:

Name of Architect, Mechanical Engineer, Contractor and Mechanical Sub-Contractor.

A complete list of installed equipment with project mark number, indicating name of vendor, address and phone number.

A sub-section with manufacturer's descriptive literature for each item of installed equipment with model, capacities, and all other pertinent information highlighted.

Section 2, Operating instructions. Provide:

General description of each separate system and sub-system.

Step by step procedure to follow in putting each piece of mechanical equipment into operation. Start-up sheets must be signed by the owner of the installing contractor certifying that the start-up has been completed per manufacturer’s written instruction.

Schematic as-built control diagrams for each separate system. Diagrams shall bear the date of the acceptance of the project. Include all temperature control panels and their respective functions.

Section 3, Maintenance Instructions. Provide:

Summary list of mechanical equipment used indicating name, model, serial number, and nameplate date of each item together with number and name associated with each system item.

Manufacturer's maintenance instructions for each piece of mechanical equipment installed in project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment and maintenance and lubrication instructions.

Section 4, Warranties. Provide:

A copy of each manufacturer's warranty statement, completely filled out and indicating date forwarded to the respective manufacturer.

PART 2 - MATERIALS

A. PIPING

1. Domestic Cold Water

    a. Inside Building, Above Grade or Slab

        i. Type "L" hard drawn copper tubing with wrought copper solder joint fittings, NIBCO, ANACONDA, or acceptable equivalent. Joints shall be made with 95.5 solder, such as Silavoy Streamline 122, Silvabrite 100 or acceptable "lead free" equivalent. Pipe to be reamed to full bore, de-burred, and joint area cleaned with a Trisodiumphosphate solution prior to joining.

        ii. Where allowed under local and state building codes: Pro-Press pipe joining system for copper piping.

    b. Outside Building, Below Grade, Slab, and Paved Areas.

        i. Schedule 40 galvanized steel with galvanized malleable iron banded 150 lb. fittings. Pipe shall be protected as specified elsewhere in this section.

        ii. Polyvinylchloride (PVC) pressure rated Schedule 40, ASTM D 2241, with rubber rings, ASTM D 1869. Piping shall be equivalent to Johns-Manville "Ring-Tite" and shall be installed in strict compliance with Manufacturer's Installation Guide. Where sizes shown are smaller than those available with “Ring-Tite” pipe, use schedule 80 PVC glued pipe and fittings. Piping option only where local codes allow its use.

        iii. Type "K" hard drawn. All else per copper specification above.

2. Domestic Hot Water.

    a. Inside Building, Above grade or slab

        i. Same as Cold Water Piping - Inside Building.

    b. Outside Building, Below Grade, Slab, and Paved Areas.

        i. Pre-insulated, Type K copper core. 1" foamed polyurethane insulation. Polyvinylchloride jacket. Sealed ends. Rubber ring internal slip joint. Fittings shall be wrought copper, with brazed joints (1100°F, min.) Ricwill, Thermal Pipe Systems.

3. Soil Waste and Vent Pipinp

    a. Inside Building and Within 5 Feet of Building Wall

i. Coated standard weight cast iron pipe and fittings, CISPI Standard 301 and ASTM A-888. Joints shall be ABI "No-Hub" stainless steel band, mechanically assembled (no welds), conforming to ASTM C564.

ii. Vent piping and waste piping above floor 2-1/2" diameter maximum may be standard weight galvanized steel pipe.

b. Outside Building

i. Johns-Manville ring-tite, or equivalent, polyvinylchloride (PVC) gravity pipe, where permitted by local codes, complying with ASTM 03034-SDR 35 with joints using flexible elastomeric seals meeting requirements of ASTM D-3212.

4. Condensate Drains

a. Type “L” hard drawn copper tubing with wrought copper solder joint fittings. All changes in direction of condensate drain shall be accomplished with plugged tees. Drains shall be extended as indicated on drawings or to nearest acceptable fixture or vent if not indicated.

5. Gas Piping

a. Inside Building and Above Grade

i. 2" and Smaller. Black steel pipe Schedule 40 with 150 psi threaded black malleable fitting. All joints shall be treated with code approved pipe dope. Flexible appliance connectors shall be convoluted stainless steel with dielectric couplings, AGA for indoor and outdoor use. Connector shall be AGA certified laboratory approved for vibration resistance.

ii. 2½” thru 4”. Same as above except with welded fittings.

iii. 5” and Larger. Same as above except with standard weight carbon steel weld fittings, long radius ells, ANSI B16.9.

b. Outside Building Below Grade

i. Black steel pipe Schedule 40 with welded fittings and joints. Protect as specified elsewhere in this section.

ii. Polyethylene pipe and fittings, ANSI B31.8. ASTM D 2513, DuPont Alloy "A" or Nipak

6. Exposed Pipe at Fixtures

a. Chrome plated red brass pipe, iron pipe size, with threaded cast bronze chromium plated couplings and fittings. Any pipe required to extend from finish wall into exposed view within Toilet Rooms shall be chrome plated.

7. Piping Protective Wrap

    a. All galvanized or black steel piping buried below grade shall be factory coated with Scotchkote 101 Epoxy Resin as manufactured by 3M Company, or "X-tru-Coat" as manufactured by Pipe Line Service Corp. Field joints shall be wrapped by Scotchrap #50 or coated with Scotchkote 302 as recommended by manufacturer. In lieu of above, pipe may be machine-wrapped with Scotchrap #51. 50% lapped with joints per above.

    b. Provide a continuous test of all pipe covering, including field joints, prior to backfilling. This test shall be made using a “Holiday Detector” as manufactured by Tinker and Rascor Co., or approved equal. Test at an electrical voltage of 10,000 volts D.C.. Any wrap holiday found shall be patched and retested. This test shall be done in the presence of the owner’s inspector

8. Concrete Thrust Blocks

    a. Shall be constructed at all valves, tees, elbows, bands, crosses, reducers and dead ends in loose-joint pipe. Blocks shall cure a minimum of 7 days before pressure is applied. Concrete shall be 2000 psi min.

9. Rain Water Leaders

    a. Shall be coated service weight cast iron "No-Hub" pipe and fittings CS 188. Joints shall be ABI "No-Hub" stainless steel bands, mechanically assembled (no welds).

10. Exposed Pipe at Fixtures

    a. Chrome plated red brass pipe, iron pipe size, with threaded cast bronze chromium plated couplings and fittings. Any pipe required to extend from finish wall into exposed view within Toilet Rooms shall be chrome plated.

B. Valves

1. General

    a. Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Grinnell, Nibco, or Stockham are acceptable. Use ball valves for 1-1/2" and smaller domestic hot and cold water, and gate valves for 2" and larger size.

2. Gate Valve

    a. 2" and Smaller. All bronze, Malleable iron hand wheel, Rising stem, Union bonnet, Wedge disc, 200 psi WOG, Stockham B-105.

    b. 2-1/2" and Larger. Iron body, bronze mounted, Non-rising stem, Wedge disc, 200 psi WOG, Flanged or AWWA hub end as applicable. Stockham G-612.

Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves.

3. Check Valves

    a. 2" and Smaller. All bronze swing check, regrinding. 200 psi WOG. Stockham B-319.

    b. 2-1/2" and Larger. Swing check, iron body, brass mounted seats, Class 125. Stockham G-931.

4. Ball Valve.

    a. Bronze body, cap, stem, disk and ball. Screwed connection. Lever handleTFE seat. O-ring seals. 600 psi WOG. Consolidated Brass “Apollo”, Grinnell,

5. Plug Valves

    a. Lubricated plug cock. Cast iron or semi-steel body and plug. 200 PSI WOG. Flanged. Wrench handle. U.L. listed for gas distribution. Resun R-1430 Walworth 1700 F. Ball valves with U.L. listing for gas distribution and equivalent or higher pressure rating may be substituted for 2" and smaller plug valves. Apollo, Watts.

C. Insulation

1. General

    a. All insulation shall comply with the requirements per the California Building energy Efficiecny standards, Title 24. Refer to Table 120.3-A, Pipe Insulation Thickness

    b. All insulation shall be provided in accordance with the "National Insulation Contractors Association" manuals. Insulation shall be applied by a contractor holding a valid California C-2 License.

    c. All insulation jackets and lapseal adhesives shall be tested as a composite product in accordance with UBC Standard No. 42-1 and shall have a flame spread of not more than 25 and a smoke developed rating of not more than 50.

    d. All domestic hot water piping, fittings and accessories shall be insulated. All circulating piping shall be insulated. Cold water piping in ventilated attic shall be insulated.

2. Interior Piping, Fittings and Valves

    a. Shall be insulated with 1" thick Fiberglass ASJ/SSL U.L. rated pipe insulation through 1" diameter pipe, 1-1/2" thick for 1-1/4" diameter pipe and above.

Fittings shall be hard molded plastic flush. Do not insulate flanges or valves unless water temperature exceeds 140°F or the piping is exposed to weather.

3. Piping Exposed to Weather or View

    a. All piping and fittings exposed to weather shall have, in addition to the above-described insulation, aluminum jacketing. 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Provide pre-fabricated aluminum strapping and seals by same manufacturer, “Childers" or equal. Secure in place with factory supplied straps. Install all joints to prevent water entry. All joints shall be sealed with outdoor mastic. Benjamin Foster 65-07 or equal.

    b. For Miscellaneous fittings for which aluminum jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the insulation with stretchable glass fabric and at least two coats of outdoor mastic.

    c. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather such as in equipment rooms shall be given an additional finish of PVC jackets.

4. Hot Water Supply/Drain Piping and Handicap Fixtures "Handi Lav-Guard" insulating kits by Truebro, Inc.. or “Trap Wrap” as manufactured by Brocar Industries. Pre-formed insulation and materials to cover hot water, cold water, and drain piping. Must conform to ADA and California codes. Pressure sensitive expanded poly foam tape will not be accepted.

D. Cleanouts

1. Style shall be ZURN as follows (equivalent models of Smith are acceptable):

    a. For vinyl tile use #ZN-1400-6

    b. For carpeted areas use #ZN-1400-14

    c. For terrazzo areas use #ZN-1400-10

    d. For ceramic tile or finished concrete use #ZN-1420-2

    e. Grade cleanouts (Non-Traffic areas) use #ZN-1400-25

    f. Grade cleanouts (Traffic areas) use #ZN-146-15W/Z-1450-8

    g. For wall cleanouts use #ZN-1460-8

2. Cleanout Box.

    a. Precast reinforced concrete. Cast iron lid marked for service.

E. Fixtures and Trim

1. General

a. Provide Rough-in for and install all plumbing fixtures shown on drawings. All trim not concealed shall be brass with polished chrome plate finish unless noted otherwise. Waste shall be chrome plated 17 gauge P-trap shall have clean-out and escutcheon at tailpiece. All enameled fixtures to be acid resisting. Standard color is white unless otherwise noted.

b. All drinking water faucet products shall be certified to NSF Standard 61 section 9 Drinking Water Components. The brass casting shall contain no more than two tenths of one percent lead by dry weight.

c. Other brass components which contact water within the faucet shall be from brass which contains no more than three percent lead by dry weight. All faucets exempt from NSF Standard 61 Section 9 shall meet the same lead content criteria.

2. Supplies

a. Standard compression stop, straight pattern, loose key, chromium plated with stuffing box.

b. All exposed fixture supplies to lavatories, sink-sand water closets shall be Brass-Craft "Speedway" flexible supplies with metal compression ring connection at all stops or fittings as designated by part number, and shall have a rigid metal to metal connection to fixture valves. For lavatories & sinks use STR 1715A and for tank-type water closets use STR 1712DL.

3. Air Chambers

a. Zurn Z-1700 "Shoktrol" complete with shut-off valve on branch to air chamber and screwdriver stop stainless steel access panel. Provide where noted on drawings and upstream at every quick-closing manual, solenoid or flush valve. Install per manufacturers instructions locating chamber between the last two fixtures on a 20’ or shorter header, or use (2) chambers (calculated for the total fixture unit count)for headers over 20’ in length with locations in the middle and between the last two fixtures on the header.

F. Backflow Preventers

1. General

a. Backflow preventers shall be provided on building domestic water service as may be required by the local utility and shall also be provided in all branch lines serving any new or existing boiler, cooling tower, evap. condenser or other device requiring chemical water treatment.

2. Reduced Pressure Type: Two spring loaded "Y" pattern check valves, differential relief valve mechanism, inlet and outlet shut-off valves, and four test clocks. Approved by AWWA. Febco, Beeco, or equivalent.

3. Double Check Type: Two spring loaded "Y" pattern check valves, inlet and outlet shut-off valves, and four test clocks. Approved by AWWA. Febco, Beeco, or equivalent.

4. Pressure Type Vacuum Breaker: Spring loaded check valve assembly, air inlet port and poppet, inlet and outlet shut-off valves, and two test cocks. Febco, Beeco or equivalent.

5. Domestic Water Heater Expansion Tank: Provide expansion tank on cold water supply to any water heater if backflow prevention is required at site water connection. “Amtrol” ST series sized per manufacturer’s recommendations.

G. Strainers

1. Threaded strainers are to be of the gasketed capped cover extra heavy iron body type - Similar to Mueller Fig. #11. Provide gate valve and pipe nipple with 3/4" hose connection on each strainer for blow-off.

H. Floor, Ceiling, and Wall Plates

1. Beaton and Cadwell No. 10, steel flange with locking device and polished chromium plated finish. Provide plates on any finished surface through which pipe passes.

I. Insulating Fitting

1. Epco dielectric unions with Epconite insulating gasket selected for applicable duty. Provide wherever pipes of different metals are joined.

J. Pipe Markers

1. One inch (1") high minimum, stenciled letters, located every 6'-0". Markers shall indicate piping service such as domestic cold water supply, etc., and shall have directional flow arrow at each location of stenciled letters. Decals pasted, glued, or adhered to piping or insulation are not acceptable unless decal wraps entirely around pipe or insulation such as Seton "Set mark", or equivalent. Decals shall be applied after painting of all piping systems is complete and after preliminary acceptance of piping system. Decals shall comply with ANSI and OSHA specifications with respect to marker size, color, and legend.

K. Thermometers

1. 9" liquid filled type with adjustable angle base, aluminum case. 2-1/2" insertion length stem. 3/4" NPT connection. 20-240F, 2F divisions. Provide separable thermometer well. Trerice, Weksler. Provide Brass thermometer well suitable for thermometer above. Provide 2" extension at insulated pipes

L. Pressure Gauge

1. Phosphor bronze tube. Bronze bushed, 1% accuracy. Cast aluminum case. 3-1/2" white dial. Adjustable pointer. Operating pressure at mid-scale. 1/4" NPT brass socket. Provide brass porous core pressure snubber and gauge cock. Trerice, Walker.

M. Gauge Cock

1. Lever handle brass cock. 1/4" NPT connections.

N. Temperature and Pressure Relief Valve

1. 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” series 40 or 140 sized per BTU input

O. Gas Pressure Reducing Valve

1. Capacity and pressure ratings as indicated on drawings. Reliance Series 1800

P. Flue and Vent Connector Piping

1. As specified in manufacturer’s literature.

Q. Union

1. 2" and smaller - AAR malleable iron, bronze to iron ground seat. 30 psi. Size 2-1/2" and larger - Grooved pipe, synthetic gasket, malleable iron housing. Victaulic Style 77, Type "E" gasket, Grinnell.

R. Pipe Hangers and Supports

1. General

    a. All plumbing piping shall be supported and seismically braced in compliance with HCAI Pre-Approval No. OPM-00542 the "nVent CADDY Seismic Bracing for MEP Systems". Copies of the above publication and details shall be provided by the Contractor and maintained at the project site until final acceptance

2. Steel pipe and Cast Iron Soil Pipe

    a. 1/2" through 4" pipe. Provide J-style hanger, with standard electro-plated finish.

    b. 5" and larger pipe. Clevis-Style pipe hanger with standard electro-plated finish.

3. Copper Tubing

    a. Provide felt-lined hanger for copper tubing with standard electro-plated finish.

4. Insulated Pipe & Tubing

    a. Provide 360° calcium silicate shield. The hanger and shield shall be fitted to the outside of the pipe insulation.

5. Cast Iron Pressure Piping

    a. Provide B-line Clevis-Type hangers sized for water works piping.

6. Hanger Rod Sizing

    a. Hanger rods shall be roll threaded mild steel with electro-galvanized finish and shall meet or exceed the following table:

Piping or Tubing Size	Hanger Rod Size
1/2" through 2"	3/8"
2-1/2" through 5”	1/2"
6" through 10"	5/8"

7. Hanger Spacing

    a. Provide at least one hanger per branch and independently support all line-mounted equipment. Provide a hanger within 12" of elbow at riser or drop. Spacing of hangers along the run of the pipe shall not exceed the following table:

Pipe or Tubing Size	Steel Pipe	Copper Tube	CI Pipe
1/2" through 3/4"	7'-0"	5'-0"	5'-0"
1" through 1-1/4"	7'-0"	6'-0"	5'-0"
1-1/2" through larger	10'-0"	10'-0"	5'-0"

8. Structure Attachments

    a. General

        i. Shall be engineered to support the intended design load and shall be sized for the hanger rod specified.

        ii. For poured-in-place construction, install B-line B2500 Spot insert. After removing the concrete forms, install hanger rod in insert hanger rod in insert using channel nuts.

        iii. For steel and concrete decking, install B-line B3019 insert through steel form prior to the pour. The anchor plate shall be fastened to the steel deck with machine screw.

        iv. For attaching to steel channels, use B-line beam clamp threaded anchor hook.

9. Trapeze Hangers

    a. Trapeze hangers shall be fabricated from galvanized channel. Stress on the installed channel shall not exceed 25,000 psi. Deflection on the installed channel shall not be greater than 1/240th of the span length. For load calculations, all piping to be assumed to be water-filled unless handling a heavier liquid. Hanger rods for trapeze hangers shall be limited to 9,000 psi stress based on the area at the root of the threads. Minimum hanger rod size shall be 3/8"

10. Riser Clamps

    a. B-Line B3373 plain finish for interiors, galvanized for exterior. Provide on vertical piping at each floor.

S. Sleeves

1. Non-Rated Assemblies: Sleeves for pipe passing through concrete floors or walls shall be Schedule 40 galvanized steel pipe of size sufficient to permit the pipes to pass through with a minimum clearance of 1/2” between sleeve and pipe. Sleeves shall have square ends cut flush with surface and shall be caulked tight whether pipe is bare or insulated. Sleeves through floors shall extend 1" above finished floor surface.

2. Rated Assemblies

a. Bare Pipe. Same as for non-rated assemblies except that sleeves shall provide a clearance of 1" between sleeve and pipe. Clearance shall be packed for its entire length with a UL system 161 three hour classification such as a 3M FireDam 160 caulk at ends and mineral wool batt material stuffer in middle of penetration.

b. Insulated Pipe. Insulation for pipe in sleeve shall consist of a 360 degree water-proofed calcium silicate insert sized to extend a minimum of 1" beyond each end of sleeve. Calcium silicate insert shall be of the same thickness of adjoining insulation. Clearance shall be packed for its entire length with a UL system 161 three hour classification such as a 3M FireDam 160 caulk at ends and mineral wool batt stuffer in middle of penetration.

T. Flashings

1. Vent flashing shall be 4 lb. seamless lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Provide 24"x24" 4 lb. lead flashing at each roof drain. Flashing for other piping through roof shall be prefabricated galvanized steel roof-jacks with 16" sq. flange. Provide storm collar and seal water tight with mastic

U. Yard Boxes and Covers

1. One piece precast concrete with cast iron cover labeled "Sewer", "Gas", "Water", etc., as required. Provide traffic weight cover in traffic areas. Provide 6" minimum length "Thinwall" series 2000 6" diameter pipe extension to valves installed deeper than boxes. Install in workman like manner. Multiple boxes located on same centerline parallel to building exterior wall. Provide 6" concrete apron in non-paved areas.

PART 3 - EQUIPMENT

A. General Requirements

1. Capacity. Capacities and efficiencies shall be in accordance with schedules shown on drawings. Scheduled numbers are to be considered minimum.

2. Dimensions. Equipment must conform to space requirements and limitations indicated on drawings and as required for operation and maintenance. Equipment that does not readily conform to space conditions is unacceptable. Prepare and submit layout drawings for all proposed equipment substitutes showing actual job conditions, required clearances for proper operation, maintenance, etc.

PART 4 - INSTALLATION

A. Equipment Connections

1. Water and drain connections shall be provided for each piece of equipment as required. Provide shut- off valve or fixture stop for each water supply to each piece of equipment whether or not equipment is furnished in this Specification Section.

2. Provide a backflow preventer at each connection to equipment as required by code whether or not equipment is provided in this specification section.

3. Provide a regulating valve at drinking fountain supplies. Valve, supply piping, and electrical connector shall be installed so as not to be visible.

4. Ratings

    a. Gas. Natural gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be approved by AGA.

    b. Electrical. Equipment shall be in accordance with NEMA standards and U.L. listed where applicable standards have been established.

5. Piping.

    a. Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be furnished, installed, and wired except where noted by others on drawings

B. Water Heaters - See plumbing fixture schedule on drawings.

C. Circulating Pump - See plumbing fixture schedule on drawings.

D. Fixtures

1. Piping beyond finished wall at each fixture shall be chrome plated.

2. All piping supporting flush valves, hose bibbs, etc., shall be securely fastened to the building structure at each device to prevent movement of piping. All supplies to individual and/or adjacent fixtures shall be at same height and on center line of waste insofar as possible. Fixture height shall be as indicated on architectural drawings

3. Wall hung fixtures shall have space between fixture and wall surface caulked with white silicone caulk.

4. Rough-in and connection for trim and other fixtures supplied by others shall be included in this specification section.

5. Where aerators are scheduled for the various fixtures, provide Chicago "Lam-A-Flo" Laminar flow controls.

6. 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.

E. Piping

1. Constantly coordinate work with that of other trades so as to prevent any interference with this installation.

2. Install cleanouts at ends of sewer 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 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.

4. Condensate Drain Piping shall be installed with constant pitch of 1/8" per foot minimum. Provide tee with clean-out plug at all changes of direction. Provide a trap at each air handling unit to prevent air leakage. Connections to equipment mounted on vibration isolators shall be made with flexible connections.

5. Freeze Protection

    a. All piping two inch and smaller located outside building and above ground and where exposed to freezing conditions shall be neatly wrapped with refrigerant insulated tape for freeze protection.

6. Sterilization of Piping

    a. Disinfect all domestic hot and cold water piping systems in accordance with 2013 CPC 609.9, "Standard for Disinfecting Water Mains". Disinfecting process shall be performed bu contractor and witnessed by a representative of the Engineer. During procedure signs shall be posted at each water outlet stating, "Chlorinating - Do not drink". After disinfecting, water samples shall be collected and sent to an independent lab for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained from lab and delivered to the Owner through the Engineer.

7. Tests and Adjustments

   a. 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. Grade tests will be allowed on “ring-tite” PVC pipe.

   b. Condensate Drain. Similar to Sanitary Sewer.

   c. Domestic Hot and Cold Water Piping: Maintain 100 psig water pressure for 4 hours.

END OF SECTION

SECTION 230000
HEATING, VENTILATING & AIR CONDITIONING

PART 1 – GENERAL

A. GENERAL PROVISIONS

1. General Provisions of the contract including General and Supplementary Conditions apply to the work specified in this Section. The provisions of this section shall apply to all sections of Division 15 of these specifications.

B. SCOPE.

2. Work 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:

    a. Air distribution systems.

    b. All equipment as shown or noted on the drawings or as specified.

    c. System energy balance.

    d. Demolition as indicated on drawings.

    e. HVAC controls.

    f. Coordination with commissioning agent.

C. CODES AND STANDARDS

1. All work and materials shall conform with current rules and regulations of applicable codes. 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.

    a. Applicable codes and standards shall include but are not necessarily limited to:

        i. <u>California Code Of Regulations:</u>

            1. Title 8, Industrial Relations

            2. Title 17, Public Health

            3. Title 19, Public Safety

            4. Title 21, Public Works

5. Title 24, Energy Regulations

ii. California Building Code.

iii. California Mechanical Code

iv. California Plumbing Code

v. Local Codes and Ordinances

vi. Air Moving and Conditioning Association (AMCA)

vii. American National Standards Institute (ANSI)

viii. Air Conditioning and Refrigeration Institute (ARI)

ix. American Society of Heating, Refrigerating, and Air Conditioning Engineers

x. American Society of Mechanical Engineers (ASME)

xi. American Society for Testing and Materials (ASTM)

xii. American Water Works Association (AWWA)

xiii. National Electrical Code (NEC)

xiv. National Electrical Manufacturers Association (NEMA)

xv. National Fire Protection Association (NFPA)

xvi. Occupational Safety and Health Act (OSHA)

xvii. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

xviii. Americans with Disabilities Act. Accessibility Guidelines for Buildings and Facilities. (ADAAG).

D. PERMITS AND FEES

1. The Contractor shall take out all permits and arrange for all tests in connection with such work as required. All charges are to be included in the work. All charges or fees for service connections, meters, etc., shall be included in the work.

E. COORDINATION OF WORK

1. Before starting any work, thoroughly examine all existing and newly completed underlying and adjoining work and conditions upon which the installation of this work is in any way dependent for the workmanship required by the Contract Documents. Report to the Architect and Engineer in writing any and all conditions which might adversely affect this work and limit ability to perform the required workmanship.

2. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc., shall be carefully planned, prior to installation of any work, to avoid all interference's with each other, or with structural, electrical or architectural elements. Verify the proper voltage and phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment.

3. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Carefully investigate the mechanical, electrical, structural, architectural drawings and field conditions that could affect the work to be performed and arrange such work accordingly. Provide the required piping and ductwork offsets, fittings, and accessories to meet such conditions.

4. Spaces provided in the design of the building shall be utilized and the work shall be kept within walls or furring lines established on the drawings. Any discrepancy between Architectural or Mechanical drawings with respect to wall or furring locations and dimensions shall be brought to the Architect's attention for resolution before proceeding with installation.

5. Any work which is done as an addition, expansion, or remodel of and existing system shall be compatible with that system.

F. MANUFACTURER'S RECOMMENDATIONS

1. All material, equipment, and devices, etc., shall be installed in a manner meeting approval of the manufacturer of the particular item. The Contractor shall make himself available of all installation manuals, brochures, and procedures that the manufacturer issues for the equipment and material. Contractor shall be held responsible for all installations contrary to the manufacturer's recommendations. Contractor shall make all necessary changes and revisions to achieve such compliance

G. GUARANTEE

1. 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.

H. QUIETNESS

1. Piping of all types, ductwork, and equipment shall be arranged and supported so that the vibration is at a minimum and is not transmitted to the building structure.

I. DAMAGES BY LEAKS

1. The Contractor shall be responsible for damages caused by leaks in the temporary or permanent piping or mechanical systems prior to completion of work and during the period of the guarantee.

J. SUBMITTALS

1. Shop Drawings. Within 30 days of contract award, the Contractor shall submit PDF email copy of shop drawings for all materials, equipment, etc., proposed for use on this project. 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:

    a. 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 contract documents. Descriptive literature shall be current manufacturer's brochures and submittal sheets.

    b. All shop drawings shall be submitted with title sheet including Project Title, Architect, Engineer, 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 the are proposed. All equipment shall also be identified by the mark number as indicated on drawings. Submittals shall bear the stamp of certification by the Contractor as evidence that the Contract Documents (Specifications and Drawings) have been thoroughly checked.

    c. 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. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.

2. 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.

a. 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. Submittals for products and equipment offered as an alternate to that specified will require, if accepted by the Engineer, resubmission of the Title 24 Energy Compliance Calculations if the specified product or equipment was included within the scope of the approved calculations on file with the reviewing authority. The cost of preparing resubmission will be the responsibility of the Contractor.

K. OPENINGS, CUTTING AND PATCHING

1. 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 or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Restoration of all 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 and Engineer.

L. HANGERS AND SUPPORTS.

1. Provide all hangers, bracing, and supports for the proper installation of equipment and materials under this Section of the Specification.

2. Any structural element required to properly hang or support piping, ducts, or equipment, etc., provided under this Specification Section and not shown on the Architectural or Structural Drawings shall be provided under this Specification Section.

3. All ducts and [mechanical plumbing piping shall be supported and seismically braced in compliance with HCAI Pre-Approval No. OPM-00542 the "nVent CADDY Seismic Bracing for MEP Systems". Copies of the above publication and details shall be provided by the Contractor and maintained at the project site until final acceptance

M. CONTINUITY OF SERVICES

1. All existing services and systems shall be maintained except for short intervals when connections are to be made. The contractor shall be responsible for any interruptions of services and shall repair damage done to any existing service caused by the work.

2. If utilities not indicated on the drawings are uncovered during excavation, the Contractor shall notify the architect immediately for further instructions.

N. ELECTRICAL CONNECTIONS

1. Provide under Specification Division 23000 all required control conduit, wiring, controls and control panels as indicated on the drawings or as may be required for system operation.

2. No control device shall be mounted with rigid connections on vibration isolated mechanical equipment. No field furnished control device shall be mounted on any piece of equipment so that it interferes with physical access of air or water flow, or covers any portions of nameplates or access doors.

3. Starters.

    a. Magnetic motor starters for all equipment shall be furnished under this Specification for installation under Specification Division 16000, except those shown to be in a motor control center on the Electrical Drawings and those located in factory assembled units.

    b. Starters shall be of the appropriate horsepower and voltage, equipped with the proper NEMA enclosures for indoor and NEMA 3R enclosures for outdoor, with thermal overloads, necessary auxiliary contacts, and ambient compensated overloads, one in each leg.

    c. A circuit breaker shall be mounted in a common enclosure unless the starter is not mounted within sight of the motor, in which case the disconnecting means shall be a separate device provided under Specification Division 26000, Electrical. Mounted in the starter cover shall be "hand-off-automatic" and "reset" control devices. Magnetic switches shall be of pivoted armature design. Starters shall have auxiliary contacts as required by the control system.

4. Motors.

    a. Shall be selected for quiet operation, voltage, and rpm to match the project electrical characteristics. Motors shall be open, drip-proof, normal torque and weatherproofed where indicated or required. Motors shall be of the NEMA premium efficiency type.

5. Electrical Coordination

    a. Prior to commencing construction arrange a conference with the electrical and mechanical trades as well as equipment suppliers and verify types, sizes, locations, voltage requirements, controls and diagrams of all equipment furnished by them. In writing, inform the Architect that all phases of coordination of this equipment have been covered and if there are any unusual conditions or problems they shall be enumerated at this time.

O. FLASHING

1. Whenever any part of the Mechanical System(s) must penetrate the roof or outside wall, the openings shall be flashed and counter-flashed absolutely water tight with minimum 22 gauge galvanized sheet metal, prime coated. Flashing aprons shall extend not less than eight inches (8") from the duct, pipe, or supporting member in all directions unless detailed otherwise. All penetrations shall be flashed following the procedures of the National Roofing Contractor's Association

P. PAINTING

1. Paint all black iron supports, hangers, anchors, etc., and all uninsulated black iron pipe work installed in weather exposed locations with one coat of rust resisting primer.

Q. ACCESS DOORS AND PANELS

1. 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 or as required to match wall construction. 16-gauge steel frame and 14-gauge steel panel with paintable finish, except in ceramic tile, where panel shall be 16-gauge stainless steel with satin finish. Continuous hinge. Screwdriver latch. Deliver panels to the General Contractor for installation. Provide Zurn Z-1460-4 for square doors and Z-1460-5 for rectangular doors, Karp, or equivalent. Unless otherwise noted , the minimum sizes shall be as follows:

    a. 1 valve up to 1-1/2" 12"x12"

    b. 1 valve up to 3" 16"x16"

    c. Fire damper, VAV box, coil 24"x24"

R. SYSTEM IDENTIFICATION

1. Equipment. All equipment shall be identified with a plastic laminated engraved nameplate which bears the unit number marked as indicated on the drawings (e.g. AC-4) Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the unit.

S. DEFINITIONS

1. Provide. The term "provide" as used in these specifications or on the Drawing shall mean furnish and install.

2. Piping. The term "piping" as used in these Specifications or on the Drawings shall mean all pipe, fittings, nipples, valves, unions, hangers, and thermal insulation, etc., as may be required for a complete and functional system.

3. Ductwork. The terms "duct" or "ductwork" as used in these Specifications or on the drawings shall mean all ducts, fittings, joints, dampers, hangers, and thermal insulation, etc., and other devices as may be required to make a complete and functional system.

4. Wiring. The term "wiring" shall include the provision of all necessary products which are required for a complete installation and shall include products such as conduit, electrical boxes, connections, transformers, relays and switches.

T. PROJECT CLOSE-OUT

1. Record Drawings

   a. Provide in accordance with general conditions of the specifications.

2. Operation and Maintenance Manual for Mechanical Systems

   a. Provide three (3) copies of Operation and Maintenance Manuals to the Engineer for review and acceptance. Provide the Owner's designated representative with one copy of the approved O & M manual. Bind Operation and Maintenance Manuals for each Mechanical System (Plumbing, Air Conditioning, etc.) in a hard-backed binder. Cover of each binder shall have the following lettering:

OPERATION
AND
MAINTENANCE
MANUAL
ROSAMOND HIGH SCHOOL
CAFETERIA BUILDING
SOUTHERN KERN UNIFIED SCHOOL DISTRICT
ROSAMOND, CA

Provide a transmittal letter at the beginning of the manual on the Contractor's letterhead. Letter shall be signed by a contractor principal (Owner or Corporate Officer) and shall be countersigned by the Owner's designated representative and shall indicate the date when the mechanical systems were shown and explained in detail to the Owner's designated representative. (The Engineers office shall be notified 48 hours minimum prior to the owner-contractor meeting.)

Provide a master index at the beginning of Manual showing items included. Use plastic tab indexes for the sections of the Manual.

Section 1, General. Provide:

Name of Architect, Mechanical Engineer, Contractor and Mechanical Sub-Contractor.

A complete list of installed equipment with project mark number, indicating name of vendor, address and phone number.

A sub-section with manufacturer's descriptive literature for each item of installed equipment with model, capacities, and all other pertinent information highlighted.

Section 2, Operating instructions. Provide:

General description of each separate system and sub-system.

Step by step procedure to follow in putting each piece of mechanical equipment into operation. Start-up sheets must be signed by the owner of the installing contractor certifying that the start-up has been completed per manufacturer's written instruction.

Schematic as-built control diagrams for each separate system. Diagrams shall bear the date of the acceptance of the project. Include all temperature control panels and their respective functions.

Section 3, Maintenance Instructions. Provide:

Summary list of mechanical equipment used indicating name, model, serial number, and nameplate date of each item together with number and name associated with each system item.

Manufacturer's maintenance instructions for each piece of mechanical equipment installed in project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment and maintenance and lubrication instructions.

Section 4, Air Conditioning System Balance and Test Run Reports. Provide:

One-half size reproduction of air conditioning plans annotated to match tabulated measurements.

Tabulated and summarized measurements.

Section 5, Warranties. Provide:

A copy of each manufacturer's warranty statement, completely filled out and indicating date forwarded to the respective manufacturer.

PART 2 - MATERIALS

A. Ductwork.

1. General.

a. Construct ductwork to meet all functional criteria defined in section VII, of the SMACNA "HVAC Duct Construction Standards Metal and Flexible". This shall subsequently be referred to as the SMACNA manual.

b. Interior ducts shall be constructed with G-60 or better galvanized steel (ASTM 527) LFQ, chem treat. Exterior ductwork or any duct exposed to high humidity conditions (i.e. dishwasher exhaust) shall be G-90 or better.

c. Support, access doors not part of ducts, bar or angle reinforcing damper rods and items made of uncoated mild steel shall be painted with two coats of two coats primer or provide galvanized equivalent.

2. Rectangular Ducts.

   a. Construct ductwork and supports to meet all functional criteria defined in section VII, of the SMACNA “HVAC Duct Construction Standards Metal and Flexible” 2005 Edition. Hanger spacing shall not exceed 8’.

3. Ells. Rectangular ells of ninety degrees shall be mitered and fitted with AERO/DYNE, "HEP" or equivalent, adjustable turning vane of airfoil contour design. Side rails shall be installed so that vane at heel of elbow shall fit snugly without air passing on the back side. Spacing of vanes according to manufacturers recommendations.

4. Round Ducts.

   a. Galvanized.

      i. Spiral lockseam with standing rib duct. For round ducts, 8" diameter or less, provide Noll or Young and company snap-lock galvanized steel.

      ii. Round elbows shall be pleated or welded gore (5 piece ells). Non-welded gore elbows for use with snap lock ducts shall be taped at gore intersections.

5. Duct Joints.

   a. Rectangular. All ducts shall utilize “Ductmate 25/35” factory fabricated duct joint connectors with #440 gasket tape. Flanged interior gaskets shall be Ductmate #440 or Butyl Rubber Gasket which meets Mil-C 18969B, Type II Class B, and TTS-S-001657 must also pass UL-723. The material must not contain any vehicle that will support fungal or bacterial growth. Formed on flanges shall not be accepted for any duct exceeding 42” in width or any duct subjected to greater than 2” W.G..

   b. Round. All round ducts shall utilize male-female slip joints with minimum three (3) sheet metal screws. 0-20” ducts shall utilize sealing compound applied continuously around joint before assembling and after fastening. Wrap joints with 3” wide duct tape. 21” – 72” ducts, use 3-piece, gasketed, flanged joints consisting of two internal flanges (with integral mastic sealant), and one external closure band. Ductmate Spiralmate or equal.

6. Sealing.

    a. Interior to Building - Hardcast fiber tape and liquid adhesive. DT-5300 or DT-540 tape. FTA-20 adhesive. Ductmate PROseal.

    b. Exterior to Building - For joints exposed to weather, sealant shall be G.E. silicone. For joints not exposed to weather, sealant shall be Eco-Duct Seal 44-60, or United Sheet Metal.

    c. Exposed Ducts. All joints shall use Hardcast Galva-Grip or equivalent. Joint shall be finished clean from outward appearance.

7. Flexible Insulated Ducts.

    a. Shall be J.P. Lamborn Company Type AMF or Thermoflex M-KE acoustical low pressure duct. Duct shall be listed and labeled UL-181 Air Duct; meet NFPA-HUD minimum standards and comply with UMC 6. Duct factory R-value 4.2 minimum. In un-conditioned spaces, R-8 minimum.

    b. Hangers shall consist of minimum 3" wide 28 gauge galvanized steel and shall be spaced a maximum of 36" on center. Flexible duct shall be installed in compliance with the manufacturer's latest installation instructions. No kinks or sharp bends allowed. Turning radius shall be a minimum of 1.5 times diameter of duct. A copy of which shall be at the site during and after installation. Provide a minimum of at least one hanger per duct section.

    c. Connections to round ducts or collars shall be made with galvanized or stainless steel worm clamps or "Panduit" adjustable clamps listed by UL-181.

    d. Unless indicated otherwise on the drawings, flexible duct shall be limited to the final 5 foot portion of the duct system connecting to the supply diffuser or return grille. Flex duct shall be limited to factory cut pieces with factory applied end connections.

8. Fire Dampers.

    a. Fire damper assembly shall bear the U.L. 555 Label and the California State Fire Marshall listing number. Provide duct access door to fire damper as required by job conditions in compliance with Title 24, California Mechanical Code. Fire dampers shall be installed in all rated walls and ceilings penetrated by ducts, grilles and diffusers. Fire damper shall have rating equivalent to construction. Dampers shall be installed in strict compliance with manufacturer's installation instructions.

9. Fire/Smoke Dampers.

    a. Damper Assembly shall bear the U.L. 555S Label and State Fire Marshall listing number. Provide access door to smoke damper as required by job conditions in compliance with Title 24, California Mechanical Code. Means of disconnect shall be provided between detector and damper(s), where detector is included as factory mounted and wired. Dampers shall meet most current standard for UL testing. UL555 and UL555S. Dampers shall be suitable for a dynamic system. See details on plans for leakage and velocity requirements. If not listed on plans, provide leakage class I and velocity level at 3,000 FPM.

10. Volume Dampers.

    a. Branch Duct Volume Damper - Volume control damper (VCD) in square or rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16- gauge blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gauge channel frame, actuating rod 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 spring loaded shaft nut and serrated self-locking die cast core. Ventlok 640. Provide remote ceiling operator with chrome plated or painted cover where shown on drawings or where damper control is otherwise inaccessible.

11. Back-draft Dampers.

    a. Unless otherwise noted on drawings: .025 aluminum counter-balanced blades with felt strip on mating edges, and machined brass mounted in six gauge steel channel frame, Pacific Model PRO 1100AI or equal. Normally closed back-draft dampers are required at all roof exhaust fans and all outside air intakes.

12. Duct Fire Caulking.

    a. All ductwork passing through rated assemblies that do not have a fire or fire/smoke damper shall be installed with a U.L. listed fire caulking assembly. Exact details of U.L. listed assembly shall be followed. Provide inspector of record and project engineer submittal showing U.L. listed fire caulking detail that the contractor intends to use for each condition. In lieu of fire caulking, at contractors option, provide fire damper installed in accordance with U.L. listing

13. Filters.

    a. Pre-Filters.

        i. Minimum of MERV 13 filter, consisting of a nominal 2" thick, pleated type, panel filter, CSFM listed. Initial resistance at 500 feet per minute face velocity shall not exceed 0.30" w.g. Provide one complete change of all filters after air balance is completed and prior to final acceptance

B. Piping.

14. Refrigerant Piping.

a. General. Copper Type "L", hard drawn, ASTM B88 with wrought copper fittings, silver alloy brazed 1100°F., joints, Sil-Fos or equal. Size 3/8" O.D. and smaller to be refrigerant tube ASTM B 280. All elbows to have long radius.

C. INSULATION.

1. All insulation shall be instrict compliance with California Building Energy Efficiency Standards, 2019 Edition, Title 24.

2. Refer to table 120.3-A for pipe insulation thickness required. This shall be a minimum. If construction documents call for a higher rating, the higher rating shall apply.

3. Insulation shall have a flame spread of not more than 25 and a smoke developed rating of not more than 50.

4. Ducts.

a. General. All supply, return, exhaust ducts and plenums shall be insulated externally and/or lined internally as specified herein or as indicated on the drawings. Ducts in directly or indirectly conditioned spaces shall be insulated to aminimum level of R4.2 Ductwork in unconditioned spaces such as an attic where the roof insulation is at the ceiling level or where located outdoors shall have an insulation level of R8 minimum.

b. Ducts in Attics. All supply and return ducts shall be insulated externally with 2" thick fiberglass 3/4# density. Where rectangular ducts are lined internally, they shall be wrapped on the exterior with 1" thick fiberglass, 3/4# minimum density.

c. Exposed Ducts Within Conditioned Spaces. Shall not require external insulation unless noted on the drawings.

d. Ducts Exposed to Weather All supply and return ducts shall be lined internally with 2" thick Manville “Permacote Linacoustic” glass fiber and thermosetting resin duct liner, R-8. Provide with antimicrobial edge coating, Johns Manville Superseal Edge Treatment or Superseal HV. Coating edges with adhesive is not acceptable. All field cut edges must be coated prior to delivering duct to job site. Any lined duct left untreated that has been subjected to dirt and / or dust will be rejected, and will not be accepted for installation. Edges must be treated so that complete coverage is obtained, with no raw edges. Apply as directed by manufacturer’s literature.

e. Interior Duct Surfaces. All supply, return. or exhaust duct connections to air conditioning units or fans shall be internally lined for a minimum distance of ten lineal feet upstream and downstream of fan unless otherwise indicated on the drawings. Interior duct liner where applied for attenuation purposes only shall be 1" thick Manville “Permacote Linacoustic” glass fiber and thermosetting resin duct liner, R-4.2. Provide with antimicrobial edge coating. See paragraph above.

f. Duct Wrap. Shall be tightly wrapped around ducts to prevent sagging with longitudinal and transverse lap of at least 6". Laps shall be wired or stapled to eliminate gaps. Insulation shall be secured by wrapping with 18 gauge galvanized wire 12 o.c. adhesive. Insulation shall be applied with density identification exposed.

g. Duct Liner Shall be adhered to clean metal with minimum 100% coverage of adhesive such as 3M Adhesive #38, additionally secured with approved mechanical clips or welded pins per SMACNA standards. Provide with antimicrobial edge coating. Apply per paragraph 2 d) above. Coating edges with adhesive is not acceptable.

5. Refrigerant. Cover piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendations. Cover all fittings, unions, valves and connections. Piping exposed to weather shall be covered with aluminum jacketing, .016” thickness. Screw along seams to secure and silicone caulk.

PART 3 - EQUIPMENT

A. General Requirements

1. Start-up. All equipment shall be started and tested in strict accordance with the manufacturer’s written instructions. Provide the inspector of record factory start-up literature for each mechanical item. Demonstrate to inspector that strict compliance to the start-up procedure has been completed for each item. Start-up sheets must be completed and turned in with the O&M manuals. Start-up sheets must be signed by the owner of the installing contractor certifying that the start-up has been completed per manufacturer’s written instruction.

2. Acceptance Testing. Complete acceptance testing of all systems and equipment as required under the Building Energy Efficiency Standards, 2013 Edition, Title 24. Submit all completed and signed forms to the building department or the Division of the State Architect, where applicable.

3. Capacity. Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.

4. 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 is not acceptable that does not readily conform with the 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.

5. Ratings.

    a. Gas. Natural gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be approved by AGA.

    b. Electrical. Electrical equipment shall be in accordance with NEMA Standards and UL listed where applicable standards have been established.

6. 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 none-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.

7. 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 provided. Provide terminal blocks for controls and interlocks not included in equipment package.

    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 underground conductor. Switches, contacts and other devices shall be in undergrounded 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 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 indication. Insulation shall be double dip and bake with Class F thermal polyester non-hygroscopic epoxy base insulating materials. Design shall limit starting inrush current and running current to values shown on drawings. Motors exposed to weather shall be open drip-proof approved by manufacturer for this type of service. All motors 1 horsepower and larger shall be the high efficiency type with efficiency and power factor equal or exceeding Century E-Plus.

8. Fan Selection.

    a. Fan Curves. Performance curves shall be submitted for all units of 3000 CFM or greater. Operating point for forward curved fans shall be from point of maximum efficiency toward increased CFM limited by horsepower scheduled. Operating point for backward inclined fans shall be selected near point of maximum efficiency. Curves shall plot CFM verses static pressure with constant brake horsepower, RPM and efficiency lines.

    b. 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.

9. Screens. All duct or louver openings to the outside shall be covered with 1/4" galvanized screen.

PART 4 - INSTALLATION

A. Ductwork.

1. Installation shall conform with NFPA 90A and SMACNA Low Pressure Duct Construction Standards 2005 Edition. Provide mounting and supporting of Ductwork and accessories including, but not limited to, structural supports, hangers, vibration isolators, stands, clamps and brackets, access doors, and dampers. Install ductwork accessories as indicated in accordance with the manufacturer's printed instruction. Allow clearance for inspection, repair, replacement, and service. Ductwork and accessories shall be installed in a manner to prevent vibration and rattling.

2. Deflectors. Provide in rectangular elbows, duct mounted supply outlets, take-off or extension collars to supply outlets, and tap-in branch take-off connections. 45 degree take-off is an acceptable alternative for low velocity systems (below 1,500 FPM).

3. Grilles. Each air inlet and outlet shall be flush with finished surface of wall or ceiling and shall be securely attached thereto. Provide plaster grounds at locations of all wall and hard surfaced ceiling grilles.

4. Branch Take-Offs. All branch ducts from main supply air and to return air trunk duct shall be provided with splitter blade full height of branch take-off and 1" less than branch width. Regulators to be Young or equal. Dampers located in inaccessible areas shall have extended shafts with concealed regulator in adjacent ceiling or wall.

5. Dampers. Install volume control damper and damper regulator on all branch ducts.

6. Flexible Glass Fiber Duct. 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 used to connect the grille to the sheet metal branch duct). No joints permitted in 5' length. Joints shall be installed with metal bands and fiber tape and adhesive. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).

7. All ductwork and mechanical piping shall be supported and seismically braced in compliance with HCAI Pre-Approval No. OPM-00542 the "nVent CADDY Seismic Bracing for MEP Systems". Copies of the above publication and details shall be provided by the Contractor and maintained at the project site until final acceptance

B. Piping.

1. General. Piping Layout:

    a. 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 Engineer. (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. Hangers. Support at intervals with hangers as specified elsewhere within these Specifications or as indicated on the Drawings. No piping shall be in contact with any part of the building structure including sub-assemblies.

3. Obstructions. Piping shall be installed to clear beams, etc., unless sleeving is particularly indicated. Constantly coordinate work with that of other trades so as to prevent any interference with this installation.

4. Pipe Joints. Pipe Joints shall be smooth inside and cut pipe ends shall be thoroughly reamed to remove all burr. Each length of pipe and each fitting shall be carefully examined and all burrs removed before fabrication.

    a. All ends and openings in all pipe and fittings shall be taped or plugged immediately after installation to exclude dirt until fixtures are installed or final connections are made.

5. Fittings.

    a. All joints and changes in direction shall be made with standard fittings.

6. Refrigerant Piping.

    a. Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation, fill with dry nitrogen to 250 psi and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment.

C. Insulation.

1. See materials section of this specification for installation requirements.

D. Equipment Installation.

1. 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.

E. System Air Balance.

1. General.

    a. The contractor shall employ the services of an independent system balancing company registered by AABC, NBC, or NEBB. The balancing contractors shall be limited to one of the following:

        i. Air Control Services 515 E. 19th St., Bakersfield, CA 93305 (661) 327-8755

        ii. Air Control Balancing 1959 N. Gateway #103, Fresno, Ca. 93727 (559) 454-8000

        iii. American Air Balance 4721 E. Hunter, Anaheim, Ca. 92807 (714) 693-3700

        iv. Los Angeles Air Balance Co. 1848 W. 11 St., Upland, Ca. 91786 (909) 931-1114

        v. RS Analysis 111 Natoma Street, Folsom, Ca. 95630 (916) 351-9842

        vi. National Air Balance 4171 Business Center Drive, Fremont, Ca. 94538 (510) 623-7000

    b. Submit within thirty (30) days after receipt of contract, submittal data forms of the selected balance company for the testing and balancing of the air conditioning, heating, and ventilation systems.

c. After development of the balancing procedure to be followed for each respective system, a representative of the system balancing company shall periodically visit the jobsite, particularly before any insulation is applied to ducts or piping, and confirm the suitability of the ducts, piping, accessories, hardware, and access panels installed for balancing. Any noted deficiencies shall be reported to the Contractor in writing with a copy to the Engineer. Noted deficiencies shall be corrected at this time by the Contractor.

d. Final system testing and balance shall not begin until the system has been completed and is in full working order. The Contractor shall put all heating, ventilating, and air conditioning systems and equipment into full operation and shall continue the operation each working day during the balancing procedure. The balancing company shall be responsible for all adjustments to the heating, cooling and ventilating equipment necessary for the system to operate as specified. Upon completion conduct a running test under substantial load conditions demonstrating to the satisfaction of the Owner's representative that all equipment and controls are operating as intended and have been properly adjusted for these conditions.

e. The system balance company shall include an extended warranty of one hundred eighty (180) days after completion and acceptance of test and balance work, during which time the Engineer at his discretion may request a recheck, or resetting of any outlet, fan, etc., as listed in report. The system balance company shall provide technicians to assist the Engineer in any re-test required during this period. Seasonal re-balance during the first year of operation is part of the scope of this specification.

f. The flow quantities shown on the drawings are not to be considered absolute. If changes in flow quantities are required to attain comfort conditions in any area, the balancing company shall make the required changes at no extra cost.

2. Procedure.

a. The testing and balancing of the systems, including all equipment, ducts, piping, and accessories shall be done in strict compliance with the latest edition of the Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems as published by National Environmental Balancing Bureau or equivalent AABC standard.

3. Acceptance of Tests.

a. In the event any tests or inspections prove unsatisfactory, such shall be made a matter of record. Acceptance of the system shall be postponed until all defects or improper adjustments have been corrected and the work is again inspected and tests satisfactorily repeated.

4. Data to be Furnished.

    a. At completion of running tests two (2) complete sets of data listed below for all items of equipment shall be furnished for incorporation in Owner's Equipment Manual for the project:

    b. Manufacturer's equipment outline drawings.

    c. Manufacturer's performance curves for fans, pumps, and flow control devices and capacity tables for equipment.

    d. Pertinent running test data; such as system test points, test point data, horsepower, RPM, FLA, etc., including final instrument set points and adjustments as left.

5. Fan Drives.

    a. Shall be changed as necessary to obtain the desired flow rate at minimum brake horsepower and to avoid objectionable fan or air noise in any part of the building. As a part of the work of this contract, the Contractor shall make any changes in the pulleys, belts, and dampers or the addition of dampers, required for the correct balance as recommended by system balancing company, at no additional cost.

F. Temperature Controls:

1. General.

    a. A complete system of automatic temperature control shall be provided. Complete system shall consist of the existing plus that which is necessary for proper function and operation

    b. Wall plates for any control located in finished areas shall match finish of light switch plates in that same area.

    c. All conduit and wiring shall be installed in strict compliance with spec division 26, electrical.

2. Electrical Wiring. All electrical wiring and conduit in connection with the drawings shall be provided under Specification Division 23. Any wiring not shown on the drawings but required for proper operation of the automatic temperature control system shall be performed under this Section.

3. Room Thermostats. See plans for specifications.

END OF SECTION

SECTION 260100
BASIC MATERIALS AND METHODS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 WORK INCLUDED

A. The specifications and drawings are intended to cover a complete installation of systems. The omission of expressed reference to any item of labor or material for the proper execution of the work in accordance with present practice of the trade shall not relieve the Contractor from providing such additional labor and materials.

B. All labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of electrical system, complete, as shown on the drawings and/or specified herein. Work includes but is not necessarily limited to the following:

1. Conduits for all wiring systems, unless otherwise specifically noted.

2. All electrical wiring and connections to equipment furnished under other sections of Specifications.

3. All electrical wiring and connections to Owner furnished equipment.

4. All wiring and conduit for Air Conditioning and Heating and Ventilating systems, and electrical equipment in Plumbing Section of work.

5. Time clocks and contactors for control of lighting and air conditioning.

6. Pull wires in conduit runs indicated as conduit only (CO).

7. Lighting panelboards.

8. Building electrical wiring, conduits, outlet boxes, junction boxes, convenience outlets, switches, plates and all miscellaneous items of electrical equipment, apparatus and material specified and/or shown on Drawings.

9. Disconnect switches, magnetic motor starters and manual motor starters.

10. All required grounds.

11. All anchors, chases, sleeves and supports for electrical equipment.

12. Excavation necessary for execution and completion of electrical work.

13. Required backing, supports and blocking for lighting fixtures.

14. Fire Alarm and Detection System.

15. Intrusion Alarm System.

16. Public Telephone System.

17. Intercom and Public Address System.

18. Master Clock System.

19. Class Change Signal and Program System.

20. Computer Network Wiring System.

21. Tests of entire system.

22. Lighting fixtures complete with lamps and required accessories.

23. Dry type transformers.

24. Guarantees.

25. Temporary power for building construction.

26. Temporary lighting during construction.

27. Complete connections to all motors, apparatus, electrically operated devices, etc., as shown on Drawings.

28. Circuits, switches, starters and connections for all exhaust fans, blowers and heaters.

29. Flashing of conduits through roof.

30. Shop Drawings.

31. Include an allowance of $250.00 for the material cost of any lighting fixture where an outlet is shown on drawings without a fixture type designation.

32. In these specifications, Fire Alarm, Clock and Class Change Signal, PA/Intercom, Television, Intrusion Alarm, etc. are referred to as Auxiliary Systems or Signal Systems.

1.03 GUARANTEE

A. In addition to guarantee required in Division 01 or specifically specified elsewhere, all materials and equipment provided and installed under this Division of Specifications shall be guaranteed by Contractor in writing for a period of one year from date of acceptance of work by Owner. Should any trouble develop during this period due to defective materials or faulty workmanship, the Contractor shall furnish all necessary labor and materials to correct the trouble without costs to Owner.

B. Guarantee complete and perfect operation of entire system and that all apparatus will perform in accordance with detailed drawings and Specifications.

C. Guarantee that all equipment will be supported in such a way as to be free from objectionable vibration and noise.

D. Guarantee that all licenses and royalties for use of any patented feature of system will be paid before acceptance of system.

1.04 GENERAL REQUIREMENTS

A. Codes: Construct project in accordance with following codes and regulations.

1. 2019 California Electrical Code (CEC), Part 3, Title 24 C.C.R.

2. 2019 California Mechanical Code (CMC), Part 4, Title 24 C.C.R.

3. 2019 California Plumbing Code (CPC), Part 5, Title 24 C.C.R.

4. 2019 California Energy Code, Part 6, Title 24 C.C.R.

5. 2019 California Historical Building Code, Title 24 C.C.R.

6. 2019 California Fire Code, Part 9, Title 24 C.C.R.

7. 2019 California Existing Building Code, Title 24 C.C.R.

8. 2019 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 C.C.R.

9. 2019 California Referenced Standards Code, Part 12, Title 24 C.C.R.

10. Local codes and ordinances.

11. Division of State Architect.

Keep a copy of applicable code available at Site while performing work of this Section. Nothing in these Drawings and Specifications to be construed as authority to violate codes and ordinances. Conflict with applicable regulations to be resolved at Contractor's expense before installation.

B. Permits, Fees and Inspections: Obtain and pay for all necessary permits and fees required by any constituted authority having jurisdiction including utilities. Arrange and pay for all required inspections or examinations and deliver certificates of inspection to Architect.

C. Record Drawings:

1. Provide record drawings for work of this Section.

2. Keep up-to-date a complete "As-Built" record set of blueline prints corrected daily and showing every change from original Drawings and Specifications and exact "As-Built" locations, sizes, and kinds of equipment.

3. Prints for this purpose may be obtained from Architect at cost of printing. Keep this set of Drawings on job and use only as a record set.

4. Drawings to serve as work progress sheets. Make neat and legible notations in red ink thereon daily as work proceeds, showing work as actually installed. Drawings to be available at all times for inspection, and kept at a location designated by Architect.

5. On completion of work, obtain one set of prints from Architect at cost of printing, and note neatly in scale all changes on record set. Deliver complete set of prints together with one set of blueline prints to Architect together with Contractor's name, address and phone number. Incorrect, non-legible or non-reproducible drawings will not be accepted.

D. Selection and Ordering of Equipment and Materials: Within two weeks after award of Contract, arrange for purchase and delivery of all light fixtures, equipment and materials required in ample quantities and at proper time. Inform Architect immediately of any inability to obtain suitable delivery of any equipment or material. Send copy of letter verifying date of purchases to Architect.

E. Shop Drawings and Material Lists:

1. Submit material lists and shop drawings as called for in Division 01, and as supplemented by this Division, and with sufficient promptness to ensure that overall work of project will not be delayed.

2. Submit six copies of a list of materials and equipment manufacturers that Contractor intends to use.

3. Provide shop drawings for following:

a. Distribution Sections.

c. Panelboards.

e. Lighting fixtures, lamps and necessary accessories.

f. Time switches.

g. Contactors.

h. Dry type transformers.

i. Magnetic Motor Starters.

j. Emergency Power System.

k. Fuses.

l. Flush floor boxes, covers and carpet flanges.

m. Disconnect switches.

n. Wall dimmers and dimmer panel.

4. Do not fabricate work until reviewed shop drawings for work have been received from Architect. Work fabricated or erected in advance of reviewed shop drawings will be at risk of Contractor.

5. Architect's or Engineer's review of shop drawings does not relieve Contractor of responsibility for errors including details, dimensions, or materials, as well as conformance with requirements of Drawings and Specifications.

6. Shop drawings will be checked by Architect and Engineer for conformance to design as a convenience to Contractor. Dimensions will not be checked. Should interferences become evident, notify Architect immediately so that matter may be resolved prior to proceeding with fabrication.

7. No reimbursement based on a claim that work was placed in accordance with dimensions shown on a reviewed shop drawing will be allowed for removing or replacing work already in place.

8. Make available a copy of every reviewed shop drawing at Project Site.

9. Submit shop drawings in coherent groups; e.g., all lighting fixtures at one time.

10. Submit actual samples of specified equipment or material to Architect for review when requested.

F. Substitution and Approval of Material:

1. Base all bids and proposals only upon materials, construction and equipment named or described in specification and/or shown on drawing. Should a Contractor wish to use other equipment than that specified, he shall submit proposed substitution by fully describing equipment he prefers to use and by listing credit or additional cost to his bid as a separate item should substitution be acceptable.

2. All equipment and materials proposed for substitution shall be similar in design and equal in quality and function to those specified herein or on drawings. Contractor (not sales vendor) shall demonstrate his proposed substitution and shall specifically note all differences between item specified and proposed substitution. Actual samples and test data, certified by an independent testing laboratory, shall be submitted when requested.

3. Each substitution will be given consideration, but without any obligation expressed or implied on part of Architect to change named requirements of specification. Only one substitution for each item of equipment will be permitted. Contractor assumes sole responsibility for performance and space requirements for substitute equipment. Decision of Architect shall be final as to whether or not substitution is acceptable.

G. Terminology:

1. Term "provide" used on Drawings and elsewhere in the Specifications shall be considered to mean "furnish and install".

2. Term "UL" means Underwriters Laboratories Inc.

H. Workmanship: See supplementary Conditions, Architect is sole judge of whether execution is in a workmanlike manner.

I. Safety Conditions: Be responsible in preventing energized switches, circuit breakers or circuits from being turned to "On" position during construction period. Be responsible for damages to personnel and/or property resulting from contact with energized circuits, switches, circuit breakers, busses or other electrical apparatus. Construct all electrical work with electrical system de-energized in area. At no time permit work on equipment or apparatus with energized circuits.

J. Verification of Dimensions: All scaled and figured dimensions are approximate and are given for estimating purposes only. Before proceeding with work carefully check and verify all dimensions and sizes and assume all responsibility for fitting of materials and equipment to other parts of equipment and to structure. Where apparatus and equipment have been indicated on drawings, dimensions have been taken from typical equipment of class indicated. Carefully check drawings and see that equipment will fit into spaces provided.

K. Locations:

1. Locations of conduits, outlets, apparatus and equipment indicated on drawings are approximate only and shall be changed to meet architectural and structural conditions as required.

2. Install conduit and equipment in a manner and in locations avoiding all obstructions, preserving headroom, keeping openings and passageways clear and readily accessible for maintenance and repairs. Make changes in locations of conduit or equipment which may be necessary to accomplish this. Drawings are essentially diagrammatic to extent that many offsets, bends, special fittings and exact locations are not indicated. Examine all drawings prepared by manufacturers, suppliers and installers of all equipment including air conditioning and plumbing fixture shelving, for requirements and locations of equipment and outlets.

3. Should any structural interferences prevent installation of outlets, setting of cabinets for lighting panelboards, running of conduits, or installation of other electrical equipment at locations shown on Drawings, necessary minor deviations therefore as determined by Engineer may be permitted. In event changes in indicated locations or arrangements are necessary due to developed conditions in building's construction or rearrangement of furnishings or equipment, Owner shall be permitted to move any junction box or utility outlet a distance of 10' and such changes shall be made without extra cost providing change is ordered before work is installed. Submit an estimate of cost or credit for other changes and proceed only upon written authority of Architect.

4. Be cautioned that diagrams showing electrical connections are diagrammatic only and must not be used for obtaining lineal runs of wiring or conduit. Wiring diagrams do not necessarily show exact physical arrangement of equipment.

5. Locations of outlets, lighting fixtures, cabinets, panelboards, apparatus, motors, mechanical equipment, etc., shown on Electrical Drawings is only approximate. Do not scale them from Electrical Drawings.

6. Verify locations of outlets, lighting fixtures, equipment etc., with Architectural Drawings of interior and exterior details and finish, and coordinate location of electrical work with mechanical and other equipment.

7. Locate lighting fixtures as per reflected ceiling plans prepared by Architect.

L. These Specifications and attendant Drawings are intended to cover a complete and operable electrical system. Follow Drawings and Specifications and execute all work according to true intent and meaning. Should any error or omission exist in either or both of these Drawings and Specifications, or conflict one with another, have same explained and adjusted by Engineer before submitting bid price for electrical work; otherwise at own expense, supply proper materials and labor to completely install same, make good any damage to or defect in work of results obtained therefore caused by such error, omission or conflict. Most restrictive, greater quantity or size, better quality or other superior condition of all representations shall prevail. It is intended that outlets be located symmetrical with Architectural elements notwithstanding fact that locations indicated on Drawings may be distorted for clarity.

M. Omission of expressed reference in Drawings or Specifications to any item of labor or material necessary for proper execution of work in accordance with present good practice of trade will not relieve Contractor from providing such additional labor and materials.

N. Job Visits by Engineer: Periodic visits to job by Engineer is for express purpose of verifying compliance by Contractor with contract documents. Such visits by Engineer shall not be construed as construction supervision. Neither shall such visits be construed to make Engineer responsible for providing a safe place for performance of work by Contractor or Contractor's employees or safety of supplies of Contractor or his subcontractors.

O. Cooperation with Others: Organize work that will harmonize with work of all trades so that all work may proceed as expeditiously as possible. Be responsible for correct placement of work and connection of work to all related trades.

P. Protection of Finish: Provide adequate means for protecting all finished parts of materials and equipment against damage from any cause during progress of work and until acceptance by Architect. Cover all material and equipment in storage and during construction in such a manner that no finished surfaces will be damaged, marred or splattered with paint. Keep moving parts perfectly clean and dry. No paint spraying will be permitted in building. Replace or refinish damaged material or equipment including face plates or panels without additional costs to Owner.

Q. Cleaning Equipment and Premises: Thoroughly clean all parts of materials, equipment and exposed parts such as receptacles and panelboards, of cement, plaster and other materials. Remove all oil and grease spots with a non-inflammable cleaning solvent. Brush exposed metal work with steel brushes to remove rust and other spots and leave smooth and clean. During progress of work, carefully clean up and leave premises and all portions of building free from debris. At completion of work, remove all waste materials and debris resulting, leaving everything in a complete and satisfactory condition.

R. Cutting and Patching: Include all cutting and patching in bid. Do not cut any structural members without first having received written permission from Architect. Cutting of round openings which can be done by use of a rotary drill shall be done by Contractor requiring same. Cutting and patching finish work shall be performed by workmen of the respective trade.

S. Conditions at Site: Visit Job Site and become familiar with all existing conditions within scope of work and include in Bid Proposal allowance for these conditions. Verify exact locations of services prior to construction. Notify all other Contractors of these utility locations.

T. Documents: Read all relevant documents, become familiar with job, scope of work, type of general construction, Architectural, Structural, Mechanical and Electrical Drawings and Specifications. Also become familiar with purpose for which these Drawings have been prepared and become cognizant of all details involved.

U. Acceptance: Before work will be accepted, demonstrate to Owner and Architect that entire installation is complete and in proper operating condition and Contract has been fully and properly executed. Following items shall be prepared and submitted to Architect:

1. Two copies of all test results required under this Division.

2. Two copies of local and/or state code enforcing authorities final inspection certificates.

3. Copies of as-built record drawings as required.

4. Notify Architect in writing when installation is complete and that a final inspection of this work can be performed. In event defects or deficiencies are found during this final inspection they shall be corrected to satisfaction of Architect before final acceptance can be issued.

5. Two Maintenance and Operating Manuals as required.

V. Field Inspections: Provide proper facilities for access of Owner or Owner's representative to conveniently examine and inspect all portions of work covered in this Contract at any and all reasonable hours.

W. Completing Work: At completion of work, remove all waste materials and debris resulting from work, leaving everything in a complete and satisfactory condition.

X. Electrical Superintendent: Include services of a qualified electrical foreman capable of interpreting intent of Drawings and Specifications, to study Plans, Specifications and references, and coordinate all requirements with other trades, authorized to make decisions and issue instructions; be constantly in charge of work and available at job site at all times and at final inspection. Instruct Owner's representative for proper operation and recommend maintenance of all systems.

Y. Maintenance and Operating Manuals:

1. Before completion and acceptance of work, furnish Owner with two complete sets of operating and maintenance instruction manuals. Bind each set in durable hardboard binder and index.

2. Compile data for manuals upon approval of material list and sketches so as not to delay final approval of work installed. Operating manuals to contain all pertinent data relating to electrical installation such as fixture cuts, manufacturer's approval, shop drawings, sketches, wiring diagrams and equipment operating instructions.

3. Instruct Owner's operating personnel with electrical operating procedures before work is considered complete.

Z. Extra Work or Costs to This Contractor Due to Other Contractors or Trades: Adjusted between this Contractor and offending Contractor at no extra cost to Owner. Notify Architect before such extra work is done.

AA. Tests:

1. Upon completion of work and adjustment of all equipment, all systems shall be tested under direction of Owner's representative to demonstrate that all equipment furnished and installed and/or connected under provision of these Specifications shall function electrically in manner required. All tests shall be completed prior to final inspection of project.

2. All systems shall test free from short circuits and grounds and shall be free from mechanical and electrical defects. All circuits shall be tested for proper neutral connection.

3. All instrumentation and personnel required for testing shall be furnished by Contractor.

BB. Noise Control:

1. Perform electrical work to a manner in minimize transmission of noise and preserve acoustical properties of building structure.

2. Where equipment is mounted on vibration isolators, use flexible connections to reduce transmission of noise.

3. Where conduits pass through sleeves in interior walls, floors, or ceilings, completely fill space between each conduit and its sleeve to provide an airtight seal.

4. Use glass fiber material, "Duxseal" compound, for acoustic seals.

CC. Seismic Bracing Standards: All pipes, cable trays, conduits, etc. shall be supported and braced in accordance with SMACNA “Seismic Restraint Manual, Guidelines for Mechanical Systems”, including Appendix B, “Additional Requirements for OSHPD” and “Addendum no. 1, September 2000”. Comply with CBC, where requirements are more stringent than SMACNA, including, but not limited to the following:

1. Pipes and conduit shall be braced to resist the forces prescribed in California Building Code.

2. Where possible, pipes, conduit and their connections shall be constructed of ductile materials (copper, ductile iron, steel or aluminum and brazed, welded, or screwed connections.) Pipes, conduits and their connections, constructed of nonductile materials (e.g., cast iron, no-hub pipe and plastic), shall have the brace spacing reduced to one-half of the spacing allowed for ductile material in accordance with California Building Code or SMACNA Seismic Restraint Manual.

3. Seismic restraints may be omitted for the following conditions:

   a. All piping suspended by individual hangers 12 inches or less in length from the top of the pipe to the bottom of the structural support for the hanger.

   b. All electrical conduit less than 2.5 inches trade size.

4. For rigidly supported, electrical conduit, or cable trays, the product of $C_a I_p$ need not to exceed 1.2 for any value of I_p.

5. All Trapeze assemblies supporting, cable trays and conduit shall be braced to resist the forces and relative displacements per ASCE 7 Chapter 13, considering the total weight of the elements on the trapeze.

6. Conduit supported by a trapeze where none of these elements would individually be braced need not be braced if connection to the pipe/conduit of directional changes do not restrict movement of the trapeze. If this flexibility is not provided, bracing will be required when the aggregate weight of the pipes and conduit exceed 10 pounds/foot. The weight shall be determined assuming all pipes and conduits are filled with water.

DD. Bracing Standards Application: Comply with bracing standards by evaluating the complete installation of all utilities and equipment, and providing a comprehensive solution based on Contractor’s layout, coordination withal other trades, and with the structural design and all other provisions for incorporating systems into the buildings. Show bracing products and layout in shop drawing submittals. The following criteria apply to the bracing of all systems:

1. The design parameters for determining the Total Design Lateral Force shall be as designated on the structural drawing.

2. Seismic Hazard Levels (SHL) shall be as designated on structural drawings.

3. Contractor shall submit documentation for each condition, which is not specifically covered in the SMACNA manual, including piping configurations and conditions, structural systems, structural connection methods, and other issues regarding the application of the standards.

4. Provide expansion anchors, sized per SMACNA guidelines, for use in concrete.

5. For connections to structural steel, wood framing, etc. provide bolted or welded connections, sized per SMACNA guidelines.

6. Seismic bracing components consisting of structural shapes.

7. Seismic bracing cable shall be galvanized steel, conforming to ASTM A603, zinc-coated with minimum 0.4 ounces/sf, pre-stretched, 7 x 19 strand, sized per SMACNA guidelines.

EE. In hard ceiling space where access to j-boxes, detectors, etc is required, provide ceiling access panel, fire-rated typical.

END OF SECTION

SECTION 260519
WIRE AND CABLE-RATED 600 VOLT

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Building wire.

2. Ground Conductors.

3. Wiring connections and terminations.

4. Conductor Identification.

B. Related Work:

1. Section 260100 - Basic Materials and Methods.

2. Section 260526 - Grounding.

3. Section 260533 - Conduit.

4. Section 260553 - Electrical Identification.

PART 2: PRODUCTS

2.01 BUILDING WIRE

A. Wires shall be single conductor type THHN or THWN insulated with polyvinyl chloride and covered with a protective sheath of nylon, rated at 600 volts. Wires may be operated at 90 degrees C. maximum continuous conductor temperature in dry locations, and 75 degrees C. in wet locations and shall be listed by UL Standard 83 for thermoplastic insulated wires, listed by Underwriter's Laboratories (UL) for installation in accordance with Article 310 of the California Electrical Code (CEC). Conductors shall be solid copper for 12 AWG and smaller conductors, and stranded copper for 10 AWG and larger conductors. Conductors shall be insulated with PVC and sheathed with nylon. Wires shall be identified by surface markings indicating manufacturer's identification, conductor size and metal, voltage rating, UL symbol, type designations and optional rating. Indentations for lettering are not permitted. Wires shall be tested in accordance with the requirements of UL standard for types THWN, or THHN.

B. Conductors shall be solid Class B or stranded Class C, annealed uncoated copper in accordance with UL standards, or another Nationally Recognized Testing Laboratory (NRTL).

C. Control Circuits: Copper, stranded conductor 600 volt insulation, THWN/THHN.

D. Minimum branch circuit wiring: No. 12 AWG copper, 600 volt insulation.

E. Minimum wire size except for control wiring: No. 14 AWG copper, 600 volt insulation.

F. Wiring for fluorescent lighting fixtures mounted end-to-End: Type “THHN”.

2.02 GROUND CONDUCTORS

A. Equipment ground: Insulated conductor green in color.

B. Isolated circuit ground: Insulated conductor green in color.

C. Ground Wires: Bare copper or with green colored insulation.

2.03 CONDUCTOR ARRANGEMENT AND IDENTIFICATION

A. Ties: T & B "Ty-rap" or 3M Company.

B. Lacing: Nylon twine.

C. Markers: Adhesive type, Brady.

2.04 CONDUCTORS

A. All Wire: New and delivered to job site in unbroken packages.

B. Each package shall bear Underwriter's and Manufacturer's labels and seals indicating date of manufacture and maximum allowable voltage.

PART 3: EXECUTION

3.01 INSTALLATION

A. Wires shall not be installed until debris and moisture is removed from conduits, boxes, and cabinets. Wires stored at site shall be protected from physical damage until they are installed and walls are completed.

B. Wire-pulling compounds furnished as lubricants for installation of conductors in raceways shall be compounds approved and listed by UL, NRTL, or equal. Oil, grease, graphite, or similar substances are not permitted. Pulling of 2 AWG or larger conductors shall be performed with a cable pull machine. Any runs shorter than 50 feet are exempt. When pulling conductors, do not exceed manufacturer’s recommended values

C. At outlets for light, power, and signal equipment, pigtail splices with 8-inch circuit conductor leads for connection to fixtures, equipment, and devices.

D. Pressure cable connectors, pre-insulated 3M Scotchlok, Hubbell Power, O-Z/Gedney or equal, Y, R or B spring-loaded twist-on type, may be furnished in splicing number 8 AWG or smaller wires for wiring systems; except public address and telephone systems.

E. Joints, splices, taps, and connections to switchboard neutral, bonding or grounding conductors, conductors to ground busses, and transformer connections for wires 6 gage and larger shall be performed with high-pressure cable connectors approved for installation with copper conductors. Connectors shall be insulated with heavy wall heat shrink WCSM, or cold-applied roll-on sleeve RVS. Insulation level shall be a minimum of 600V and joints, splices, and taps shall be qualified to ANSI C 119.1, UL, NRTL, or equal listed mechanical pressure connections.

F. Connections to any bussing and high-press cable connectors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade five machine screws secured with constant pressure-type locking devices.

G. Connection of any bonding or grounding conductors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade five machine screws secured with constant pressure-type locking devices.

H. Wire switchboards, panel cabinets, pull boxes, and other cabinets except public address, shall be neatly grouped and tied in bundles with nylon ties at 10-inch intervals. In switchboards, panels and terminal blocks, wires shall be fanned out to terminals. If bundles are longer than 24 inches, a maximum of nine current carrying conductors may be bundled together.

I. Install conductor lengths with a minimum length within the wiring space. Conductors must be long enough to reach the terminal location in a manner that avoids strain on the connecting lug.

J. Maintain the conductor required bending radius.

K. Neutral conductors larger than 6 gage, which are not color identified throughout their entire length, shall be taped, painted white or natural gray, or taped white where they appear in switchboards, cabinet, gutters or pull boxes. Neutral conductors 6 gage and smaller shall be white color identified throughout their entire length.

L. Fire alarm and clock wiring shall be continuous from terminal cabinets or from equipment to each device. Splices are not permitted between devices and/or terminal cabinets at junction and pull boxes. Wiring shall be terminated at terminal blocks or devices only.

M. Wiring systems shall be free from short circuits and grounds, other than required grounds. The contractor shall be responsible for the testing of feeder and branch circuit conductor's insulation resistance. The insulation of the conductors shall be tested prior to connections to any panelboards, switchboards, variable frequency drives, lighting control systems, ballasts, and wiring devices such as but not limited to GFI receptacles, TVSS receptacles, or equipment. Insulation testing of panelboards and switchboards shall be independently performed from the insulation testing of any conductors as specified in other sections of this specification.

1. Utilize the services of an approved independent testing laboratory to perform megger time-resistance insulation testing of feeder conductors. Tests must be conducted with wires disconnected at both ends.

   a. Provide calibration program records to assure the testing instrument to be within rated accuracy. The test equipment accuracy shall be in accord with the requirements stated by the National Institute of Standards and Technology (NIST).

   b. Test equipment shall be provided with a label stating the date of last calibration. As a minimum the equipment shall have been calibrated within the past 12 months.

   c. Test reports shall include the following:

      1) Identification of the testing organization.
      2) Equipment identification.
      3) Ambient conditions.
      4) Identification of the testing technician.
      5) Summary of project.
      6) Description of equipment being tested.
      7) Description of tests.
      8) Test results.
      9) Analysis, interpretation and recommendations.

3.02 COLOR CODES

A. General Wiring:

1. Color code conductor insulation as follows:

SYSTEM VOLTAGE		
Conductor	208Y/120	480Y/277
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Natural Gray

Neutrals shall be colored-distinguished if circuits of two voltage systems are used in the same raceway.

2. For phase and neutral conductors 6 gage or larger, permanent plastic-colored tape may be furnished to mark conductor end instead of coded insulation. Tape shall cover not less than 2 inches of conductor insulation within enclosure.

B. Signal Systems: Wires for signal systems shall be color-coded. Except where otherwise specified, color-coding shall be as follows:

SYSTEM	COLOR CODE
Clocks	Pink, Gray and Orange
Fire Alarm Horns	Pink (+) and Gray (-)
Fire Alarm Strobes	Orange (+) and Blue (-)
Un-Interruptible 24 Volt Power (Annunciator, Water Flow, and Audible Device)	Yellow (+) and White (-) Note: A single white wire may be common to both
Interruptible 24 Volt Power (4 wire smoke detectors, duct detectors)	Brown (+) and White (-) Note: A single white wire may be common to both
Switch-Leg Sprinkler Bell (Between water flow and audible device)	Violet (+) and White (-)
Door Holding Magnets (Non Power Limited)	Black (+) and White (-)

3.03 FEEDER IDENTIFICATION

A. Feeder wires and cables shall be identified at each point the conduit run is broken by a cabinet, box, gutter, etc. Where terminal ends are available, identification shall be by means of heat shrink wire markers, which provide terminal strain relief. Markers shall be by Tyco Electronics, Panduit, Brady Perma-Sleeve, or equal. Identification in other areas shall be by means of wrap-around tape markers from Tyco Electronics, Panduit, Brady Perma-Code or equal. Markers shall include feeder designation, size, and description.

3.04 TAPE AND SPLICE KITS

A. Splices, joints, and connectors joining conductors in dry and wet locations shall be covered with insulation equivalent to that provided on conductors. Free ends of conductors connected to energized sources shall be taped. Voids in irregular connectors shall be filled with insulating compound before taping. Thermoplastic insulating tape approved by UL, NRTL, or equal for installation as sole insulation of splices shall be furnished and shall be installed according to manufacturer's printed specifications.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 260526
GROUNDING

PART 1: GENERAL

1.01 Provide required grounding.

1.02 SYSTEM DESCRIPTION

A. All metallic objects on the premises that enclose electrical conductors or that are likely to be energized by electrical currents shall be effectively grounded.

B. All metal equipment parts such as enclosures, raceways, and equipment grounding conductors and all earth grounding electrodes shall be solidly joined together into a continuous electrically conductive system.

C. All metallic systems shall be solidly interconnected to the electrical system as provided by the service entrance and for each grounded separately derived system that is installed.

D. A separately derived A.C. source shall be grounded to the equipment grounding conductor and to a separate made electrode.

E. Electrical continuity to ground metal raceways and enclosures, isolated from equipment ground by use of non-metallic conduit or fittings, shall be provided by a green insulated grounding conductor of approved size within each raceway connected to isolated metallic raceways, or enclosures at each end. Each flexible conduit shall be provided with a green insulated grounding conductor of approved size. In addition to using metallic conduits as ground, provide a ground wire sized per code in <u>every</u> conduit.

F. Cold water or other utility piping systems shall not be used as the only source of grounding electrodes. Grounding electrodes shall be "made electrodes" specified as follows:

1. Grounding electrodes as specified in Part 2 of this Specification.

2. Concrete enclosed electrode, which is made up of at least 20'-0" of #4 AWG, minimum size, copper conductor, encased by at least 2" of concrete, located within or near bottom of a concrete foundation, or footing, which is in direct contact with earth. Footing rebar must be connected to copper wire using approved connections. An external electrode as specified in Article 2.01, Paragraph B of this Specification Section must be installed and connected to foundation or footing rebar.

G. Non-current-carrying metal parts of high voltage equipment enclosure, signal and power conduits, switchboard and panelboard enclosures, motor frames, equipment cabinets, and metal frames of buildings shall be permanently and effectively grounded.

H. Metallic or semi-conducting shields, and lead sheaths of cables operating at high voltage, shall be permanently and effectively grounded at each splice and termination.

I. Neutral of service conductors shall be grounded as follows:

1. Neutral shall be grounded at only one point within school site for that particular service. Preferable location of grounding point shall be at service switchboard, or main switch.

2. Equipment and conduit grounding conductors shall be bonded to that grounding point.

3. If other buildings on campus are served from a switchboard or panelboard in another building, power supply is classified as a feeder and not as a service.

4. Equipment grounding conductor is carried from switchboard to each individual building. At building, grounding conductor is bonded with power equipment enclosures, metal frames of building, etc., to "made electrode" for that building.

5. Neutral of feeder shall not be grounded.

J. If there is a distribution transformer at a building, secondary neutral conductor shall be grounded to "made electrode" serving building.

K. Within every building, main switchboard or panel, shall be bonded to a 1" or larger cold water line with a 1" conduit with one #6 wire. Metallic piping systems (gas, fire sprinkler, etc.) shall be bonded to cold water line with 3/4" conduit with one #8 wire.

PART 2: PRODUCTS

2.01 YARD BOXES

A. Yard boxes shall be precast concrete and shall be approximately 14" wide, 19" long, and 12" deep (outside dimensions), or larger, if necessary, to obtain required clearances. Boxes shall be equipped with bolt-down, checkered, cast iron covers and a cast iron frame cast into box. Yard boxes shall be Brooks 36 or approved equal.

2.02 ELECTRODES

A. "Made" electrodes shall be approved copper-clad steel ground rods, minimum 3/4" diameter, 10'-0" long.

2.03 GROUND ENHANCEMENT MATERIAL

A. Ground enhancement material as manufactured by Erico Electrical Products shall be used packed inside a 3" diameter hole around ground rod. Manufacturer's installation instructions must be followed for each ground rod installation.

PART 3: EXECUTION

3.01 ELECTRICAL DEVICES

A. Grounding electrodes shall be located in nearest usable planting area, where not otherwise indicated on Drawings, and each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, concrete yard box shall be 2" above planting surfaces.

B. If concrete enclosed electrode is used, grounding wire shall terminate to a suitable copper plate with grounding lugs.

C. Grounding rods shall be driven to a depth of not less than 8'-0". A permanent ground enhancement material as manufactured by Erico Electrical Products shall be used at each ground rod to improve grounding effectiveness. The manufacture's guidelines shall be used for each installation.

D. Grounding electrodes shall have a resistance to ground of not more than 5 ohms.

E. When using grounding rods, if resistance to ground exceeds 5 ohms, 2 or more rods connected in parallel shall be provided to meet grounding resistance requirement.

F. Ground rods shall be separated from one another by not less than 10'-0"

G. Parallel grounding rods shall be connected together with approved fittings and approved grounding conductors in galvanized rigid steel conduit, buried not less than 12" below finish grade.

H. Electrical Contractor shall include in his bid, cost of services of an approved independent testing laboratory, to test grounding resistance of all made electrodes, ground rods, and bonding of building steel, water pipes, gas pipes and other utility piping. Tests to be performed are as follows:

1. Visually and mechanically examine ground system connections for completeness and adequacy.

2. Perform "fall of potential" tests on each ground rod or ground electrode where suitable locations are available per IEEE Standard No. 81, Section 8.2.1.2. Where suitable locations are not available, measurements will be referenced to a known dead earth or reference ground.

3. Perform the two point method test per IEEE No. 81, Section 8.2.1.1 to determine ground resistance between ground rod and building steel, and utility piping - such as water, gas and panelboard grounds. Metal railings at building entrances and at handicapped ramps shall also be tested.

4. Test shall be conducted in presence of the District Electrical Inspector.

I. Three copies of test results shall be submitted to the District Electrical Inspector. Test results shall be submitted on an official form from the independent testing laboratory showing project location, test engineer, test conditions, test equipment data, ground system layout or diagram, and final test results.

END OF SECTION

SECTION 260533
CONDUIT

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Rigid metal conduit and fittings.

2. Intermediate metal conduit and fittings.

3. Electrical metallic tubing and fittings.

4. Flexible metal conduit and fittings.

5. Liquidtight flexible metal conduit and fittings.

6. Non-metallic conduit and fittings.

PART 2: PRODUCTS

2.01 RIGID STEEL CONDUIT AND FITTINGS

A. Rigid Steel Conduit: Hot dipped galvanized inside and out, galvanized threads, mild steel, zinc coated, inside and outside protective coating. Standard lengths: 10'-0".

B. Bushings: Threaded insulated metallic type except sizes 1" and smaller may be non-metallic type. Setscrew bushings are not acceptable.

C. Couplings, elbows, bends and other fittings: Same material and finish as rigid steel conduit. All shall be threaded type.

2.02 RIGID ALUMINUM CONDUIT AND FITTINGS

A. Conduit: Extruded from 6063-T24 alloy of maximum 1/10% copper content and containing lubricating inside liners; rigid threaded type.

B. Bushings: Insulated metallic except that sizes 1" and smaller may be non-metallic.

2.03 INTERMEDIATE METAL CONDUIT (IMC) AND FITTINGS

A. Conduit: Galvanized steel, zinc coated, protective coating inside and out.

B. Fittings and Conduit Bodies: Use fittings and conduit bodies specified above for rigid steel conduit.

C. Conduit: May be used in lieu of rigid steel conduit where permitted by code, except in concrete, underground, runs longer than 100 feet for all power feeders with conduit greater than 2 inches.

2.04 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

A. Conduit: Hot dipped galvanized or sherardized inside and out, zinc coated with protective enamel coating inside. Provide bushings at ends of conduits.

B. Connectors: Steel, insulated, bused tap-on or wrench tightened compression type. (Couplings similar) Indentor or screw type not acceptable.

C. Conduit: May be used in lieu of rigid steel conduit where permitted by code, except exposed, in concrete and for runs more than 100' for all power feeders with conduit greater than 2 inches.

2.05 FLEXIBLE METAL CONDUIT AND FITTINGS

A. Conduit: Steel single strip, hot dipped galvanized on all 4 sides prior to fabrication. Flexible aluminum conduit will not be allowed.

B. Connectors: Die cast with ridges that thread into conduit. (Binding screw type connectors are not acceptable.)

C. Conduit: May be used in lieu of rigid steel conduit where specifically indicated; at connections to vibrating equipment; at drops to light fixtures from J-boxes; at locations judged by Architect impractical to use rigid conduit. Maximum length for any application shall be 6 feet.

2.06 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS

A. Conduit: Steel, single strip, hot dipped galvanized on 4 sides prior to fabrication.

B. Connectors: Insulated, special Appleton "STN" Series.

C. Jacket: Liquidtight, polyvinyl chloride plastic.

D. Conduit: Use for final connection to motor terminal boxes and transformers. Use at exterior locations, damp locations, wet locations and for flex connections in kitchen, restrooms and similar areas.

2.07 PLASTIC CONDUIT AND FITTINGS

A. Conduit: Extruded, virgin polyvinyl chloride compound, Schedule 40, heavy wall, in 10'-0" lengths with couplings.

B. Fittings: Non-threaded type couplings.

C. Conduit: May be used underground only. Vertical elbows and risers of all sizes shall be rigid steel with 20 mil bonded PVC coating.

2.08 CONDUIT SUPPORTS

A. Conduit Clamps, Straps, and Supports: Steel or malleable iron. Clamps: Unistrut Nos. P111 thru P1124, Kindorf No. C105. Straps: One or two hole as required.

B. Conduit hangers, racks and trapezes: Steel, threaded rods, channel iron "U" shaped racks equal to "Unistrut".

C. Individual conduit hangers: Steel, threaded rods with malleable iron split rings.

D. Hanger rods: 3/8" minimum diameter for 2" and smaller conduit, factory made. 1/2" minimum for 2-1/2" and larger conduit.

E. Wire supports: 12 gauge zinc coated iron tie wire, or 16 gauge galvanized double annealed steel tie wire.

2.09 CONDUIT ROOF JACKS AND FLASHING

A. Roof Jacks:

1. For Single Conduits Through Roof: Stonemen Stormtite Series #1100-4; seamless 4 pound lead flashing assembly, 8" skirt, steel reinforced varipitch boot; caulk type cast iron counter flashing sleeve, with vandal proof set screws, and Perma-seal waterproofing compound.

2. Sleeves for Conduits: Sleeves shall be adjustable type, of 26 gage galvanized iron, Adjust-to Crete Co. Adjust-to-Crete, or Jet Line Products Inc. Jet-Line, or equal.

3. Where conduit enters a building through a concrete foundation below grade, or ground water level, or where it is necessary to seal around a conduit where it passes through a concrete floor or wall, provide O-Z/Gedney Type FSK Thru Wall and Floor Seal, or equal.

2.10 CONDUIT PULLING CORDS

A. Pull Wire: No. 12 galvanized iron or nylon pull wire rated 250 pounds tensile strength.

2.11 CONDUIT FITTINGS, ELLS AND BUSHINGS

A. Special conduit fittings: Crouse-Hinds "Condulets" or Appleton "Unilets".

B. Ells: Same quality, same finish and same make as conduit.

C. Bushings: Thomas & Betts or approved equal.

D. Seismic separations and expansion joints: OZ type "AX" complete with bonding strap and clamps. At exterior locations use OZ type "EX".

2.12 CONDUIT SEALS AND SEALING COMPOUND

A. Vertical seals: Crouse Hinds type "EYD" or Appleton type "SF".

B. Horizontal Seals: Crouse Hinds type "EYS" or Appleton type "ESU".

C. Sealing compound: Crouse Hinds "CHICO" or Appleton "APELCO".

D. Fireproofing Compound: Dow Corning No. 3-6548 RTV or equal by 3M Company or Nelson.

2.13 UNDERGROUND SPACERS FOR PVC CONDUIT

A. Spacers: PVC, interlocking type, intermediate and base styles.

B. Sizes: For 2" to 4" conduit.

C. Manufacturer: Carlon or approved equal.

2.14 SPECIAL UNDERGROUND COUPLINGS FOR PVC CONDUIT

A. Expansion couplings: PVC type to expand up to 4".

B. Couplings: Socket type for joining PVC conduit.

C. Adapters: Socket type at one end for PVC conduit and threaded female type at other end for metallic connection.

2.15 PLASTIC CONDUIT CEMENT

A. Solvent weld cement: Fast drying, brush-on type.

2.16 MC CABLE

A. Metal Clad (MC) cable system is not allowed.

PART 3: EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Arrange conduit to maintain headroom and present a neat appearance.

B. Unless indicated otherwise, conceal conduit within or behind finished walls and ceiling.

C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

D. Maintain minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.

F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

H. Do not support conduit from any equipment subject to vibration. Support from structural members only.

I. Structural Considerations for Conduit Routing:

1. Where conduits are to pass through or will interfere with any Structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other buildings elements, to accommodate the electrical work, such work shall conform to State Building Code.

2. Where conduits are terminated in groups at panelboards, switchboards and signal cabinets, etc., provide templates or spacers to hold conduits in proper position and to preserve alignment. Conduits terminating at signal cabinets shall enter cabinets in following approved locations only: Conduits entering top, side, and bottom of cabinets shall be aligned in a single row, centered 2" from rear of cabinet; conduits entering back of cabinet shall be aligned in a single row centered 2" from top of cabinet. Conduits shall not be spaced closer than 3" on centers.

3. 1" and smaller conduits above metal lath ceilings shall be tied to ceiling channels. 1-1/4" conduits above metal lath ceilings shall be rigidly suspended with pipe hangers or pipe racks or shall be secured to superstructure with factory made pipe straps. Conduits in metal lath or steel stud partitions, shall be tied to furring channels or studs. In ceiling spaces and in partitions, tie wires shall be spaced not more than 5'-0" apart, shall hold conduit tight against channels and studs at point of tie and shall not bear any of weight of conduit. Tie wire shall be #16 gage galvanized double annealed steel tie wire.

4. Where auxiliary supports, saddles, brackets,, etc., are required to meet special conditions they shall be made rigid and secure before conduit is attached thereto.

5. Conduit in ceiling spaces, in stud walls and under floors shall be supported with factory made pipe straps or shall be suspended with pipe hangers or pipe racks. Pipe straps shall be attached to and shall hold conduit tight at point of support against ceiling and floor joists, rafters, and wall studs, or 2" x 4" headers fitted between joists or wall studs.

6. Conduits installed on exposed steel trusses and rafters shall be fastened with factory made conduit straps or clamps which shall hold conduit tight against supporting member at point of support.

7. Conduits under buildings shall be strapped with factory made conduit straps to underside of concrete floor or joists, or wood floor joists, or shall be suspended with pipe hangers or pipe racks. Conduits under building shall not rest on ground but shall be suspended from building or shall be buried below surface of ground. 1" and larger conduits under buildings shall be suspended with conduit hangers or racks.

8. Pipe hangers for individual conduits shall be factory made, consisting of a pipe ring and threaded suspension rod. Pipe ring shall be malleable iron, split and hinged, and shall securely hold conduit, or shall be springable wrought steel. Rings shall be bolted to or interlocked with suspension rod socket. Rods shall be 3/8" for 2" conduit hangers and smaller and shall be 1/2" for 2-1/2" conduit hangers and larger.

9. Pipe racks for groups of parallel conduits and for supporting total weights not exceeding 500 pounds shall be trapezed type and shall consist of a cross channel, Steel City Kindorf #B-900, Unistrut #P-1000 suspended with a 3/8" minimum diameter steel rod at each end. Each rod shall be fastened with nuts, top and bottom to cross channel and with a square washer on top of channel. Each conduit shall be clamped to top for cross channel with conduit clamps, Steel City Kindorf #C-105 or Unistrut Nos. P-1111 through P-1124. Conduits shall not be stacked one on top of another, but a maximum of 2 tiers maybe on same rack providing an additional cross channel is installed. Where a pipe rack is to be longer than 18", or if weight it is to support exceeds 500 pounds, submit details of installation to the Architect for approval.

10. Factory-made pipe straps shall be one or 2-hole formed galvanized clamps, heavy duty type, except where otherwise specified.

11. Hangers straps, rods, or pipe supports under concrete shall be attached to inserts set at time concrete is poured. Under wood use bolts, lag bolts, or lag screws; under steel joists or trusses use beam clamps.

3.02 CONDUIT INSTALLATION

A. Cut conduit square using a saw or pipe cutter; de-burr cut ends.

B. Bring conduit to the shoulder of fittings and couplings and fasten securely.

C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.

D. Install no more than equivalent of two 90- degree bends between boxes for conduits 2" diameter and larger, three for conduit under 2" diameter. Locate pull boxes as required.

E. Use conduit bodies to make sharp changes in direction, as around beams.

F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch size.

G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.

H. Support rigid, intermediate and thin wall conduit at 8'-0" maximum on centers and 3'-0" from junction boxes.

I. Support flexible and liquidtight flexible conduit at 4'-0" maximum on centers and 12" from junction boxes.

J. PVC conduit: Use underground only. Encase in 3” concrete (2000 psi) envelope except under building.

K. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.

L. Install expansion-deflection joints where conduit crosses building expansion or seismic joints.

M. Where conduit penetrates fire-rated walls and floors, seal opening around conduit with UL listed fire barrier, "3M" calk or equal.

N. Route conduit to roof mounted devices and equipment through roof jacks. Provide flashing/roof jacks for all new and existing conduits which penetrate roof to appropriate Roofing Section(s) for installation.

O. Run conduit to equipment on roof concealed in attic space. Penetrate roof at equipment locations only.

P. For conduits to roof mounted HVAC equipment, penetrate roof with roof jacks outside footprint of HVAC units. Do not penetrate roof inside HVAC units.

Q. Do not use aluminum conduit below grade, cast in concrete or in masonry in contact with earth.

R. Conduit underground may be rigid conduit and in these conditions shall be given two heavy coatings of a suitable primer and a single half lapped layer of protective plastic tape. Primer and tape shall be "Scotchrap" No. 50 tape. Primer and tape shall be "Scotchrap" Primer or Trantex V-10 tape and Dutch Brand Primer. Primer and tape shall be in strict accordance with manufacturer's instructions. As an alternate, conduit and fittings shall have a PVC bonded coating (40 mil thickness minimum) by Occidental Coating Company.

S. Where conduit is installed underground, under slabs on grade, exposed to weather or in wet locations, make joints liquid tight and gastight.

T. For underground or under slab conduit, apply a heavy coat of Pabco P & B No. 2 paint to all surfaces within 6" each side of fittings and to areas where wrenches or other tools have been applied. On exposed conduit, repair scratches and other defects with galvanizing repair stick, Enterprise Galvanizing "Galvabar".

U. Cut threads on rigid conduit to standard taper and to a length such that all bare metal exposed by threading operation will be completely covered by couplings or fittings used. In addition, cut lengths of thread such that all joints will become secure and wrench tight just preceding point where conduit ends would butt together in couplings and where conduit ends would butt into ends or shoulders of other fittings. Securely tighten all threaded connections.

V. Make joints in rigid conduit installed in concrete or masonry liquid-and-gas-tight, with red lead and oil, or other approved joint compound and engage not less than five threads.

W. Keep bends and offsets in conduit runs to an absolute minimum. Replace all deformed, flattened or kinked conduit. Provide large radius factory made bends or power bend rigid metal conduit of 1-1/4" trade size or larger.

X. Place sleeves for electrical conduit passing through walls, beams or slabs before concrete is poured (exception-floor slabs on earth). Where conduit passes through suspended floor slabs, outside of chases, sleeves shall be standard weight black steel pipe extending 1-1/2" above the finished floor level. Sleeves at other locations shall be either lightweight galvanized steel tube, or galvanized sheet steel, with a minimum thickness of 24 USSG. Clearance between conduit and sleeves shall be not less than 1/2". Sleeves through outside walls below grade shall be caulked tight. Caulk with oakum and mastic to obtain watertight joint.

Y. Penetration Membrane: Where penetration cannot be avoided, cut and re-seal membrane at point of penetration.

Z. Provide minimum 3/4" conduit size underground.

AA. Run exposed conduit parallel with or at right angles to building line, beams, or ceilings. Place symmetrical bends or metal boxes at changes in direction or taps.

BB. Stub from each panel which is flush mounted in a wall, from top of panel a minimum of 3-3/4" conduits to nearest ceiling space or other accessible locations and cap for future use. Tag to indicate panel origination.

CC. Independently support conduit rising from floor for motor connections if over 24" above floor. Support shall not be a motor or duct work which may transmit vibrations.

DD. Provide pull wire in all conduit runs indicated as conduit only (C.O.).

EE. Do not run conduit closer than 12" to any hot water pipe, steam pipe, heater flue or vent.

FF. Terminate conduit stub-ups through floor for connection to equipment of junction boxes in couplings flush with top of concrete slab floor.

GG. Within building, bury underground conduit a minimum of 6" below bottom of slab.

HH. Use rigid metal conduit where legally required, where exposed to weather, where located in unheated areas, or where subject to mechanical injury, here defined as exposed conduit less than 7'-6" above floor in areas accessible to anyone other than authorized operating or maintenance personnel.

II. Where a conduit from one structure crosses to another structure, e.g., from a building to an arcade or from one arcade to another arcade, use a section of liquid-tight flex conduit at the crossing with sufficient slack to allow the two structures to move during an earthquake without breaking the conduit. For stub up to relocatable buildings, provide liquid-tite flex from stub up to first box on back of building.

JJ. Provide PVC deflection - expansion joint fittings where underground run passes through expansion joint or is necessary for seismic conditions.

KK. Provide a green insulated ground wire in all flexible conduit runs regardless of length.

LL. Wipe plastic conduit (PVC) clean before joining. Apply even coat of cement to entire area to be inserted into fitting. Let joint cure for 20 minutes minimum. Use approved solvent-weld cement specifically manufactured for purpose. Threading of PVC conduit is prohibited.

MM. Install an equipment ground (green) insulated conductor in each non-metallic conduit.

NN. Do not install PVC conduit above grade for any reason. Seal both ends of all PVC conduit runs at each junction box or conduit interruption with sealant. Seal steel conduit risers to panelboards, switchboards, or pullboxes from underground PVC conduit runs.

OO. Flash and counterflash all conduit runs passing through roof.

PP. Use electrical metallic tubing above grade in dry locations only and where not subject to mechanical injury or otherwise prohibited. Concrete and masonry in contact with earth are not considered dry locations.

QQ. Use liquid tight flexible conduit for final connections to motors and vibrating equipment. Use flexible conduit where required for equipment servicing for connections to recessed lighting fixtures from nearby accessible junction boxes, and for concealed runs in dry locations where structural conditions prevent use of other types of conduit.

RR. For conduits for computer cables and coax cables, use large radius bends. Do not use j-box or pull box to change direction. Install boxes at straight conduit sections only and sweep conduit to make turns. Do not use condulet fittings to change directions.

SS. Minimum radius for conduits designated for computer LAN wiring, coax cable wiring, data wiring, fiber-optics wiring, and TV cable wiring shall be as follows:

3/4"C	-	12"
1"C	-	12"
1-1/4"C-	18"	
2"C	-	24"
2-1/2"C-	24"	
3"C	-	30"
3-1/2"C-	30"	
4"C	-	30"
5"C	-	36"
6"C	-	42"

TT. Size all conduits as legally required or larger where indicated or preferred. Where portions of a conduit run are increased in size, for whatever reason, make all remaining portions in that run same size.

UU. Mark all underground conduit stub-outs with a 6 inch square by 2 foot deep concrete block with an embedded brass nameplate indicating the origin of conduit.

VV. Do not cut concrete, masonry or structural members except where approved by Architect.

WW. Underground Requirements:

1. Except for branch circuit conduits and auxiliary system branch circuits within a building, all conduits installed underground shall be entirely encased in concrete (2000 psi), 3" thick on all sides with multiple conduits spaced not less than 3" apart, except where otherwise specified. Provide approved conduit spacers as required to prevent any deflection of conduits when concrete is placed and to preserve position and alignment of conduits in concrete. Conduits shall be tied to spacers. Anchors shall be installed to prevent floating of conduits during pouring of concrete. Red concrete shall be used to encase conduits of systems operating above 600 volts. To protect conduits from underground to surface wall mounted panels, terminal cabinets, etc., encase conduits in 3" high concrete curb.

2. Assemble sections of conduit with approved fittings and stagger all joints. Cut ends of conduit shall be reamed to remove all rough edges. Joints in all conduits shall be made liquid-tight. All bends at risers shall be completely below surface where possible.

3. Two or more conduit runs in a common trench shall be separated by at least 3" of concrete. Conduit runs installed in a common trench with other utility lines and water, gas, sew lines, shall be separated from such lines by at least 12" horizontally. Power conduits shall be separated from low voltage signal conduits by 6" of concrete.

4. Slope underground conduits between two pull boxes towards one of the boxes to avoid water and moisture trap. For underground conduits coming out of a building, slope conduits towards the first pull boxes. Take care to install underground conduits such that water cannot travel through underground pull boxes and conduits back into a building. Prevention method shall include but not limited to installing pull boxes with draining provision where conduits enter building, sealing both ends of each conduit water tight, etc.

5. Provide electronic markers to identify conduit stub locations at property lines, as required by electric service utility company.

6. All underground conduit systems for use by service utility company shall meet all requirements of utility company.

3.03 EXCAVATION AND BACKFILL

A. Include all excavation and backfilling required for work under this Section.

1. Bury underground conduit at least 27 inches below finished grade to top of conduit encasement.

2. Underground branch circuit conduit, within building limits, 6" below bottom of slab unless specifically indicated otherwise in these specifications.

3. After installation of work has been inspected and approved, backfill trenches with clean earth, moistened and layer tamped to same compaction density as specified for both building and site locations under "Earthwork".

B. Locate existing underground pipes by use of electronic locating devices and exercise utmost care in excavation work. Contractor is responsible for satisfactory repair of any underground utility line damaged as result of his excavation.

C. Trenches or any other excavation required for installation of electrical work, which are outside of barricaded working area, shall be barricaded at all times with continuous portable barricades. At completion of work, remove barricades from site. Backfill trenches and excavations outside of barricaded working area immediately after approval of conduit work by Inspector.

D. Where asphalt concrete has been cut, backfill up to existing grade.

E. Do not start excavations until approval is obtained from Inspector.

END OF SECTION

SECTION 260534
BOXES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Wall and ceiling outlet boxes.

2. Floor boxes.

3. Pull and junction boxes.

4. Sealant.

B. Related Work:

1. Section 26 0100 - Basic Materials and Methods.

2. Section 26 0533 - Conduit

3. Section 26 2726 - Wiring Devices.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS-OUTLET BOXES

A. Raco

B. Steel City

C. Bowers

2.02 OUTLET BOXES

A. Sheet Metal Outlet Boxes: One piece galvanized, pressed steel, knockout type, 4-11/16" sq. by 2-1/8" deep in all locations unless otherwise indicated or required.

B. Cast Boxes: Aluminum, or Cast feralloy, deep type, gasketed cover, threaded hubs.

C. Where Wiremold type box have to be used, e.g., on existing concrete wall, provide proper box such that the total depth of a box including the device mounted on the box, will not exceed 4 inches.

2.03 ACCEPTABLE MANUFACTURERS-FLOOR BOXES

A. Hubbell

B. Walker Parkersburg

C. Steel City

2.04 FLOOR BOXES

A. Floor Boxes: Fully adjustable, cast iron boxes, Hubbell B4200 and B4300 Series with metal carpet flanges and metal flap covers.

2.05 PULL AND JUNCTION BOXES

A. Interior and non-weatherproof boxes shall be constructed of blue or galvanized steel with ample laps, spot welded, and shall be rigid under torsional and deflecting forces. Boxes shall have auxiliary angle iron framing where necessary to ensure rigidity. Covers shall be fastened to box with a sufficient number of brass machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws at Site if boxes are not installed plumb. All surfaces of pull and junction boxes and covers shall be given one coat of metal primer, and one coat of aluminum paint.

B. Weatherproof pull and junction boxes shall conform to foregoing for interior boxes with following modifications: Cover of flush mounting boxes shall have a weather-tight gasket cemented to and trimmed even with cover all around. Surface or semi-flush mounting pull and junction boxes shall be UL approved as rain-tight and shall be complete with threaded conduit hubs. All exposed portions of boxes shall be galvanized and finished with a prime coat and coat of baked-on gray enamel.

C. All junction and pull-boxes shall be rigidly fastened to the structure and shall not depend on conduits for support.

D. Underground Concrete Pull Boxes:

1. Precast Concrete Pull Boxes. Concrete pull boxes shall be traffic type, reinforced for HS20-44 Traffic bridge loading, precast concrete. Pull boxes with inside dimensions 2'-0"x 3'-0" x 3'-0"D shall consist of a base section, top ring and cover. Base section shall have a minimum of two 10"x10" knockouts in each 3'-0" side, and one 20"x20" knockout in each 2'-0" side. Pull boxes with inside dimension 4'-0 x 4'-0"x 4'- 0"D or larger shall consist of a base section, mid section, topping, and cover. Base section shall have a minimum of two 8"x 16" knockouts on each of two opposite sides, and one 20" x 20" knockout on each of the other two opposite sides. All pull boxes shall have a minimum of 6" diameter sump knockout, and 1" diameter ground rod knockout. In each pull box, furnish and install cable racks on walls. Each rack shall be equipped with 3 porcelain cable holders on a vertical steel mounting bar. Each pull box shall have 3/4" diameter pull irons. Covers shall be traffic type consisting of steel safety plate bolted to frame. Covers shall be marked "Electrical", "Power" "Telephone", "Signal" or "Ground", as required. Pull boxes shall be as manufactured by Quickset, or approved equal. Knockout requirements as stated above is minimum requirement.

Contractor is responsible for providing pull boxes with the proper knockouts to accept the conduits as shown on the drawings. Depth of pull boxes as shown is the minimum requirement. Provide deeper pull boxes as required to accommodate conduits and minimum conduit cover requirements. All conduits must enter pull boxes in a straight horizontal line.

2. Provide end bells in all duct entrances. Terminate each metal conduit with insulated bushing having grounding terminal, O.Z. Type "Big"

3. Place pulling irons on opposite walls and below horizontal centerlines of ducts and bricked-up openings, and in bottom. Install pulling irons with each end hooked around a reinforcing bar.

4. Remove floor drain knockout and provide a depth of 24 inches of crushed rocks below box extending a minimum of 12 inches beyond all 4 sides.

5. Identify all power and signal cables by tagging in all manholes and pull boxes. Tie securely to cables with nylon cord or insulated type TW wire. Tie so that turns of wires do not form a closed electrical circuit, loop wires all around pull box perimeter at least one time to allow for slack in the wire run. All cables, power or signal must be supported by the cable racks. Cables shall not be resting on the bottom of a pull box.

6. Top of steel plate shall have a minimum co-efficient of static friction of 0.5 for either wet or dry conditions, when tested for any shoe sole material. Testing and certification of the friction factor shall be conducted by an independent testing laboratory approved by the engineer, under the direction of a registered Civil or Quality Engineer. Testing shall conform to ASTM D1047 or F489 or F609, or other procedure approved by the Engineer.

7. Where flexible conduits or boxes are used within a concrete pull box to separate systems, such conduits and boxes shall be non-metallic type.

E. Underground utility boxes shall be reinforced concrete with non-setting shoulders to prevent settlement following installation. Boxes shall be furnished with cast iron cover with finger hole, size as indicated on Drawings. Utility boxes shall be as manufactured by Quickset, or approved equal.

F. Manholes, vaults and pull-boxes required by utility company, and installed by Electrical Contractor, shall meet all requirements of utility company.

G. Cast Metal Boxes for Outdoor and Wet Location Installations: Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as rain-tight. Galvanized cast iron OR Cast aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

2.06 ACCEPTABLE MANUFACTURERS-SEALANT

A. Crouse Hinds "CHICO"

B. Permacel

C. Ductseal

2.07 ACCEPTABLE MANUFACTURERS - FIRE PROOFING SEALANT

A. Dow Corning

B. 3M Company

C. Nelson

PART 3: EXECUTION

3.01 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify exact location of floor boxes and outlets in offices and work areas with Owner's representative prior to rough-in.

C. Locate and install boxes to allow access.

D. Locate and install to maintain headroom and to present a neat appearance.

3.02 OUTLET BOX INSTALLATION

A. Unless otherwise noted on plan or specifically allowed by the Engineer, conceal all boxes flush in wall or in ceiling space above drop ceiling. In finished areas and where it is not possible to conceal conduits and boxes, for example, on existing concrete wall, provide Wiremold type metallic surface raceways and boxes.

B. Do not install boxes back-to-back in walls. Provide minimum 6 inch separation, except provide minimum 24 inch separation in acoustic-rated walls.

C. Provide knockout closures for unused openings.

D. Support boxes independently of conduit except for cast box that is connected to two rigid metal conduits, both supported within 12 inches of box.

E. Use multiple-gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

F. Install boxes in walls without damaging wall insulation.

G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

H. Position outlets to locate lighting fixtures as shown on reflected ceiling plans.

I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of recessed lighting fixture, to be accessible through lighting fixture ceiling opening.

J. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs. Accurately position to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes. Install plaster rings to interface with equipment to be mounted thereon.

K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

L. Provide cast outlet boxes in exterior locations and wet locations. Provide cast bell-boxes at interior locations where box is exposed to view. (do not use regular 4/s or handy box with exposed knockouts and unfinished appearances for these interior exposed applications).

M. Where boxes are installed in fire rated ceiling or walls, be responsible for preserving integrity of fire rating as required.

N. In fire-rated wall, use 4" square deep boxes. Do not aggregate more than 100 square inches of boxes for any 100 square feet of wall or partitions. Separate outlet boxes on opposite sides of walls or partition by a minimum horizontal distance of 24 inches. Where the separation cannot be achieved due to site condition, provide 2-hour rated fire-proof material behind boxes to maintain fire rating of walls.

3.03 FLOOR BOX INSTALLATION

A. Set boxes level and flush with finished concrete floor.

B. Use cast iron floor boxes for installations in slab on grade.

C. During pouring of floor slab sections, take proper steps to prevent flush floor outlets from being displaced from exact required locations and finished flush positions.

3.04 PULL AND JUNCTION BOX INSTALLATION

A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.

B. Support pull and junction boxes independent of conduit.

END OF SECTION

SECTION 260553
ELECTRICAL IDENTIFICATION

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Nameplates.

2. Wire and cable markers.

B. Related Work:

1. Section 26 0100 - Basic Materials and Methods.

2. Section 26 0519 - Wire and Cable -Rated 600 Volt.

3. Section 26 0526 - Grounding.

4. Section 26 0533 - Conduit.

5. Section 26 0534 - Boxes.

6. Section 26 2213 - Dry Type Transformers.

7. Section 26 2416 - Panelboards.

8. Section 26 2816 - Disconnect Switches.

9. Auxiliary System Sections.

PART 2: PRODUCTS

2.01 MATERIALS

A. Nameplates: Engraved three-layer laminated plastic, white letters on a black background.

B. Wire Markers: Cloth markers, split sleeve or tubing type.

PART 3: EXECUTION

3.01 INSTALLATION

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates parallel to equipment lines.

C. Secure nameplates to equipment fronts using screws or rivets. Secure nameplate to outside face of panelboard doors.

D. Embossed tape will not be permitted for any application.

3.02 WIRE IDENTIFICATION

A. Provide wire markers on each conductor in panelboard gutters, pull boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.

3.03 NAMEPLATE ENGRAVING SCHEDULE

A. Provide nameplates of minimum letter height as scheduled below.

B. Panelboards, Switchboards, and Distribution Sections: 1/4 inch identifying equipment designation; 1/8 inch identifying voltage rating and source. Provide nameplates on load centers furnished with relocatable buildings. Nameplates for relocatable buildings shall match description on circuit breakers or switches at switchboards or panelboards feeding the buildings.

C. Individual Circuit Breakers, Switches, Motor Starters in Panelboards, and Distribution Sections: 1/8 inch identifying circuit and load served, including location.

D. Individual Circuit Breakers, fused and non-fused disconnect Switches, and Motor Starters: 1/8 inch identifying load served.

E. Transformers: 1/4 inch identifying equipment designation; 1/8 inch identifying primary and secondary voltages, primary source, and secondary load and location.

F. Emergency Power Units: 1/4 inch identifying equipment designation; 1/8 inch identifying incoming and outgoing voltages.

G. Exterior metal pull boxes: 1/4 inch identifying systems in boxes.

H. Terminal Cabinets: 1/4 inch identifying systems.

3.04 MARK CONDUCTOR RUNS

A. Apply markers after conductors installed in conduits.

B. Apply in panelboards and in junction boxes.

C. Mark feeders in panelboards, switchboards and distribution sections.

3.05 MARK JUNCTION BOXES

A. Mark covers of junction boxes with non-erasable marker to indicate circuit numbers or systems contained within boxes.

B. Mark fire alarm boxes with red marker and identifying as "FA".

C. Paint fire alarm conduits red at intervals such that conduits can be clearly identified for fire alarm system.

END OF SECTION

SECTION 260605
EMERGENCY SYSTEM

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. This specification defines the electrical and mechanical characteristics and requirements for a line interactive, single-phase, solid-state uninterruptible lighting inverter, hereafter referred to as the Central Inverter system. The system shall provide high quality, AC power for today's electronic lighting loads (power factor corrected and self-ballast fluorescent, incandescent, quartz re-strike or halogen and HID) during emergency backup.

The system shall incorporate a high frequency pulse width modulated (PWM) inverter utilizing IGBT technology, a microprocessor controlled inverter and a temperature compensating battery charger, communication port a user friendly control panel with audible and visual alarms.

1.03 DESIGN STANDARDS

A. The system shall be designed in accordance with the applicable sections of the current revision of the following documents. Where a conflict arises between these documents and statements made herein, the statements in this specification shall supersede.

- UL 924 Standard Emergency Lighting and Power Equipment
- UL 924A Auxiliary Lighting
- ANSI C62.41 (IEEE 587)
- ANSI C62.42.45 (Cat. A & B)
- National Electrical Code
- NFPA- 101 (Life Safety Code)

1.04 DESIGN REQUIREMENTS - ELECTRONICS MODULE

A. The system shall be able to supply the rated kW from .5 lagging to .5 leading.

1.05 DESIGN REQUIREMENT - BATTERY SYSTEM

A. Battery Cells: The system shall be provided with sealed, valve regulated, front access, lead acid batteries.

B. Reserve Time: The battery system shall be sized to provide the necessary reserve time to feed the inverter in case of a mains failure.

Battery Reserve time: 90 minutes

C. Recharge Time: The battery charger shall recharge the fully discharged batteries within a 24 hour period. The charger shall be an integrated 3 step with equalize, microprocessor controlled and temperature compensating.

1.06 DESIGN REQUIREMENT - TRANSFORMER MODULE

A. For systems with mixed input voltages the use of an isolation and / or auto transformer may be required. The transformer(s) is not bypassed when optional maintenance bypass circuit is activated.

1.07 MODES OF OPERATION

The system shall be designed to operate with less than a 2-millisecond transfer time:

A. Normal: The unit Inverter is a line interactive stand by system and the commercial AC power continuously supplies the critical load. A boost tap transfer protection circuit will maintain the desired output voltage during low voltage “brownout” situations, without continuously switching to battery, thereby preserving battery capacity. The input converter (bi-directional transformer) derives power from the commercial AC power source and supplies to the inverter while simultaneously providing floating charge to the batteries.

B. Emergency: Upon failure of the commercial AC power the inverter instantaneously with a maximum of a 2-millisecond break, switches its power supply from the input converter to the battery system. There shall be no loss of power to the critical load upon failure or restoration of the utility source.

C. Recharge: Upon restoration of commercial AC power after a power outage, the input converter shall automatically restart and start charging the batteries. The critical loads are powered by the commercial AC power again.

1.08 PERFORMANCE REQUIREMENTS

A. AC Input to Unit:

1. Voltage Configuration for Standard Units: 1-phase, 2-wire-plus-ground.

2. Voltage Range: (+10%, -15%)

3. Frequency: 60 Hz (+/- 3Hz)

4. Power Factor: .5 lagging / leading

5. Inrush Current: 1.25 times nominal input current, 10 times 1 line cycle for incandescent loads

6. Current Limit: 125% of nominal input current

7. Current Distortion: 10% THD maximum from 50% to full load

8. Surge Protection: Sustains input surges without damage per standards set in ANSI C62.41 (IEEE 587) & ANSI C62.42.45 (Cat. A&B)

1.09 AC OUTPUT, UNIT INVERTER

1. Voltage Configuration for Standard Units: 1-phase, 2-wire-plus-ground

2. Static Voltage Stability: Load current changes +/- 2%, battery discharge +/- 12.5%

3. Dynamic Voltage Stability: +/- 2% (25% step load), +/- 3% (50% step load)

4. Dynamic Recovery Time to within 1% of nominal: 3 cycles (0-100% load step)

5. Output Harmonic Distortion: < 3% (with linear load)

6. Frequency: 60 Hz (+/- .05Hz during emergency mode)

7. Load Power Factor Range: 0.5 lagging to 0.5 leading

8. Output Power Rating: kVA = kW

9. Overload Capability: to 100% continuous rating
to 115% for 10 minutes
to 150% for 16 line cycles

10. Crest Factor: <= 2.8

11. Efficiency: 97 - 98%

1.10 SUBMITTALS

A. System configuration with single-line diagrams.

B. Functional relationship of equipment including weights dimensions and heat Dissipation.

C. Descriptions of equipment to be furnished, including deviations from these specifications.

D. Size and weight of units to be handled by installing contractor.

E. One set of instruction manuals. Manuals shall include a functional description of the equipment, installation, safety precautions, instructions, step-by-step operating procedures and routine maintenance guidelines, including illustrations.

1.11 WARRANTY

A. The manufacturer shall warrant the module against defects in materials and workmanship for 2 years.

B. The battery manufacturer's standard warranty shall be passed through to the end user. Sealed Lead Calcium VRLA, 10-year life expectancy – one-year full replacement warranty plus an additional nine years pro-rata.

1.12 QUALITY ASSURANCE

A. A minimum of 35 years of manufacturer's experience in the design, manufacture, and testing of emergency power systems is required.

B. Before shipment, the manufacturer shall fully and completely test the system to assure compliance with the specification.

PART 2: PRODUCT

2.01 FABRICATION

A. All materials of the system shall be new, of current manufacture, high grade, free from all defects and shall not have been in prior service except as required during factory testing.

B. Unit shall be Myers Power Products Illuminator IE Series or equal.

C. The system module and batteries shall be housed in a single freestanding NEMA type 1 enclosure. Front access only shall be required for installation, adjustments and expedient servicing (MTTR: < 15 minutes). All components shall have a modular design and quick disconnect means to facilitate field service.

D. The unit shall be powder painted with the manufacturer's standard color. The unit shall be constructed of replaceable subassemblies. Like assemblies and like components shall be interchangeable.

E. Cooling of the unit shall be forced-air in emergency mode with internally mounted fans to minimize audible noise. Fans shall not operate in the standby mode. Fan power shall be provided by the inverter. No air filters shall be required.

2.02 COMPONENTS

The unit shall be comprised of the following components:

A. UPS Module: The UPS module shall contain an inverter, an AC distribution module with an input circuit breaker, a boost tap transformer, control, and monitoring subsystems. Provide all output circuit breakers as shown on the drawings.

B. Battery Module: The battery module shall contain the battery plant required to produce the reserve energy to supply the inverter during abnormal AC mains conditions. The 90 - minute battery module shall be contained in same cabinet as electronics regardless of the system VA.

C. Battery Charger:

1. General: In the standard configuration, the charger converts ac voltage to dc voltage. With commercial power present, the inverter power transformer is powered and the IGBT modules are microprocessor controlled to recharge the batteries. The temperature compensated battery charger circuit supplies constant voltage and constant current to the batteries. Once the batteries have received a full recharge, a constant trickle charge maintains batteries at maximum level. Recharge time is 24 hours maximum at nominal ac input voltage. The ac ripple current of the dc output meets the battery manufacturer specification, thus ensuring the maximum battery lifetime.

2. AC Input Current: The charger unit is provided with an ac input current limiting circuit whereby the maximum input current shall not exceed 125% of the output full current rating.

3. Automatic Restart: Upon restoration of utility AC power, after a utility AC power outage and after a full UPS automatic end-of-discharge shutdown, the UPS will automatically restart, performing the normalUPS start up.

4. DC Filter: The charger shall have an output filter to minimize AC ripple voltage into the battery. Under no conditions shall ripple voltage into the battery exceed 2% RMS.

5. Battery Recharge: The charger is capable of producing battery-charging current sufficient enough to recharge the fully discharge battery bank within a 24-hour period. After the battery is recharged, the charger shall maintain full battery charge until the next emergency operation.

6. Over-voltage Protection: The charger is equipped with a DC over-voltage protection circuit so that if the DC voltage rises above the pre-set limit, the charger shuts down automatically and initiates an alarm condition.

D. Inverter:

1. General: The inverter converts dc voltage supplied by the battery to ac voltage of a precisely stabilized amplitude and frequency that is suitable for powering most sophisticated electrical equipment. The inverter output voltage is generated by sinusoidal pulse width modulation (PWM). The use of a high carrier frequency for PWM and a dedicated ac filter circuit consisting of a transformer and capacitors, ensure a very low distortion of the output voltage (THD<3% on linear loads).

2. Overload Capability: The inverter during emergency modes shall be capable of supplying current and voltage for overloads exceeding 100% and up to 150% of full load current for 16 line cycles, 115% for 10 minutes.

3. Output Power Transformer: A dry type power transformer provides the inverter AC output. The transformer is built with copper wiring exclusively. The hottest winding temperature of the transformer shall not exceed the temperature limit of the transformer insulation class of material at ambient temperature.

E. Display and Controls:

1. Monitoring and Control: The UPS system provides operation monitoring and control, audible alarms, and diagnostics. The front-mounted control panel includes a 4-line by 20-character vacuum fluorescent display and a keypad for user interface. The display will be menu driven. The system will have a continuous scrolling display of the following: Date & time, System Status (AC Status, Battery Status, Charger Status) and any system faults: This allows the operator to easily “watch” system functions as they occur and check on virtually any aspect of the system’s operation. Monitoring and control are microprocessor-based for accuracy and reliability. To ensure only authorized personnel can operate the unit, the system is multi-level password protected for all control functions and parameter changes.

2. Metering: Scrolling through the meter functions can monitor the following measurements:

- Utility input voltage
- System output voltage
- Battery voltage
- Battery current
- System output current
- System output VA
- Inverter wattage
- System temperature
- Battery temperature
- Date & time

3. Audible Alarm: Audible alarm will activate with any of the following conditions and automatically store the 75 most recent events.

- High battery charger voltage
- Charger Fault
- High AC input voltage
- Low AC input voltage
- Near low battery voltage
- Low battery voltage
- Load reduction fault
- High Ambient temperature
- Inverter fault
- Output fault
- Output overload
- Output Overload shutdown

F. RS-232 Interface:

The system shall be equipped with an RS-232 serial port (DB9) for remote communications.

G. Manual and Programmable Testing:

The system shall incorporate a manual test function and two automatic test modes. The system will perform a programmable, self-diagnostic monthly test for 5 minutes, which is preset, for the 15th of every month and the user can program the event day and time. The yearly self-diagnostic test is for 90 minutes and the user can program the day and time the event is to take place. The microprocessor automatically records the last 75 test events in its own separate test result log.

H. Battery Assembly:

The batteries are a front access sealed, lead-acid valve regulated battery cells with a one year full, nine year prorated warranty. Batteries shall be interconnected via buss bars and cables will be provided for shelf interconnects where required. A disconnect means shall be included for isolation of battery assembly from the UPS module.

I. System Options:

Provide the following options:

1. Output Circuit Breakers: Distribution circuit breakers are for output load protection. Protection for the normally on and/or for the optional normally off loads. A maximum of 24 unsupervised 1-pole and a maximum of 15 supervised 1-pole circuit breakers are available. All circuit breakers are rated for 10,000 AIC. Provide output breakers as shown on the drawings.

2. Output Circuit Breaker Trip Alarm: An audible and visual alarm activates when an output distribution circuit breaker is open or has tripped.

3. Summary Form “C” Contacts: Form “C” contacts rated at 5 amps maximum at 250VAC/30VDC. Dry contacts will change state when any system alarm activates. Contacts change states with the following alarms: High battery charger fault, near low battery, low battery, load reduction fault, output overload, high/low AC input volts, high ambient temperature, inverter fault, and with optional circuit breaker trip alarm.

4. Normally Off Output: This output circuit is dedicated for the “emergency only” equipment. “Emergency only” equipment operates during power outages and when the system is on battery back up. This option leaves the load circuits off during normal utility power conditions.

5. Long Life Sealed Lead Calcium, VRLA Battery: Maintenance free battery that requires no addition of water over the life of the battery. The battery cells are housed in protective, steel cases. Life expectancy is designed for 20-years at 77ºF (25ºC). Warranty is one-year full replacement plus an additional fourteen years pro-rata.

6. Provide factory relays such that after a power outage, emergency lights will stay on for minimum 15 minutes.

PART 3: EXECUTION

3.01 INSTALLATION, SYSTEM SHIPPING, START-UP AND TESTING

A. Shipping: System shall be shipped separately from batteries. Batteries shall be shipped to Project site directly from battery supplier and shall remain in their sealed cartons until opened and examined in presence of IOR. Batteries shall be shipped to Project site not more than 30 days before system start-up.

B. Start-Up: System start-up shall be performed by a technical representative of manufacturer, in presence of Architect, with loads connected, and shall include necessary testing and adjusting to assure proper operation of system functions. System start-up shall include follow-up visits as required. Following start-up, maintain system on a normally OFF input circuit until Substantial Completion.

C. Testing: Before Substantial Completion, conduct in presence of Architect, a complete performance testing of system. Testing shall include operating system in emergency mode for at least 90 minutes with loads connected, while monitoring battery voltage, output voltage and output frequency. Power factor of load shall be measured to ascertain compatibility with system. Furnish and operate necessary test equipment.

D. Equipment shall be anchored in accordance with California Zone 4 seismic requirements

3.02 BATTERIES

A. Batteries shall be complete with necessary connectors and accessories, fully charged, and ready for service.

B. Documentation for manufacturer’s warranty for all batteries shall be delivered to Architect.

3.03 SERVICE MANUALS

A. Service Manuals: Submit service manuals to OAR including following:

1. A detailed explanation of operation of system

2. Instructions for routine maintenance.

3. Detailed instructions for repair of major components of system.

4. Pictorial parts list and parts numbers.

5. Pictorial and schematic electrical drawings of wiring systems, including operating and safety devices, and major components.

6. Programming Instructions.

7. Program listing.

8. Final test report.

9. Installation Instructions: Submit manufacturer's written installation instructions.

3.04 TRAINING

A. Before Substantial Completion, provide the services of a manufacturer's representative on the Project site to instruct persons designated by the Owner in the operation and maintenance of the system. Instruction time shall not be less than 4 hours. Provide training video and training materials to designated owner’s personnel.

3.05 PROTECTION

A. Protect Work of this section until Substantial Completion.

3.06 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION

SECTION 260921
ELECTRICAL-HVAC-PLUMBING COORDINATION

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Coordination with HVAC and Plumbing Sections of work.

2. Electrical components, wiring and connections to electrical HVAC and Plumbing equipment.

B. Related Work:

1. Section 260100 - Basic Materials and Methods.

2. Section 260533 - Conduit.

3. Section 260519 - Wire and Cable.

4. Section 260534 - Boxes.

5. Section 262813 - Fuses.

6. Section 260553 - Electrical Identification.

7. Section 262816 - Disconnect Switches.

1.03 QUALITY ASSURANCE

A. Size fuses in accordance with manufacturer's published data and equipment nameplate information.

B. Confirm with Mechanical Contractor correct sizes of all starter heater sizes.

1.04 PROJECT RECORD DOCUMENTS

A. Submit record documents under provisions of Section 017720.

PART 2: PRODUCTS

2.01 MATERIALS

A. Air Conditioning and Heating & Ventilating equipment will be furnished and installed by HVAC Contractor. Plumbing equipment will be furnished and installed by Plumbing Contractor.

B. Electrical components for these systems will be a part of work of this section.

PART 3: EXECUTION

3.01 INSTALLATION

A. Furnish, install and connect all required electrical components for air conditioning and heating systems and for plumbing system.

B. Secure a control wiring diagram from Air Conditioning Equipment Supplier at time of receipt of Contract and determine all control and protective apparatus and devices necessary for correct and proper operation of air conditioning equipment and furnish such apparatus and devices. Be responsible for proper wiring and connecting of air conditioning equipment and plumbing equipment.

C. Refer to mechanical plans, check all locations of mechanical equipment that may or may not show on electrical plans and include in bid sum sufficient to cover total cost of mechanical installation. Coordinate with Air Conditioning Equipment Supplier to ensure that all equipment is covered in Contract.

D. Unless specifically noted on drawings, run conduit in attic or ceiling space to equipment on roof so that no conduit runs or lays on roof. Penetrate roof at equipment location only.

END OF SECTION

SECTION 260925
LIGHTING AUTOMATION SYSTEM

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

Provide a complete low voltage lighting control system as shown on the drawings and specified herein.

Lighting control system shall utilize networking technology connecting relay panels, switches and sensors based upon a 2 wire data line providing both power and data to all devices. The network shall be free topology, therefore a serial loop is not necessary to achieve maximum network distance. The system shall utilize a web server device complete with a touch screen located in a relay panel so that programming and viewing of status can be accomplished at the panel or by any PC connected to the same LAN or via the internet.

All relay panel interiors shall be pre-assembled complete with the necessary relays, transformers and devices. Relay panels that are wall mounted shall have interiors separate from enclosure so as to permit easy mounting, conduit installation and wire pull to enclosures. Enclosures mounted in the ceiling space are not required to have separate interiors.

1.03 RELATED SECTIONS

A. Section 260100 Basic Materials and Methods

B. Section 260519 Wire and Cable-Rated 600 Volt

1.04 QUALITY ASSURANCE

A. ETL Approvals: The control panels shall be tested and listed under the UL 916 Energy Management Equipment Standards by a nationally recognized testing laboratory.

B. NEC Compliance: The control system shall comply with all applicable National Electrical Codes regarding electrical wiring standards.

C. NEMA Compliance: The control system shall comply with all applicable portions of the NEMA standards regarding the types of electrical equipment enclosures.

D. Component Pre-testing: All control equipment shall undergo strict inspection standards. The equipment shall be previously tested and burned-in at the factory prior to installation.

E. System Checkout: A factory-trained technician or factory-authorized personnel shall functionally test the control system and verify performance after installation.

F. Manufacturer:

1. Manufacturer shall have a minimum of ten years experience in control systems.

2. Manufacturer shall be Douglas Lighting Control or approved equal.

3. Product shall be Dialog System by Douglas Lighting Control or approved equal.

1.05 WARRANTY

A. Manufacturer shall supply a one-year warranty on all hardware and software. As limited 10 year warranty shall be provided on the individual relays.

1.06 SUBMITTALS

A. Product Data: Submit manufacturer's data on lighting control system and components.

B. Shop Drawings: Submit drawings of lighting control system and accessories including, but not necessarily limited to, the central programming system, intelligent relay panels, network wiring, switch inputs, analog inputs and modem location.

1. Riser Diagram.

2. Central Programming System Diagram.

3. Control System Network Wiring Diagram.

PART 2: PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. Relays

1. Lighting control relays shall be mechanically latching and shall come complete with a manual ON/OFF switch. The mechanical switch shall continuously display the true state of the relay's internal contacts.

a) Single pole relays shall be rated and UL/CSA listed for 120, 277and 347 VAC lighting loads at 20 amps. Use Douglas WR-6161.

b) Double pole relays shall be rated and UL listed for 208, 240 or 480 VAC and CSA for up to 347 VAC lighting loads at 20 amps. Use Douglas WR-6172.

2. The relays shall have a label indicating the short circuit fault current rating as per the NEC 2005. The relays shall have passed UL 508 short circuit tests at 14,000 amperes.

3. Each lighting control relay shall be capable of controlling incandescent, fluorescent, electronic ballast and H.I.D. lighting loads and have an inrush capability of 3000 amperes. Relays shall be complete with a 5 year Manufacturer's Limited Warranty.

4. Lighting control relays shall include captive screw terminals for both the line voltage and the low voltage connections. Switching the relay shall be accomplished with ONE signal wire and a common return. The signal wire shall be able to signal ON and OFF and shall carry status current that indicates if the relay is ON or OFF.

B. Pre-assembled Relay Panels: PWEx Series

1. Where indicated on the drawings, provide a factory pre-assembled relay panel. The panel's enclosure shall be for surface or flush installation, with a screw-on cover or a hinged door assembly as required.

2. The panel shall consist of a pre-assembled interior insert; UL/CSA approved Douglas Cat No: CxxM or WxxM series with capacities for 12, 24, 36, 48 or 72 relays as required. Panel enclosure must be UL/CSA Approved.

3. Panel interior shall have the following pre-assembled and pre-wired:

- Suitable divider separating class 1 and class 2 compartments.
- Control transformer, UL/CSA approved for class 2 circuits, Douglas Cat. No. WR-4075-xxx where xxx = primary voltage.
- Low voltage relays as required by switched circuits shown on plans or schedules.
- Control devices as required.

C. Relay controls installed in relay panels

Relay Drivers: WRD-3408

1. The low voltage relays shall be connected to the Dialog system by a WRD-3408 relay driver unit. Each WRD-3408 relay driver has 8 outputs. Provide enough relay driver units to so that each relay in the system is connected to an output.

2. Relay drivers shall be able to control relays on and off, determine relay status, provide feedback as to whether a relay is connected and be addressable within the Dialog network.

D. Dimming Ballast Control

1. The Dialog system shall be able to control the Douglas Dialog series DEMANDflex® ballasts or by using the WDB-3314 Dimming Ballast Module, the industry standard 0-10VDC Dimming Ballasts. Each WDB-3314 shall have 4 outputs, each output can control up to 50 Ballasts.

E. Device Network Controls

Network Controller: WLC-3150

1. The WLC-3150 Network Controller shall be able to operate the local lighting control system on a stand alone basis. For large installations that require multiple Controllers, all units must be able to operate on a stand alone basis should they become disconnected from the network..

2. The Network Controller shall provide the following user interfaces for viewing and editing data:

   - Built-in touch screen, for convenient access.
   - Built-in web server, accessed via TCP/IP connection.

3. Each WLC-3150 shall provide the following standard lighting control functions:

   - Program and control up to 256 relays or dimming points.
   - Link outputs to switches and/or sensors to provide On/Off, Preset, or Dim Up/Down commands. In addition, functions such as flick warn, time out, daylight harvesting, enable/disable, quiet time and cleaning mode can be associated with switches, sensors and relays and have these features scheduled by time of day or date.
   - Be able to group outputs and inputs to facilitate various control schemes.
   - Photo sensor to provide dusk-to-dawn and/or day light harvesting with multiple set points to different groups.
   - Astronomic controls for dusk-to-dawn applications not requiring light sensor.
   - Provide log reports for diagnostic and run time tracking purposes.
   - Time schedule types include: 7day weekly scheduling, 365 day date specific and event scheduling.

4. Each Network Controller shall provide the following system functions:

   - Demand response: connection via TCP/IP or contact input.
   - Store and upload a log file of over 100,000 events
   - Connect with other Controllers via RS485 signal line.
   - Accept software updates via USB port or Ethernet connection.
   - Backup data via Ethernet, RS485 or USB port.
   - Provide gateway function to BACnet systems, TCP/IP.

F. Satellite Panels

WSP-3414

1. Where indicated on the drawings, provide a WSP-3414 Satellite Panel complete with 4 lighting relays capable of switching 20 amp lighting loads and rated for 120/277/347VAC. Each panel is to be connected on to the data line network and configured using the WLC-3150 Network Controller and shall contain the following hardware features:

- 2 - 24VDC inputs for occupancy sensors requiring DC voltage.
- 1 DC power supply rated for 250ma for supplying power to occupancy sensors.
- Be capable of adding 2 UL924 emergency relays

2. Switches to be capable of switching individual relays, local groups of relays within the panel or global groups of relays system wide. Relays may also be configured to have interlocking logic so that if the photo sensor has switched a relay off it is possible to set a local wall switch so it cannot override the photo sensor relay on unless there is insufficient light.

3. In rooms with photo sensor control, it shall be possible to set relays to switch at different light levels so that as the amount of daylight changes, different amounts of artificial light can be switched on or off. It shall be possible to set a sequence of switching 3 lamp fixtures with a relay each for the single lamp and outer lamps as follows: As daylight increases, the single lamp relay is switched off first. The next step requires the outer lamp relay OFF and the single lamp relay ON simultaneously. As daylight passes the maximum threshold, the single lamp relay is switched off. This sequence is reversed as daylight declines.

4. The Satellite Panels shall accept either 24VDC or 24VAC occupancy sensors by other manufacturers. The inputs may be configured for OFF only or ON/OFF switching scenarios. It shall be possible to link the photo sensor control with occupancy sensing so that when light levels are high enough, the occupancy sensor will not switch the photo sensor controlled relays ON.

5. The WSP-3414 Satellite Panel shall have capability of adding the WDB-3314 Dimming Module with 4 outputs capable of dimming 0-10VDC fluorescent dimming ballasts. Each of the outputs can be assigned to Constant Light Control programs each capable of controlling multiple zones. The Constant Light Control programs shall be capable of being set in both “open loop” or “closed loop” modes and the dimming channels can be linked to relays to allow for switching off of loads if ambient light levels are sufficient. Programming of the Constant Light Controls shall be by the WLC-3150 Dialog Control Unit.

G. Wall Switches & Accessories

WSW-35xx series Data Line Switches

1. Switches shall connect to the lighting control network via a common 2-wire, non polarized data line. Switches shall be configured and programmed to control one or more outputs in the lighting control system.

2. Switches shall have addresses set with an infra-red setting device that accesses the front of the switch and permits setting of the switch without removing the switch from the wall box.

3. Switches are linked to a single output or a group of outputs.

4. Switches, occupancy sensors and daylight sensors can be set to a common output address to permit multiple points of control for a single relay or dimming output.

5. Switches, occupancy sensors and daylight sensors can be set to a common group address to permit multiple points of control for a group of outputs.

6. Each switch can be programmed for ON/OFF control of outputs and UP/DOWN control of 0-10VDC dimming ballasts.

7. Switch modules shall be available with 1, 2, 3, or 4 single button switches per gang or 2, 4, 6, 8 two button switches per gang. Shape of switch to be standard 'Decora' opening.

8. Switches and switch hardware shall mount to standard wall boxes.

9. Switches shall include an integral LED for status indication.

10. Each switch shall permit a paper switch label to be inserted for identification purpose. The label shall be held in place under a clear plastic cover and shall be field replaceable should the operation of the switch change. Permanently etched switches are not acceptable.

11. Adhere to the factory recommended wiring practices so that physical removal of any single switch shall still permit communication between relay panels in the rest of the lighting control network.

    Keyed Switches: WSK-35xx series

12. Keyed switches shall be connected to the lighting control network via a 2-wire, non polarized data line.

13. Keyed ON/OFF switches shall include an integral LED to indicate both ON and OFF states.

    Dimmer Switches: WSD-35xx series

14. Dimmer switches shall be connected to the lighting control network via a 2-wire, non polarized data line. Each switch shall be capable of raising or lowering light levels of individual or groups of lighting fixtures.

15. Switches shall include integral LED indication for light levels as well as a switch for ON/OFF control.

H. Occupancy Detection

Indoor, ceiling mount, PIR Occupancy Sensor: WOC-3801

1. Where required, provide a PIR occupancy sensor Model WOC-3801. The occupancy sensor shall be connected via the 2 wire data line and can signal either an individual relay or a group of relays. No additional connections are required for power.

2. Occupancy sensor to include the following features:

   - Adjustable time out (30 sec to 30 min) and sensitivity
   - Tilt & swivel lens direction adjustment
   - Coverage of 1600 sq. ft., Indoor ceiling mount, ceiling heights 8' to 16'max
   - Off only configuration

3. The occupancy sensor can be adjusted by direct connection or via the Network Controller. It shall be possible to adjust time-out and other technology options of the sensor via time schedules in the controller.

4. The Controller shall log when the sensor senses occupancy so this information is available for HVAC systems via the BacNet gateway in the Controller.

   Indoor, ceiling mount Dual Technology Occupancy Sensor: CM-PDT-DL

5. Where required, provide a dual technology occupancy sensor Model CM-PDT-DL series. The sensor shall utilize Passive Infra Red technology to sense initial occupancy in a space and Microphonics technology to sense continued occupancy together with the PIR detection. Provide the appropriate sensor model to comply with the requirements of the space where installed.

6. Occupancy sensor to also include the following features:

   - Adjustable time out (30 sec to 20 min)
   - Operates directly off the relay coil requiring only 2 wires to connect to relays in panel
   - Coverage of up to 1600 sq. ft., ceiling heights 8' to 10'max
   - Function select - on/off switching or off-only switching.
   - Multiple sensors may work together using the orange trigger wire so all will act in unison.
   - Available options include dual outputs and an auxiliary status SPDT relay for signaling other systems.

   Indoor, wall mount Dual Technology Occupancy Sensor: WSD-PDT-DL

7. Where required, provide a dual technology occupancy sensor Model CM-PDT-DL series. The sensor shall utilize Passive Infra Red technology to sense initial occupancy in a space and Microphonics technology to sense continued occupancy together with the PIR detection.

8. Occupancy sensor to also include the following features:

   - Adjustable time out (30 sec to 20 min)
   - Operates directly off the relay coil requiring only 2 wires to connect to relays in panel
   - PIR coverage for hand wave detection to 10', walking detection to 20'
   - Microphonics coverage to 20'
   - Function select - on/off switching or off-only switching.

- Available options include dual outputs and an auxiliary status SPDT relay for signaling other systems.

Indoor, corner mount Dual Technology Occupancy Sensor: WV-PDT-DL

9. Where required, provide a dual technology occupancy sensor Model CM-PDT-DL series. The sensor shall utilize Passive Infra Red technology to sense initial occupancy in a space and Microphonics technology to sense continued occupancy together with the PIR detection.

10. Occupancy sensor to also include the following features:

- Adjustable time out (30 sec to 20 min)
- Operates directly off the relay coil requiring only 2 wires to connect to relays in panel
- Coverage of up to 40 ft., mounting height 8' to 10'max
- Function select - on/off switching or off-only switching.
- Multiple sensors may work together using the orange trigger wire so all will act in unison.

Available options include dual outputs and an auxiliary status SPDT relay for signaling other systems.

WCI-3928 Contact Input for occupancy sensors

11. When occupancy sensors by other manufacturers are required, provide WCI-3928 -8 Contact Input units. Each unit shall provide or DC to power each sensor and will accept a contact closure from each sensor which can be assigned to any relay or group. Check with factory to ensure compatibility.

12. Sensors connected to input unit to include the following features adjustable via system:

- Adjustable time out (3 min to 30 min)
- Function select - on/off switching, off-only switching.
- Multiple sensors may work together using either direct connection to sensors or via multi-sensor function built into WCI-3928 units.

I. Photo Sensor & Daylight Controls

Photo Sensor series WPH-37XX Light Sensor

1. Provide where required a light sensor capable of sensing from 1 to 60,000 lux for direct light measurement or 1 to 6000 lux for indirect light measurement. The sensor shall derive both its power and data information from the Dialog data line. The sensor shall be available in both indoor and outdoor versions.

2. The ambient light level shall be continuously monitored in lux by the sensor. The sensor shall broadcast to the network the existing light level when requested or when there is a change in detected light level.

3. Set point adjustments can be made via the touch screen or web server interface in the WLC-3150 Network Controller.

4. Each sensor can be programmed to provide ON/OFF control of relays, raise/lower of 0-10vdc type or DEMANDflex ® ballasts.

5. One sensor shall permit different outputs to switch and/or control light levels as ambient light changes. Light levels shall be controlled by 'sensor only' or in combination with a time schedule.

6. It shall be possible to set a maximum light level which cannot be exceeded during daylight harvesting operations or for non daylight controlled areas, a permanent or "tuned" light level to maximize energy savings.

J. Handheld Programmer

WIR-3110

1. Provide a WIR-3110 Handheld Programmer to facilitate the following functions:

- Set switch type and address
- Create presets
- Calibrate photo sensors and set addresses and light levels
- Set addresses of motion sensors

K. DEMANDflex ® Dialog Series Ballasts

1. Provide where shown on the drawings Dialog series Demand Flex ballasts. Each ballast shall have the following features:

- Receive raise and lower commands from CCM control modules causing ballasts to go to required light levels. The data from the CCM module is received by the ballasts over the power lines.
- Each ballast shall have the option of selecting 1 of 3 available channels of control so that different light levels may be selected for different groups of ballasts.
- Wide range voltage from 120 – 347VAC, UL certified
- True parallel lamp configuration
- Filament cutout at 0.77 ballast factor or greater.
- Fast program start
- Auxiliary port to allow individual 0-10VDC ballast control override or download of special configuration parameters. Light level is determined by the lower setting of the 0-10VDC control or the signals sent from the CCM modules.
- Dimming range 5% - 100%.

CCM Ballast Control Modules

2. Provide 1 CCM module for each circuit requiring Dialog DEMANDflex ® ballasts. Each module shall turn the circuit on or off and can signal each of 3 channels of control to be at a designated light level. The signals sent to the ballasts from the CCM module are via the same conductors providing power to the ballasts. No additional control wiring shall be necessary.

3. Each CCM module shall communicate with the WLC-3150 Network Controller via the 2 wire Dialog data line network. Each module shall be uniquely addressable within the Dialog network.

4. Provide factory preassembled panels with the correct number of CCM modules and place adjacent to corresponding distribution panels. Connect panels together with manufacturer's recommended data cable.

PART 3: EXECUTION

3.01 GENERAL

A. Lighting control system shall not be used for ay other purpose other than its intended use and application.

B. Provide all required interconnections with other systems such as emergency power sources, fire alarm systems, and building management system as required or indicated on drawings.

C. Installation shall meet or exceed standard practice of workmanship and quality.

D. Drawings generally indicate work to be provided, but do not indicate all bends, transitions, or special fittings required to clear beams, girders or other work already in place. Investigate conditions where conduits are to be installed, and furnished and install required fittings.

3.02 INSTALLATION AND SET-UP

A. Verify that conduit for line voltage wires enters panel in line voltage areas and conduit for low-voltage control wires enters panel on low-voltage areas. Refer to manufacturer's drawings for location of line and low-voltage areas.

B. Digital switches and wire shall be according to lighting control manufactures requirements.

C. Central lighting control panels and remote lighting control panels are connected via a dataline. Connect entire lighting control system per manufacturer's requirements. Do not exceed manufacturer's total dataline length requirement.

D. Panels shall be located so that they are readily accessible and not exposed to physical damage.

E. Panel locations shall be furnished with sufficient working space around panels to comply with the California Electrical Code.

F. Panels shall be securely fastened to the mounting surface by at least 4 points.

G. Unused openings in the cabinet shall be effectively closed.

H. Cabinets shall be grounded in accordance with Article 250 of the California Electrical Code, and manufacturer's recommendations.

I. Lugs shall be suitable and listed for installation with the conductor being connected.

J. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.

K. Maintain the required bending radius of conductors inside cabinets.

L. Clean cabinets of foreign material such as cement, plaster and paint.

M. Distribute and arrange conductors neatly in the wiring gutters.

N. Follow the manufacturer's torque values to tighten lugs.

O. Before energizing the panelboard, the following steps shall be taken:

1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been furnished.

2. Remove shipping blocks from component devices and the panel interior.

3. Remove debris from panelboard interior.

P. Follow manufacturers' instructions for installation.

3.03 OPERATING/SERVICE MANUALS

A. Service and Operation Manuals:

1. Submit operation and service manuals. Complete manuals shall be bound in flexible binders and data shall be typewritten or drafted.

2. Provide a printed copy of the systems configuration as programmed, including all system labeling codes, and passwords.

3. Provide an electronic copy on compact disk of the system configuration program.

4. Manuals shall include instructions necessary for proper operation and servicing of system and shall include complete wiring circuit diagrams of system, wiring destination schedules for circuits and replacement part numbers. Manuals shall include as-built cable Project site plot plans and floor plans indicating cables, both underground and in each building with conduit, and as-built coding used on cables. Programming forms of systems shall be submitted with complete information.

5. Record Drawings: Provide a copy on vellum of Project site and building drawings, indicating location of equipment, conduit and cable runs, and other pertinent information.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.05 TESTING

A. Set-up, commissioning and testing of the lighting control system, and Owner instruction shall include:

1. Confirmation of system programming.

2. Confirmation of operation of individual relays, switches, occupancy sensors and daylight sensors.

3. Operation of system's features under normal and emergency operations.

4. Before energizing check and demonstrate in the presence of the IOR that cables and wire connections are free from short circuits, ground faults, and that there is continuity, and necessary insulation.

5. Confirm system operations and functionality.

6. Check system interface response to other systems such as fire alarm and emergency power system conditions.

7. Provide training to cover installation, maintenance, troubleshooting, programming, and repair and operation of the lighting control system.

3.06 INSTRUCTION PERIODS

A. Before Substantial Completion, arrange and provide an eight hours Owner instruction period for designated personnel.

3.06 SPARE PARTS

A. Provide a minimum of 5% spare parts of each type of relay, sensors, switches, and peripheral devices.

3.08 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 260933
DIMMING EQUIPMENT

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Wall Dimmers.

2. Dimmer Control Panel.

3. Electronic Touch Type Switch.

4. Dimmer Controllers.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013323.

B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - WALL DIMMERS

A. Lutron Electronics Company.

B. No substitution.

2.02 WALL DIMMERS AND SWITCH

A. Switch (electronic touch type): No. NTETS-1000.

B. Incandescent Dimmer: No. NT-600.

C. Fluorescent Dimmer: No. NTHF-40.

2.03 ACCEPTABLE MANUFACTURERS - DIMMER CONTROL PANEL AND CONTROLLERS.

A. Lutron Electronics Company.

B. No substitution.

2.04 DIMMER CONTROL PANEL

A. Floor mounted, ventilated complete with circuit breakers, main input lugs, control wiring, dimming modules and vents.

B. Size: 62 inches high by 26 inches wide by 14 inches deep.

C. Catalog No. HLT3N4 LU4/120-4 DP8.

2.05 DIMMER CONTROLLERS

A. Remote Lighting Scene Activator: No. VPA-4S.

B. Manual Slide Control: No. VSA-9.

C. Preset Control Center: No. VA-54T.

D. Preset Control Center: No. VA-34T.

E. Preset Control Center: No. VA-14T.

F. Combined Slide/Scene Activator: No. VCA-1.

G. Manual Slide Control: No. VSA-1.

2.06 WALL PLATES

A. Same manufacturers as dimmers.

B. Colors as selected by Architect. Do not order plates or dimmers without confirming colors with Architect.

PART 3: EXECUTION

3.01 INSTALLATION

A. Install wall dimmers 48 inches above floor, "OFF" position down. Verify mounting height with Architect prior to installation.

B. Install all equipment in accordance with manufacturer's instructions.

C. Provide all necessary wiring and interconnection of equipment. Test system prior to turning project over to Owner.

D. Install plates with all four edges in continuous contact with finished wall surfaces without use of mats or similar devices.

E. Install plates level.

END OF SECTION

SECTION 262213
DRY TYPE TRANSFORMERS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Dry type two winding transformers.

B. Related Work:

1. Section 260100 - Basic Materials and Methods.

2. Section 260519 - Wire and Cable.

3. Section 260526 - Grounding.

4. Section 260529 - Supporting Devices.

5. Section 260533 - Conduit.

1.03 SUBMITTALS

A. Include outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA, and impedance ratings and characteristics, loss data, efficiency at 25, 50, 75 and 100 percent rated load, sound level, tap configurations, insulation system type, and rated temperature rise.

B. Instruction manual covering installation, operation and maintenance of transformers.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store in a warm, dry location with uniform temperature. Cover ventilating openings to keep out dust.

B. Handle transformers using only lifting eyes and brackets provided for that purpose. Protect units against entrance of rain, sleet, or snow if handled in inclement weather.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - DRY TYPE TWO WINDING TRANSFORMERS

A. Cutler Hammer.

B. General Electric Company.

C. Square D Company.

D. Substitutions: Under provisions of Section 016000.

2.02 DRY TYPE TWO WINDING TRANSFORMERS

A. Dry Type Transformers: Factory-assembled, air cooled dry type transformers; K-4 rated, kVA ratings as shown on the Drawings. Transformers 15 KVA and larger shall meet the energy efficiency requirements of NEMA TP-1 to comply with California Title 24.

B. Insulation system and average winding temperature rise for rated KVA as follows:

Rating	Rise (degree C)
1-15 KVA	115
16-500 KVA	150

C. Case temperature shall not exceed 35 degrees C rise above ambient at its warmest point.

D. Transformer Openings: Screened against rodent entry.

E. Winding Taps, Transformers 15 KVA and Larger: 4-2½ percent taps below normal rated voltage.

F. Sound Levels: Maximum sound levels are as follows per NEMA Standards:

KVA	Sound
15-50	45 db
51-151	50 db
151-300	55 db
301-500	60 db

Where “Reduced Sound Level” transformers are indicated on the drawings, provide units with sound ratings that are 3 db below the above standards.

G. Basic Impulse Level: 10 KV.

H. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

I. Mounting: Transformers 75 KVA and less shall be suitable for wall, floor, or trapeze mounting; transformers larger than 75 KVA shall be suitable for floor or trapeze mounting. (See drawings for mounting of each transformer. Mount as shown on drawings.)

J. Coil Conductors: Continuous windings with terminations brazed or welded.

K. Enclosure: Type 1. Provide lifting eyes or brackets.

L. Isolate core and coil from enclosure using vibration- absorbing mounts.

M. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

PART 3: EXECUTION

3.01 INSTALLATION

A. Set transformer plumb and level.

B. Use liquid-tite flexible conduit, 2 ft minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

C. Mount transformers on vibration isolating pads, Korfund, Caldyne or Mason, suitable for isolating the transformer noise from the building structure.

D. Provide seismic restraints.

E. Provide factory fabricated transformer wall supports for transformers indicated to be wall mounted.

F. Provide factory fabricated transformer steel frame and supports for ceiling mounted transformers for transformers indicated to be ceiling mounted.

3.02 TESTING

A. Visual and Mechanical Inspection

1. Documentation of equipment nameplate data.

2. Inspection for physical damage, proper installation, anchorage and, grounding.

3. Cleaning of interior and bushing and insulator surfaces,

4. Verification that as-left tap connections are as specified. If no specifications are provided then tap connections will be left as found.

5. Examination for shipping brackets or fixtures that may not have been removed during installation. Insured that resilient mounts are operational.

6. Verification of tightness of accessible bolted electrical connections.

7. Verification of proper auxiliary device operation such as fans and instrumentation. Verification that fan motors have correct overcurrent protection.

8. Verification that control and alarm settings on temperature indicators are as specified. If no specifications are provided then control and alarm settings will be left as found.

9. Verification of operation of alarm control and trip circuits from temperature indicators.

B. Electrical Tests

1. Insulation resistance testing winding-to-winding and winding-to-ground.

2. Turns ratio testing between windings for all tap positions. Verification that winding polarities are in accordance with nameplate.

3. Insulation power factor testing on all high- and low-voltage windings in accordance with Double Engineering test procedures.

4. Dielectric absorption testing winding-to-winding and winding-to-ground for ten minutes. Calculation of the polarization index.

5. Secondary voltage measurements phase-to-phase and phase-to-ground with the transformer energized.

6. Measurement of resistance of each high-voltage winding in each no-load tap-changer position. Measurement of resistance of each low-voltage winding in each load tap-changer position, if applicable.

7. Excitation current testing on each phase.

8. Over potential testing on all high- and low-voltage windings-to-ground.

END OF SECTION

SECTION 262416
PANELBOARDS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Lighting branch circuit panelboards.

B. Related Work:

1. Section 260100 - Basic Materials and Methods.

2. Section 260519 - Wire and Cable.

3. Section 260526 - Grounding.

4. Section 260529 - Supporting Devices.

5. Section 260533 - Conduit.

6. Section 260553 - Electrical Identification.

1.03 SUBMITTALS

A. Submit shop drawings for equipment and component devices.

B. Include outline and support point dimensions, voltage, main bus ampacity, circuit breaker arrangement and sizes.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURER - PANELBOARDS

A. Square D.

B. General Electric.

C. Cutler Hammer

D. ITE.

2.02 BRANCH CIRCUIT PANELBOARDS

A. Lighting panelboards: Safety type with 277/480 volt and 120/208 volt, three phase, four wire. Circuit breakers: Molded case thermal magnetic type quick-make, quick-break approved by designated use and voltage, bolt-on, 20 ampere single pole branch circuit unless otherwise indicated on schedules. Toggle type mechanism shall have trip indicator. Circuit breakers where used to switch light fixtures: Type "SWD". Breakers for HVAC equipment shall be HACR rated. Minimum interrupting capacity rating for 120/208 volt units: 10,000 amperes and for 277/480 volt system units: 14,000 amperes. 120/208 volt panelboards shall have 200% rated neutral bus. Provide a handle tie on the single pole breakers on each multi-wire branch circuit (circuits sharing a common neutral) such that the circuits of each multi-wire branch circuit can be disconnected simultaneously.

B. Panelboard cabinets for lighting panels: Single door, with Underwriters' label.

C. Cabinets: Constructed in accordance with N.E.C. Standards, of not less than No.12 gauge galvanized sheet steel and painted inside with rust resistant paint. Minimum width: 20 inches; depth: 5-3/4".

D. Panelboard cabinets shall be sufficient height and width to allow a minimum of 4 inch wiring gutters around all sides, except feeder entrance side, which shall be 6 inches wide.

E. Fronts of all cabinets shall be constructed of one (1) piece of code gauge galvanized sheet but not less than 12 gauge steel, fastened with screws and countersunk washers.

F. Doors: Fastened to trims with substantial continuous flush hinges, flush spring catch latch and cylinder lock with two (2) keys for each floor. All locks: Master keyed.

G. Directory frames: 1/32", Lucite.

H. Interiors: Factory assembled rigid frame, supporting bus, mains and neutral bar. Bussing: Copper and arrange for sequence phasing throughout with a current density in copper not to exceed 1000 amperes per square inch. Neutral bar: Located at opposite end of structure from mains.

I. Circuit number labels shall be engraved laminated plastic, white letters on a black background. Stick on decal paper label is not acceptable.

J. Equipment supplier shall provide “Flash Hazard” warning signs as required by the NEC.

K. Panelboards shall be by "Original Equipment Manufacturer" that also manufactures circuit breakers. Load center type panelboards are not acceptable.

PART 3: EXECUTION

3.01 INSTALLATION

A. Install panelboards plumb.

B. Height: 6 ft maximum to top of panelboard.

C. Provide filler plates for unused spaces in panelboards.

D. Provide typed circuit directory for each panelboard. Do not revise branch circuit numbers for any reason.

E. Stub three empty 3/4 inch conduits to accessible location above ceiling out of each recessed panelboard and cap.

F. Provide padlocking device for each and every circuit breaker in "Off" position in each and every panelboard.

G. Use common internal trip element for two and three pole circuit breakers.

H. Finish panels gray.

I. Rigidly support cabinets to building construction in an approved manner.

J. Provide approved lock-in devices on all circuit breakers serving fire alarm panels and devices, motors, heaters, clocks, signal circuits, night lights, drinking fountains, or equipment remotely located. (Lock-in devices are not padlocking devices.)

K. Provide identifying screwed on bakelite nameplate to face of each panelboard.

L. Coordinate with other trades and ensure that no pipes or ducts are installed in the space within 6 feet above top of panelboards. Be responsible also that all doors from electrical rooms swing out from room.

M. Provide handle tie bars on circuit breakers serving each multi-wire branch circuits sharing a common neutral wire.

3.02 FIELD QUALITY CONTROL

A. Measure steady state load currents at each panelboard feeder. Should difference at any panelboard between phases exceed 20 percent, notify Electrical Engineer immediately. Take care to maintain proper phasing for multi-wire branch circuits.

B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers.

END OF SECTION

SECTION 262726
WIRING DEVICES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Wall Switches

2. Receptacles.

3. Device plates and box covers.

B. Related Work:

1. Section 260100 - Basic Materials and Methods.

2. Section 260526 - Grounding.

3. Section 260534 - Boxes.

4. Section 260553 - Electrical Identification.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS – WALL SWITCHES

A. Harvey Hubbell Company.

B. Pass and Seymour.

C. Leviton.

2.02 WALL SWITCHES

A. Wall switches for Lighting Circuit AC general use snap switch with toggle handle, rated 20 amperes and 120/277 volts AC. Handle: White or color as selected by Architect, plastic. Decorator spec grade.

2.03 ACCEPTABLE MANUFACTURERS - RECEPTACLES

A. Harvey Hubbell Company.

B. Pass and Seymour.

C. Leviton.

2.04 RECEPTACLES

A. Convenience and Straight-blade Receptacles: NEMA Configuration 5-15R: Decorator Spec Grade, White.

B. Convenience and Straight-Blade Receptacles: NEMA configuration 5-20R: Decorator Spec Grade, White.

C. Convenience receptacle, isolated ground type, orange in color: Decorator Spec Grade.

D. GFI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter, NEMA 5-20R, Decorator Spec Grade, White. Unit shall comply with UL 2003 GFCI requirements including lockout action.

E. Receptacles: Highest specification grade.

F. Provide tamper-resistant receptacles with thermoplastic dual mechanism shutter system to help prevent insertion of foreign objects. Receptacles shall have extra heavy-duty brass, one-piece mounting strap with integral ground. Receptacles shall be white color, impact resistant nylon face and back body. For tamper-resistant receptacles rated 20 amps/125 volts, provide NEMA 5-20R, white in color. For tamper-resistant receptacles rated 15 amps/125 volts, provide NEMA 5-15R, white in color. Provide Decorator Spec Grade receptacles.

G. Split wired half controlled receptacle: NEMA 5-20R, 20 amp, Pass & Seymour 26352CH-W or equal.

2.05 ACCEPTABLE MANUFACTURERS - WALL PLATES (Match manufacturer of Device)

A. Harvey Hubbell Company.

B. Pass and Seymour.

C. Leviton.

D. TayMac.

E. Match manufacturer of switches and receptacles.

2.06 WALL PLATES

A. Interior Device Plates: Sierra Electric .040 stainless steel to suit device; multi-gang where required; blank plates at junction boxes and capped outlets.

B. Weatherproof Cover Plates: Receptacles in wet locations shall be installed with an outlet enclosure clearly marked “Suitable for Wet Locations While In Use”. There must be a gasket between the enclosure and the mounting surface, and between the cover and base to assure a proper seal. The enclosure must employ stainless steel mounting hardware and enclosure shall be recessed where possible and by TayMac Corporation or equal.

C. Highest specification grade.

PART 3: EXECUTION

3.01 INSTALLATION

A. Install wall switches 48 inches above floor to top of wall box, “OFF” position down. Verify mounting height with Architect prior to installation.

B. Install convenience receptacles 18 inches above floor, or as noted on drawings, grounding pole on bottom.

C. Install specific-use receptacles at heights shown on Contract Drawings.

D. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets in non-public places.

E. Install devices and wall plates flush and level.

F. Provide etched plates with 3/16” high black letters for:

1. Outlets where voltage is other than 120 volt.

2. When switch controls device other than lighting fixture.

3. When switch is located out of sight of unit being controlled.

4. Lock switches.

5. Where more than one switch occurs under a common plate.

6. Air Distribution System control switches.

G. Install plates with all four edges in continuous contact with finished wall surfaces without use of mats or similar devices.

H. Provide blank cover plates for all boxes as required.

I. In Kitchen, all 15A and 20A 115V receptacles shall be GFI type.

END OF SECTION

SECTION 262813
FUSES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Fuses.

B. Related Work:

1. Section 260100 - Basic Materials and Methods.

2. Section 262816 - Disconnect Switches.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - FUSES

A. Bussmann

B. Gould-Chase Shawmut

2.02 FUSES

A. Fuses, 600 amperes or less: Dual-element with a minimum time delay of 10 seconds at 500% rating; current limiting; interrupting capacity of 200,000 amperes RMS symmetrical.

B. Fuses: Of same manufacturer, of sizes shown on Drawings, of required size for proper operation of equipment protected.

C. Fuses, 250 volt: LPN-RK, Class "RK".

D. Fuses, 600 volt: LPS-RK, class "RK".

2.03 SPARE FUSES

A. Furnish 3 spare fuses of each type and each size.

PART 3: EXECUTION

3.01 INSTALLATION

A. Install fuses in switches and other equipment requiring fuses.

B. Do not ship equipment from factory with fuses installed.

C. Verify that correct size fuses are installed in switch. Verify that all three fuses in a three-pole switch and two fuses in a two-pole switch are exactly of same amperage and voltage ratings.

3.02 TESTS

A. Operate system with fuses in place after approval by inspecting authority.

B. Replace immediately any defective fuse and/or correct any and all deficiencies discovered through blown fuses.

END OF SECTION

SECTION 262816
DISCONNECT SWITCHES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Disconnect switches.

2. Enclosures.

B. Related Work

1. Section 260100 - Basic Materials and Methods.

2. Section 260553 - Electrical Identification.

3. Section 262813 - Fuses.

1.03 SUBMITTALS

A. Include outline drawings with dimensions, and equipment ratings for voltage, capacity and horsepower.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - DISCONNECT SWITCHES

A. General Electric.

B. Cutler Hammer.

C. Square "D" Company.

2.02 DISCONNECT SWITCHES

A. Fusible Switch Assemblies: Heavy duty, quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in "ON" position. Handle lockable in "OFF" position. Fuse Clips: Designed to accommodate Class R fuses, current limiting, 200,000 A.I.C.

B. Nonfusible Switch Assemblies: Heavy duty quick-make, quick-break, load interrupter enclosed knife switch with externally operable hand interlocked to prevent opening front cover with switch in “ON” position. Handle lockable in “OFF” position.

C. Enclosures: NEMA Type 1 or NEMA Type 3R as indicated on Drawings.

D. Fusible and Nonfusible Switch Enclosures: Assembled with defeatable door interlocks that prevent door from opening when operating handle is in "ON" position.

PART 3: EXECUTION

3.01 INSTALLATION

A. Install disconnect switches where indicated on Drawings.

B. Install fuses in fusible disconnect switches.

C. Install "Caution" sticker on inside of switch door indicating exact type of fuses to be installed therein.

D. Verify that size, type and rating of fuses installed in each switch is correct and that all fuses in any one individual switch are the exactly same.

3.02 IDENTIFICATION

A. Provide screwed-on bakelite nameplate.

B. See Section 260553 for nameplate data.

END OF SECTION

SECTION 265100
LIGHTING FIXTURES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Work includes but is not limited to the following:

1. Lighting fixtures and accessories.

B. Related Work:

1. Section 260100 - Basic Materials and Methods.

2. Section 260519 - Wire and Cable.

3. Section 260526 - Grounding.

4. Section 260529 - Supporting Devices.

5. Section 260533 - Conduit.

6. Section 260534 - Boxes.

1.03 SUBMITTALS

A. Submit Shop Drawings.

B. Include outline drawings, lamp and ballast data, support points, weights, and accessory information for each lighting fixture type.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - LIGHTING FIXTURES

A. See Lighting Fixture Schedule on drawings.

2.02 SWITCHING AND DIMMING CONTROLS

A. General

1. All devices color per architect.

2. Observe manufacturers installation instructions with particular attention to derating requirements for multiple gang installations.

3. Use factory made multiple gang faceplates matching device color.

4. Daylight Controls may be integrated into luminaires Performance shall equal or exceed specification for individual devices.

B. Switches

1. Standard snap style

2. 120/277 volt, 20A

3. Listed

4. Specification grade

5. Color per architect

C. Automatic control switch

1. Automatic control switch shall be a push button wall switch capable of on/off manual operation and shall also be capable of receiving automatic control signals through interrupting power to the switch and load.

2. Control switch shall mount in a standard single gang or multi-gang wall box and shall fit behind a decorator style face plate.

3. Control switch shall use an air gap relay rated for 15 Amp ballast, tungsten, general use and shall be compatible with all electronic ballasts and HID loads.

4. The control switch when used with an occupancy sensor shall provide manual on/off control from the push button and automatic shut off based on occupancy. When occupancy is not detected and the sensor's time delay has expired, the lights shall turn off. If occupancy is detected within 15 seconds of this shut off, the switch shall turn the lights back on. Otherwise, lights will remain off until the switch is manually turned on.

5. Control switch shall be capable of 3-way, 4-way, or multi-way switching.

6. Control switch shall be The Watt Shopper AS-100 or Sentry Switch or approved equal.

D. Motion sensors

1. Provide a dual technology sensor that detects presence in the control area by detecting Doppler shifts in transmitted ultrasound and passive infrared heat changes. Detection verification of both technologies must occur in order to activate lighting systems. Upon verification, detection by either shall hold lighting on.

2. Sensor shall have a retrigger feature in which detection by either technology shall retrigger the lighting system on within 5 seconds of being switched off.

3. Sensor shall be mounted and adjusted in order to eliminate detection through open doorways and outside of controlled area. To provide small motion diction and immediate activation upon entry, coverage of both technologies must be complete and overlapping throughout the controlled area.

4. The PIR technology shall utilize a temperature compensated, dual element sensor and a multi-element Fresnel lens. The lens shall be Poly IR4 material. The lens shall cover up to 2000 square feet for walking motion when mounted at 10 feet and 1000 square feet of desktop motion.

5. Ceiling or high wall mounted. Coordinate location for best detection when used with suspended lighting.

6. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall automatically adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.

7. Sensors shall have a time delay that is adjusted automatically or shall have a fixed time delay of 5 to 30 minutes, set by DIP switches.

E. Automatic daylighting switches

1. Provide an ON/OFF daylight controller to reduce the controlled lighting as the daylight level increases. Where two stages of reduction are specified, provide a two stage controller providing a sequence reduction. As an alternate, two single stage controllers may be provided to provide two stages of reduction as long as these two devices may be adjusted to provide the desired sequencing of the lighting reduction and maintain this sequencing when switching the lights off and again when switching the lights on.

2. Ceiling mounted or luminaire mounted. The function of the automatic daylighting switches shall not be provided by a wall switch or a device mounted at wall switch height. If the device s powered by line voltage then it must be enclosed in an enclosure rated a minimum of NEMA 1 with a tamper proof cover or locking cover.

3. Independently adjustable setpoint and deadband. Setpoint shall be adjustable from at least 10 footcandles up to100 footcandles. Deadband shall be adjustable up to at least 100% setpoint.

4. Adjustable time delay. Lighting level must be above the off setpoint continuously for the length of the time delay before the lights will switch off. The device shall not have a length of the time delay shorter than 3 minutes. Time delay shall be adjustable to up to 20 minutes.

5. Low voltage device to be connected by low voltage wiring to a power pack. If control sequence can be met, one power pack may be used with multiple control devices.

6. Daylight switch shall provide visible indicator of the current status of the control output. Indicator shall be an LED.

7. Daylight switch to provide a test mode that temporarily bypasses the time delays. If left in test mode, the daylight switch will automatically resume normal time delays at the end of a period no longer than 60 minutes. (This item is a requirement of the 2005 Title 24 standard).

F. Automatic daylighting dimming systems

1. Provide a daylighting controller to continuously dim the fluorescent lights. Daylighting controller may be a self contained photosensor or a controller with a remote photocell. Photocell or photosensor are to be ceiling mounted or attached to a pendant fixture.

2. Photosensor to provide 0 – 10 V dimming signal to continuously dim the ballasts proprietary methods
of signaling dimming ballasts shall be acceptable.

3. Daylighting controller may be open or closed loop type. Closed loop devices may not be used in applications where there are adjoining dimming zones such that the luminaires from one dimming zone can be viewed by the daylighting controls in another zone. All daylighting controllers shall provide proportional control. An open loop device may accomplish this with one adjustment. All closed loop devices shall have at least two adjustments to provide an adjustable response. Any device which attempts to maintain a constant photocell signal shall not be acceptable.

4. All adjustments shall be adjustable from the photocell.

5. Provide an occupant adjustment or override wall switch to allow the teacher to adjust the light levels.

6. Approved sensor/control manufacturers: Wattstopper, Lutron, Leviton, Lithonia, Novitas, Douglas.

PART 3: EXECUTION

3.01 INSTALLATION

A. Install lamps in lighting fixtures and lampholders.

B. Support surface-mounted lighting fixtures directly from building structure. Provide additional blocking, unistruts, steel channels, etc. as required.

C. Install recessed lighting fixtures with attached accessible junctions boxes to permit removal and access from below. Use plaster frames in plaster , gypsum wallboard or acoustic ceilings. In grid ceiling rated for light fixture support, support recessed fluorescent light fixtures directly from T-bar using approved earthquake clips and in addition, 2 No. 12 wires (slack wires), one at each diagonal end of fixture attached directly to a structural member. If two opposite ends of a fixture do not rest on ceiling main runners, provide 4 No. 12 wires (support wires) to structural member. In grid ceiling not rated for fixture support, attach fixture to grid using approved earthquake clips and in addition 4 No. 12 support wires directly to structural member.

D. Provide safety chain between fixture and structure for recessed light fixtures. Mount hanger channels to span structural and/or T-bar ceilings.

E. Provide required backing for all lighting fixtures.

F. Join continuously mounted fixtures by use of chase nipples.

G. Provide spacers where required.

H. Mount light fixtures so that fixture labels are not visible when viewed from below.

I. For recessed fixtures in fire rated ceiling, provide fireproofing enclosure equal to rating of ceiling.

J. In each pendant of a pendant mounted light fixture, provide a safety wire or cable attached to the fixture and structure at each support capable of supporting four times the supported load. Provide swivel mounts at ceiling and longitudinal sway mounts at fixtures to allow fixtures to swing freely a minimum of 45 degrees from vertical.

K. Test motion sensors and daylighting controls.

L. For all dimming systems, contractor is responsible for burning in all lamps for 100 hours. Lamps are to operate at full output for this period.

M. Contractor is responsible for setting up and adjusting all control devices per the manufacturer’s adjustments and resulting performance.

3.02 TESTS

A. Immediately before turning completed job over to Owner, clean all light fixtures inside and out, including plastics and glassware, adjust and tighten all trim, replace broken or damaged parts, lamp and test fixtures for electrical and mechanical operation. Replace all inoperative lamps, ballasts and other inoperative equipment.

B. Replace noisy ballasts immediately.

C. Include in bid the service of a California Registered Professional Engineer or a Professional recognized by the State of California to review and certify the final installed lighting control system as required by the California Energy Code (Title-24). The Professional shall sign the required documents, submit to the proper agency and be responsible for certifying the installed lighting control system.

END OF SECTION

SECTION 271100
COMPUTER NETWORKING WIRING SYSTEM

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 DESCRIPTION

A. Provide a complete Cable & Wiring Telecommunications Infrastructure. Provide equipment, materials and labor to render the cabling systems complete and operable for all outlet locations of the buildings, as specified within this document. This Project will use Category 6 wires, therefore, any reference of “Category 5e or Category 6” shall mean Category 6.

B. Principal items of work shall include but not be limited to:

1. Category 5e or Category 6 Data outlets.

2. Category 5e or Category 6 cables.

3. Cable management support rings in accessible ceiling space and conduits in inaccessible ceiling space.

4. Category 5e or Category 6 patch panel.

5. IC racks.

6. Fiber Optics cable patch panels.

7. Fiber Optics cables.

8. Floor mounted MC rack.

9. Testing.

1.03 CODES AND STANDARDS

A. Comply with current versions of the following applicable codes and standards:

1. Underwriters Laboratories Inc. (UL): Applicable listings and ratings

2. California Electrical Code, current enforced edition

3. National, State, and Local Occupational Safety and Health Administration (OSHA) building and fire codes

4. ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Cabling Standard

5. ANSI/TIA/EIA-569-A, Commercial Building Standard for Telecommunications Pathways and Spaces

6. ANSI/TIA/EIA-606-A, Administration Standard for Commercial Telecommunications Infrastructure

7. ANSI/TIA/EIA-607-A, Commercial Building Grounding and Bonding Requirements for Telecommunications, current issue

8. NFPA 70,National Electric Code, 2005 or current enforced addition

9. Institute of Electrical and Electronic Engineers (IEEE) 802.3 (Ethernet), 802.3u (100BaseTX/FX), 802.3Z (Gigabit Ethernet over optical fiber), 802.3ab (Gigabit Ethernet over 4 pair category 5 or higher), 802.11 (Wireless LAN)

10. Institute of Electrical and Electronic Engineers (IEEE) 802.1d (spanning tree protocol), 802.1p (QOS), 802.1q (VLAN tagging), 802.1x (Port Based Network Access Control)

11. National Electrical Manufacturer's Association (NEMA)

12. National Fire Protection Association (NFPA), NFPA-70

13. CCR Part 3 - California Electrical Code

14. CCR Part 2 - Uniform Building Code

15. ANSI, ASTM, UL, NEMA, IEEE and FCC standards as applicable.

16. The terms MC and MDF are used interchangeably.

17. The terms IC and IDF are used interchangeably.

1.04 SYSTEM DESCRIPTION

A. System Topology

1. The Backbone Topology shall be the Star Topology with the MC at the center of the star. The backbone cabling and pathway shall include multi-mode fiber optic cabling, connectors, patch cords, panels, ferrules, and enclosures required to provide the specified connectivity between the MC, ICs and the TRs.

2. The Horizontal Topology shall be the Star Topology and shall consist of Category 5e or Category 6, 100 Ohm Unshielded Twisted Pair (UTP) cables from TR's to data outlets. The horizontal cabling and pathway shall include Category 5e or Category 6 cabling from outlets to TRs and patch panels, wire management panels, vertical distribution rings, patch cords, and other miscellaneous items required to extend connectivity from IDFs to outlets. In the user areas, each Category 5e or Category 6 horizontal cabling drop outlet shall be terminated per TIA/EIA-568A, T568B.

3. There shall be one dedicated 6-strand multimode fiber optic cable from each IC to the MC.

4. Locations of MC and IC's are generally as shown on the drawings. Final locations must be verified in the field to suit the actual field condition and approved by the District during construction.

1.05 SUBMITTALS

A. Furnish catalog cuts, technical data and descriptive literature on components. Data shall be clearly marked and noted to identify specific ranges, model numbers, sizes and other pertinent data.

B. Shop drawings shall indicate wiring and schematics, details, panel configurations, sizes and a point-to-point wiring diagram of all circuits. Shop drawings shall indicate interfaces to equipment furnished by others, identifying numbers of wires, termination requirements, voltages and other pertinent details. Responsibility for each end of interfaces shall be noted on shop drawings.

C. Entire system shall be supported by engineering documentation including:

1. Riser diagrams indicating all devices, cabinets and their point-to-point connections.

D. Operating and Servicing Manuals:

1. Deliver required copies of "Operating and Servicing Manual" for each system. Each manual shall be bound in a flexible binder and data shall be typewritten or drafted.

2. Each manual shall include instructions necessary for proper operation and servicing of system and shall include circuit diagrams of systems.

E. Record Drawings:

1. Submit two "As Built" marked up drawings for all as contractor installed cable and infrastructure. To include all conduit, underground, aerial and above ground cable and pathways to/from for all buildings and each building floor.

2. Submit a full size (E) drawing of plot plan and building plans, indicating location of conduit and cable runs. Contractor shall provide drawing describing the cable pathways used in his/her installation. It is to include conduit sizes, conduit runs, conduit ID number, number of cables and types in conduit, cable type size, number of cables being carried, and the use of any inner duct. A separate redline markup (field drawn) size E drawing shall also be provided to the District Representative.

3. Contractor shall provide AutoCAD drawing in block form delineating all cable runs from beginning to end point. Drawing shall include the cable identification number, cable type, workstation faceplate ID, Patch Panel Port ID, and all empty panel ports. This drawing shall utilize a separate AutoCAD layer. Two printed E size drawings shall be presented to the District Representative and two copies of the AutoCAD V14 or newer files on Floppies.

1.06 QUALITY ASSURANCE

A. Ordinances and Regulations: The work of this Section shall conform to California Code of Regulations, Part 3, and all other applicable codes and standards.

B. Only a qualified Contractor holding C-7 or C-10 and other licenses required by legally constituted authorities having jurisdiction over the work shall do work. Contractor shall have completed at least 5 projects of equal scope to systems described herein and shall have been engaged in business of supplying and installing specified type of systems for at least 5 years. Use equipment manufacturers' certified contractors.

C. Contractor shall warranty that all work executed and materials furnished shall be free from defects of material and workmanship for a period of 1 year from acceptance date of Contract Completion, excluding specific items of work that require a warranty of a greater period as set forth in this Specification. Immediately upon receipt of written notice from the District, Contractor shall repair or replace at no expense to the District: Any defective material or work that may be discovered before final acceptance of work or within warranty period, any material or work damaged thereby; and adjacent material or work that may be displaced in repair or replacement. Examination of or failure to examine work by the District shall not relieve Contractor from these obligations.

D. Persons skilled in trade represented by work, and in accordance with all applicable building codes, shall install system in accordance with best trade practice.

E. Contractor shall include in the Material List Submission copies of the manufacturers' certifications that the Contractor is an authorized installer of Berk-Tek and Ortronics or the submitted approved equal manufacturers' products and has been adequately trained in the installation of those products. This applies to all fiber optic components and fiber optic cable.

F. Contractor shall include in the Material List Submission a list of five projects of similar scope acceptable to the District. Contractor shall include the telephone number of the customer's client contact for each project and a letter signed by a corporate officer, partner, or owner of the contracting company describing the service capability of the company and stating the company's commitment to maintain that service capability through the warranty period.

PART 2: PRODUCTS

2.01 EQUIPMENT STANDARDS

A. Where applicable all components installed under this Contract shall be listed by UL.

B. All equipment and components including cable shall be like products of a single manufacturer.

C. Equipment Requirements:

1. All cabling and connectors shall be covered by a Berk-Tek or approved equal manufacturer warranty of not less than twenty-five years.

2.02 LOCAL AREA NETWORK CABLING

A. Multi-Mode Optical Fiber Cables.

1. The optical fiber shall be multimode, graded-index optical fiber waveguide with nominal 50/125 mm core/cladding diameters. The optical fiber shall comply with ANSI/EIA/TIA-492AAAA.

2. The mechanical and environmental specifications for multi-mode fiber distribution cables shall be indoor/outdoor, riser rated, tight-buffered type cables. The cable shall meet the requirements of the California Electrical Code (CEC) section 770. The Installer shall confirm that the cable is listed for the specified application.

3. Each cabled optical fiber shall meet the graded-index attenuation performance specifications of ANSI/TIA/EIA 568-A. Attenuation shall be measured in accordance with ANSI/EIA/TIA-455-46, -53, or -61. Information transmission capacity shall be measured in accordance with ANSI/EIA/TIA-455-51 or -30. The cable shall be measured at 23 °C + 5 °C.

4. Multi-mode fiber optic cable shall meet the following minimum performance requirements:

a. At 850 nanometers (nm), the minimum bandwidth capability required is 2000 MHz-Kilometer.

b. 1300nm, the minimum bandwidth capability required is 500 MHz-Kilometer.

c. Installer shall utilize 10 GbE Gigabit Enhanced 50/125 multi-mode fiber to exceed standard bandwidth and distance limitations. Cable manufacturer shall guarantee that the multi-mode optical cable will support Gigabit Ethernet transmission up to 550 meters using 1000BASE-SX optics and 10 Gigabit Ethernet transmission up to 300 meters using 10GBASE-SX optics.

d. Manufacturer: Berk-Tek/Ortronics NetClear MM-10, NetClear SM or approved equal.

B. Fiber Optic Connectors. All fiber optic connectors shall be Duplex SC type, MM or SM connector.

1. Manufacturer: Ortronics NetClear or approved equal.

C. Fiber Optic Light Interconnection Units (LIUs). Rack mounted. Complete kit to include all panels' bulkheads and supporting hardware.

1. Manufacturer: Ortronics NetClear or approved equal.

D. Fiber Optic Distribution Shelves. 72 port rack mountable, with SC-compatible bulkheads and built-in cable management.

1. Manufacturer: Ortronics NetClear or approved equal.

E. Fiber Optic Jumper Cables.

1. Multi-mode 50/125 OFNR rated. Length: 3 meters, at a minimum, pre-manufactured with SC-SC connectors with same transmission characteristics as the terminated fibers.

2. Fiber optic patch cables shall be jacketed with polyvinyl chloride with yellow indicating a single-mode patch cable and aqua indicating an enhanced multi-mode patch cable. The cable shall meet all requirements of TIA/EIA-568-A.3-1. Provide 2 fiber patch cords for each IDF.

3. Manufacturer: Ortronics NetClear or approved equal.

F. Fiber Optic Innerduct. Materials: one-inch and/or one and one half inch, orange corrugated with pullrope, rated as required by code.

G. Category 5e and Category 6 data Cable. Horizontal enhanced category 5e cabling shall be 24 AWG, or in the case of Category 6, 23 AWG, 4-pair UTP, UL/NEC rated, with appropriately rated riser or plenum insulation and jacket materials as appropriate to the installation environment per Article 800 of the N.E.C. Individual conductors shall be FEP or polyethylene insulated as appropriate to the installation environment. Cables installed in cable trays or on "J"-hooks shall carry a CMP rating. Cable shall meet ANSI/TIA/EIA minimum requirements for attenuation (insertion loss), return loss, propagation delay, delay skew, NEXT loss, PSNEXT loss, FEXT loss, ELFEXT, and PSELFEXT for 4-pair Category 5e and Category 6 cabling as detailed in ANSI/TIA/EIA-568-A. Category 5e and Category 6 data cabling and patch cables shall be blue or green.

1. Manufacturer: Berk-Tek NetClear or approved equal

H. Flooded Category 5e cable for all underground applications: Category 5e cabling shall be 24 AWG, 4-pair UTP, UL/NEC rated, with appropriately rated polyethylene jacket with water blocking flooded core. Individual conductors shall be polyethylene insulated. Cable shall meet ANSI/TIA/EIA minimum requirements for attenuation (insertion loss), return loss, propagation delay, delay skew, NEXT loss, PSNEXT loss, FEXT loss, ELFEXT, and PSELFEXT for 4-pair Category 5e cabling as detailed in ANSI/TIA/EIA-568-A.

1. Manufacturer: Berk-Tek or approved equal

I. Category 5e and Category 6 Inserts. All Category 5e and Category 6 data inserts shall be wired to the T568B wiring pattern. Category 5e and Category 6 data inserts shall meet the appropriate ANSI/TIA/EIA minimum requirements for attenuation (insertion loss), return loss, propagation delay, delay skew, NEXT loss, PSNEXT loss, FEXT loss, ELFEXT, and PSELFEXT for connecting hardware as detailed in ANSI/TIA/EIA-568-A.

1. Ortronics NetClear or approved equal.

J. Category 5e and Category 6 Patch Cords. Patch cords shall be Category 5e or Category 6 rated, 24 AWG, 4 pair assemblies. Patch cords shall be factory assembled by the manufacturer of the cabling system. LAN Patch cords shall be the same color (blue or green) as the cabling system.

1. One ten-foot Category 5e or Category 6 patch cord for each work area outlet installed.

2. In the wiring closets, patch cords shall be provided in a like manner (one per user port).

3. Manufacturer: Ortronics NetClear or Approved Equal.

K. Category 5e or Category 6 Patch Panels. Patch Panels shall be provided in 24 or 48 port compliments with modular jack ports wired to T568B. Patch panels shall be augmented with cable support bars in rear to properly dress cable. All patch panels shall meet ANSI/TIA/EIA minimum requirements for attenuation (insertion loss), return loss, propagation delay, delay skew, NEXT loss, PSNEXT loss, FEXT loss, ELFEXT, and PSELFEXT for Category 5e connecting hardware as detailed in ANSI/TIA/EIA-568-A Quantity and size of patch panels must be selected to provide 20% expansion capacity. One EIA rack unit of horizontal wire management shall be provided adjacent to each patch panel (above and below).

1. Manufacturer: Ortronics NetClear or approved equal.

L. Faceplates. Faceplates shall be constructed of ABS molding compound and have the ability to accommodate one insert.

1. Manufacturer: Ortronics NetClear or approved equal.

M. Horizontal Cable Management panels shall be 19-inch rack mount with a minimum of four-management rings one-rack unit (1.75 inches) in height. Rings shall not exceed more that 1.75 inches in depth unless otherwise noted in the construction documents.

1. Manufacturer: Ortronics NetClear or approved equal.

N. Floor Standing Cabinet. Floor-standing equipment cabinet for MC or IC installation use as required. Cabinet shall provide at least 84 inches (48 EIA/TIA rack units) of total mounting space for 19-inch panels and 30 inches of usable interior depth. If two cabinets are required in an MC, all structured cabling components shall be within the same rack with the Backbone Switch. Cabinet shall be constructed of 14 or heavier gauge steel, with front and rear adjustable mounting rails tapped for #10-32 screws on EIA spacing front and rear. Cabinet shall be tested and certified to the seismic specifications set forth by NEBS Telcordia Technologies GR-63-CORE. Cabinet shall be provided with a thermostatically controlled heat dissipation fan; textured antique finish; matching side panels and louvered top panel; a hinged, key locking, bronze-tinted acrylic window door in front keyed to Corbin Cat 60; and a full length, hinged, key-locking rear door keyed to Corbin Cat 80. Cooling fan thermostat shall be set at 78 degrees Fahrenheit. When installed, both doors shall be able to swing fully open. Cabinets shall be UL listed.

1. Manufacturer: Chatsworth.

O. Wall-Mounted Cabinet. Wall-mounted equipment rack for IDF and LDF locations. IDF cabinet shall provide at least 45 inches of mounting space for 19-inch panels (26 EIA/TIA rack units), a 22 inch main body and a minimum of 24 inches of usable interior depth. LDF cabinet shall provide at least 24 inches of mounting space for 19-inch panels (13 EIA/TIA Rack Units), a 22 inch main body and 24 inches of usable interior depth. Cabinet bodies shall be 14 gauge or better, all welded steel construction with 14-gauge carbon steel front and rear adjustable mounting rails, tapped for #10-32 screws on EIA spacing, fully adjustable front-rear. Allowable deflection of an open cabinet, when loaded to its maximum weight capacity, shall not exceed .75 inches (3/4 inches) Wall mount IDF and LDF cabinets shall be configured to have a minimum of 18 inches from front to rear rack-mounting rails. Cabinet shall have factory made top or side ventilation capability and a thermostatically controlled heat dissipation fan rated at no more than 32dBA, a Plexiglas front door, and flush mounted locks on both front and rear sections. The front lock shall be keyed to Corbin CAT 60 and the rear lock shall be keyed to Corbin CAT 80. Cooling fan thermostat shall be set at 78 degrees Fahrenheit. Cabinets shall be provided with white powder coat finish. Cabinets shall be UL listed.

1. Manufacturer: Chatsworth.

PART 3: EXECUTION AND INSTALLATION

3.01 PREMISE WIRING INSTALLATION

Site Conditions: Installer shall examine the areas and conditions under which the work of this Section will be performed. Unsatisfactory conditions shall be reported to Owner before the contractor begins work.

A. Conduit Subsystem.

1. Excavation.

a. Call the Owner’s Authorized Representative at least 48 hours prior to excavation.

b. Locate and protect existing construction, plant life and utilities. Before excavation, contact the "Underground Service Alert of Southern California" (USASC) for information on buried utilities and pipelines.

2. Inter-building Conduits.

a. Provide and install 2 inner ducts of 1-1/2 inches and one inner duct of one inch with indexed pull cords in those conduits intended for fiber optic media.

b. Ductbanks shall have a continuous slope downward toward ground vaults and away from buildings with a pitch of not less than 4 inches in 100 feet.

c. Inter-building exterior and underground conduit runs shall not exceed 200 feet and shall not contain more than two bends of 90-degrees or less between pullboxes or vaults. Distances of up to 600 feet between underground pull boxes may be allowed if the conduit run between pull boxes has no bends, and is indicated on Drawings.

d. Stagger joints of the conduit by rows and layers so as to provide a duct line having maximum strength.

e. During and after construction, protect partially completed duct lines from the entrance of debris such as mud, sand, and dirt by means of suitable conduit plugs. As each section of a duct line is completed from ground vault to ground vault, draw a stiff bristle brush of the proper diameter through each duct until the conduit is clear of particles of earth, sand, and gravel; then immediately re-install conduit plugs.

f. Conduit fill shall not exceed 40%.

B. Local Area Network MCs/ICs.

1. MC/IC Category 5e and Category 6 Termination Installation.

a. Category 5e or Category 6 patch panels shall be installed in 24 or 48 port compliments. Installer shall provide and install all necessary patch cords, both copper and fiber optic, for internal cabinet interconnections.

b. One EIA rack unit of horizontal wire management shall be provided adjacent to each patch panel (above and below).

c. Cables shall be dressed and terminated in accordance with TIA/EIA-568-A, manufacturer recommendations, and this Specification.

d. Pair untwist at the termination shall not exceed one half an inch for Category 5e or Category 6 connecting hardware.

e. Bend radius of the cable in the termination area shall not be less then 4 times the outside diameter of the cable.

f. Cables shall be neatly bundled, not overly tight, and dressed to their respective panels or blocks. Cable wraps shall not be tight enough to disturb the internal cable pair twists.

g. The cable jacket shall be maintained as close as possible to the termination point.

h. 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.

i. Patch cords used at the rack or cabinet shall be either single-mode or multi-mode duplex fiber or Category 6, 24 AWG, 4-pair assemblies, as required.

2. MDF/IDF Fiber Termination Hardware Installation

a. Stripped fiber slack shall be neatly coiled within the fiber termination panel. No stripped slack loops shall be allowed external to the fiber panels. Fiber loops must not be smaller than minimum bend radius of the cable.

b. All cables shall be individually attached to the respective termination panels by mechanical means.

c. Each fiber cable shall be stripped upon entering termination panels and the individual fibers routed neatly into termination panels.

d. Each cable shall be clearly labeled at the entrance to the termination panel.

e. Dust caps shall be installed on unused connectors and couplings.

3. Backbone Cabling

a. Proper bending radius and pulling strength requirements of cables shall be followed during handling and installation. Cables, splice cases, punch-down frames, LIUs, patch panels and supporting hardware shall be installed in accordance with manufacturer recommendations.

b. Outside plant fiber shall be installed in 1-1/2 inch or one inch corrugated inner duct installed within the backbone conduit.

c. Interior innerduct and cable shall be Plenum or Riser rated, as required by applicable code regulation or standard. Riser rated innerduct as a minimum shall be installed on floor-to-floor fiber optic cabling.

d. Interior fiber not installed in conduit or raceways shall be installed in innerduct. Innerduct not installed in cable trays shall be installed properly strapped and supported every 4 feet in concealed spaces only. Innerduct shall be rated for indoor or outdoor use as applicable by code.

e. Cables in panels, cabinets, trays, and racks shall be neatly grouped and strapped using hook and loop cable straps. Cables shall be placed in a manner that allows equipment installation without rerouting. Full rack rail travel adjustments shall not be impeded by cable installation. Cables and panels shall be clearly identified at both ends with a unique cable numbering system and in compliance with TIA 606-A.

f. When cable runs are being installed, provide additional slack at both ends to accommodate future cabling system changes. The minimum amount of allowable slack at the:

(1) MC shall be 10 ft
(2) IC shall be 3 feet

g. All fiber optic strands shall be terminated and no fiber cable shall be spliced.

h. Cable shall be installed in accordance with manufacturers' recommendations and best industry practices.

i. Cable raceways shall not be filled greater than the NEC maximum fill for the particular raceway type.

j. Cables shall be installed in continuous lengths from origin to destination (no splices).

k. When cable runs are being installed, provide additional slack at both ends to accommodate future cabling system changes. The minimum amount of allowable slack at the:

(1) Telecommunications Room or Equipment Room is 10 ft.
(2) User Outlet is 12 in.
(3) Include the slack in all length calculations to ensure that the cable does not exceed maximum allowable lengths as defined herein. Do not store slack in bundled loops. Store cable slack in an extended loop or in a figure 8 configuration to alleviate stress.

l. The cable’s minimum bend radius and maximum pulling tension shall not be exceeded.

m. The Installer shall replace any cable damaged or subjected to installation practices outside of those specified within this document.

4. Horizontal Cabling

a. Copper Horizontal distribution cable shall be TIA/EIA-568-A, Category 5e or Category 6, 4-pair unshielded twisted pair (UTP), and CMP or CMR rated cable, as required. Each Category 5e or Category 6 cable shall be terminated on an 8-position, 8-conductor Category 5e or Category 6 jack (at the workstation locations) or patch panel (in the MC/IC/TR) wired in accordance with T568B. Associated faceplates shall accommodate four jacks. Quantities of cables to each outlet shall be in accordance with the location type and project document.

(1) Cable shall be installed in accordance with manufacturers' recommendations and best industry practices.
(2) Copper horizontal cable shall not exceed 90 meters in length.
(3) Cable raceways shall not be filled greater than the NEC maximum fill for the particular raceway type.
(4) Cables shall be installed in continuous lengths from origin to destination (no splices or cross-connects).
(5) The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
(6) Unshielded twisted pair cable shall be installed so that there are no bends less than four times the cable outside diameter.
(7) When cable runs are being installed, provide additional slack at both ends to accommodate future cabling system changes. The minimum amount of allowable slack at the:

1. MC, IC, TC will be 3 ft.
2. Work Area Outlets will be 12 inches

(8) If a J-Hook or trapeze system is used to support cable bundles in dropped ceiling or concealed ceiling spaces, all horizontal cables distributed using J-Hooks shall be supported at a maximum of four-foot intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

1. Cable installed above fire-sprinkler systems shall not be attached to the system plumbing or any ancillary equipment or hardware.
2. Cables shall not be attached to ceiling grid or lighting support wires.

(9) Pulling tension on 4-pair UTP cables shall not exceed 25 pounds for a single cable or cable bundle.
(10) The Installer will replace, before terminations are completed, any cables damaged or subjected to installation practices outside of those specified within this document, at Installer's expense.

5. Labeling and Marking

   a. Provide complete cable location chart and as-built documentation in an envelope and attach to the inside rear doors of distribution frame cabinets in wiring spaces.

   b. Mark distribution panels, cables and cover plates with computer-generated labels. Drops shall be labeled with the same identifier on the receptacle faceplate, inside each junction box, on the cable at the jack, on the cable at the patch panel, on the termination side of the patch panel, and on the patch side of the patch panel. Cable markers shall be located within 2 inches of the end of the cable jacket and shall be directly readable. Panel labels shall be computer-generated and printed using a laser printer. A disk with the label files shall be submitted as part of the project record documents.

C. Racks/Cabinets

1. Racks and cabinets shall be bolted to the floor or wall mounted, as required, and provided with tip bars and all additional accessories as required for a complete functional system. Racks and cabinets shall be seismically braced and attached to horizontal ladder racking or cable tray with ¾ inch threaded rod.

2. MC/IC cabinets shall be placed to accommodate 36-inch aisles in the front and rear. When wall mounted, cabinet placement shall allow a minimum of 31 inches clear on each side and 36 inches in front

3. Unused openings in cabinets shall be effectively closed.

4. Cabinet doors shall close without striking installed components.

5. Cabling in cabinets shall be installed and loomed is a manner that allows full travel in rack rail adjustment. Cabling shall not infringe on space used for equipment mounting.

6. Cabinets shall be grounded as specified in Article 250 of the California Electrical Code.

7. Conduits shall be installed so as to prevent moisture or water from entering and accumulating within the enclosure.

8. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.

9. Maintain the required bending radius of conductors inside the cabinet.

10. Clean the cabinets of foreign material such as cement plaster and paint.

11. Distribute and arrange conductors neatly in the wiring gutters.

3.02 CERTIFICATION AND TESTING

Provide the Owner's Authorized Representative with copies of factory calibration certificates for each test set used in the testing procedures. All test equipment used shall have been factory calibrated within the previous 12 month period. Operators of the test equipment shall have factory training in the use of the equipment and its software. All cables and termination hardware shall be 100% tested for defects in installation and to verify cable performance under installed conditions. All conductors of each installed cable shall he verified useable by the Installer 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.

A. Local Area Network

1. Copper

a. Each cable shall be tested for continuity on all pairs and/or conductors.

b. Category 5e and Category 6 data cable shall be performance verified using an automated test set for Category 5e link or Category 6 configurations.

c. Test set shall be certified Level IIE for Category 5e or Level III for Category 6. To ensure verifiable equipment calibration, the Owner may require field calibration each time a new set of tests are performed. Test for the continuity parameters defined above, and provide results for the performed tests. This test set shall be capable of testing for the continuity and length parameters defined above, and provide results for the following tests:

(1) Attenuation (insertion loss)
(2) Wire Map
(3) Attenuation to Crosstalk Ratio ACR
(4) Pair-to-pair NEXT loss
(5) PSNEXT loss
(6) Return Loss
(7) Pair-to-pair ELFEXT
(8) PSELFEXT
(9) Propagation delay
(10) Delay skew
(11) Cable length

d. Cable length shall be tested using the cable manufacturers' published Nominal Velocity of Propagation (NVP) parameter. Owners Quality Assurance Agent shall verify the NVP setting. Generic settings not using the published NVP parameter will not be accepted.

e. Test results shall be automatically evaluated by equipment, using the most up-to-date criteria from the ANSI/TIA/EIA-568-A standard and the result shown as pass/fail.

f. Test results shall be printed directly from the test unit in native format, and both hard and soft copies in native format shall be provided to the Owner. The printed test results shall include tests performed, the expected test result, and the actual test result.

2. Fiber Optics

a. Installer shall terminate, test and document all fiber optic cables with approved connectors at the drop locations and on approved fiber optic patch panels at the MC, ICs and TRs. No fiber optic cables shall remain un-terminated.

b. Fiber optic cables shall meet all EIA/TIA performance standards and shall be tested in accordance with all applicable standards. Light source and power meter tests shall be dual wavelength and shall be tested in both directions at each wavelength on each fiber strand. Optical time domain reflectometer (OTDR) tests shall be performed with an instrument suitable for testing campus cable plants. OTDR tests shall be conducted at both wavelengths from the MDF with sufficient launch cables installed at both ends of the fiber run to clearly identify the mated connectors. OTDR launch and landing cables shall not be less than 100 meters in length. The light pulse duration used shall not be greater than 50 nanoseconds. Sampling resolution shall not be less than 5 feet per 100 meters.

(1) Multi-mode fiber optic cable runs less than or equal to 200m shall be tested in both directions at each frequency with a power meter and light source combination that can verify distance and attenuation. Wavelengths tested shall include 850nm and 1300nm.
(2) Multi-mode fiber optic cable runs greater than 200m shall be tested with a power meter and light source combination and with an OTDR. Wavelengths tested shall include 850nm and 1300nm.

3. Completion. Installer's work for the installation shall be considered complete after the following have been accomplished:

a. All system testing has been completed; Installer certifies that entire system is in working order Cable Test Forms and equipment specific test documentation (both files and paper records) have been submitted to the Owner.

b. All ceiling panels previously removed have been put back in place.

c. All system labels have been put in place.

d. All construction debris and scrap materials have been removed from project site.

e. All marked up, project record documents have been returned to the Owner.

f. All unused customer material has been returned to the Owner.

g. The Owner has successfully completed acceptance testing of the network wiring installation.

h. The Owner's Inspector has inspected and accepted the installation.

3.03 PROJECT RECORD DOCUMENTS

A. As-Built Documentation

1. Block diagrams indicating all items and their point-to-point connections in a manner following floor plan layout.

B. Operating and Servicing Manuals, Record Drawings:

1. Deliver three (3) copies of operating, specification descriptions, and/or service manual. Each complete manual shall be bound in a three ring binder, and all data shall be typewritten or drafted.

a. Each manual shall include a page with Project site and Project name, date of Substantial Completion, Contractor name, address, telephone, and fax numbers.

b. Each manual shall contain a letter, signed by an officer of the company indicating the beginning and ending date of any warranties described in subsection 1.07 of this specification and shall describe the companies' commitment to service the warranty during the terms specified.

c. Each manual shall include all specifications and instructions necessary for proper operation and servicing of system.

d. Each Manual shall include installation and coordination drawings specifically related to this section shall be included as follows:

(1) Size A (8-1/2 inch x 11 inch) and size B (11 inch x 17 inch) shall be bound into the manual.

(2) Larger drawings shall be folded and inserted into transparent envelopes and bound into the manual.

2. Deliver two (2) copies of Record drawings on labeled CD's (Compact Disks) representative of the work performed shall be presented at completion of work in the most recent Autodesk's AutoCAD format (.dwg), for Microsoft Windows.

   a. The submittal shall contain all systems wiring installed including telephone, LAN, and any other low voltage system Contractor-installed wiring.

   b. The submittal shall consist of two electronic copies on CD-ROM and three paper record copies on no less than "E" size drawings, presented prior to the acceptance inspection.

   c. Owner utilizes layers as a key tool in controlling visibility of drawing elements and to provide consistent information between drawings, yet provide control over what is seen on each sheet. Premise wiring shall be shown on a separate layer, labeled as "Premise Wiring" that uses both building floor plans and conduit supporting structure layers below. The use of any version control blocks or company logos shall be on a layer separate from the premise wiring as-built drawings.

   d. All AutoCAD files (software copies) supplied shall be multi-layer drawings with the following layers as a minimum:

      (1) Layer 1 shall contain title blocks only.
      (2) Layer 2 shall contain building or site plan backgrounds only.
      (3) Layer 3 shall contain terminal cabinets, devices, cabling and other system components.

C. Cable Numbering Records

1. Owner requires both labeling and record documentation at the conclusion of each cable installation project. Labels and cable records allow the Owner to locate, identify and diagnose cases of trouble more efficiently. They are required for each cable installation project regardless of size and scope.

   a. Installation Contractor shall provide a cable management spread sheet that shall include the following:

      1) Cable Schedule
      2) Cable Test Forms
      3) Cable Labels
      4) Network planning chart.

   b. Present the data in an Excel spread sheet that will operate on Windows 98/2000/XP platforms. Information shall be presented in paper and electronic forms in a format that will be provided by the Owner.

c. A paper copy of the cable schedule in a transparent plastic sleeve shall be affixed to the front door of each Intermediate and Local distribution frame (IDF and LDF). In the MDF cabinet, the cable schedule shall be affixed to the rear door of the cabinet.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.06 OWNER ORIENTATION

A. Completed shop drawings, as specified in Section 3.04 above shall serve as the Owner's orientation.

END OF SECTION

SECTION 275116
INTERCOMMUNICATIONS, PUBLIC ADDRESS,
MASTER CLOCK AND CLASS CHANGE SIGNALING SYSTEM

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 WORK INCLUDED

A. The school has an existing Bogen Quantum Multicom IP. Provide new speakers and clocks in the new building and extend the Bogen system to the new buildings. Provide all programming. Add station ports equal to the number of new speakers.

B. Provide all conduit, surface raceways, outlet boxes, junction boxes, pull boxes, terminal cabinets, and similar devices required for work under this section.

C. Provide engineering, testing, materials components and supervision necessary to provide a complete operable installation. Authorized dealer to insure proper installation shall install systems.

1.03 RELATED WORK

A. Section 26 0160 Basis Materials and Methods.

1.04 EQUIPMENT SUPPLIERS

A. Equipment and materials shall be provided and installed by a factory authorized distributor to ensure proper specification adherence, final connection, test, turnover, warranty compliance, and service.

B. The specification is based on the equipment of manufacturers who have been approved by the district and the manufacturers herein named shall be considered as meeting the requirements of this specification. For all items which are identified by part number and manufacturer the performance specifications which are published in the most recent manufacturer’s data sheet available at the time of bidding this project shall be applicable to the present work as though fully written out herein.

C. The equipment shall be manufactured by Bogen to match existing operational and maintenance systems in the district. No substitutions will be approved.

D. Service Availability:

1. The supplier shall maintain sufficient stock on hand and have a fully equipped service organization capable of guaranteeing response time within four (4) hours of service calls, 24 hours a day, 7 days a week to service completed systems.

1.05 CODES

A. Work shall be performed in accordance with all applicable requirements of all governing codes, rules, and regulations including the following minimum standards, whether statutory or not:

State Building Code (CBC)
State Electric Code (CEC)
National Fire Protection Association (NFPA)
City, State, and other codes and requirements

B. All equipment must be registered with the FCC and approved for direct access to the line connections of the public Telephone Company.

C. All equipment must be listed by Underwriters Laboratories or a nationally recognized testing laboratory empowered by the United States Occupational Safety and Health Administration to issue listing names which are equal to U.L.

1.06 DOCUMENTATION AND SUBMITTAL

A. Contractor Qualifications (to be included in "Phase 1 Submittal")

1. A copy of the contractor's valid State of California Contractor License.

2. Proof that the contractor has been regularly engaged in the business of electronics contracting consisting of, but not limited to, engineering, fabrication, installation, and servicing of electronic systems of the type specified herein for at least the past ten- (10) consecutive years. Provide a statement summarizing any pending litigation involving any officer or principal of/or the bidding company, the nature of the litigation and what affect the litigation may carry as it relates to this work in the worst case scenario. Non-disclosure of this item, if later discovered may result, at the owner's discretion, in the contractor bearing all costs attendant with the transfer of the work to a new firm and any cost related to associated delays in the progress of the work.

3. A list containing at least ten (10) California installations comparable in scope and nature to that specified in the contract documents.

4. Submit complete documentation indicating in detail that the contractor has competent engineering, installation, service and maintenance personnel and facilities with reasonable stock of service parts within fifty air miles of the job site. Contractor shall submit a warranty statement certifying that they are capable of conforming to specified warranty requirements.

5. Contractor shall submit letters from the telephone switch manufacturer and the public address system manufacturer stating that the contractor is an authorized distributor/contractor for the equipment he proposes to use on this project and is licensed to purchase and install the software required to provide the specified functions.

B. Submittals, Submit six (6) copies of the following:

1. Complete bills of quantities, including all materials, components, devices, and equipment required for this work. The bills of quantities shall be tabulated respective of each and every system as specified, and shall contain the following information for each item listed:

1-a. Quantity
1-b. Description
1-c. Manufacturer's Name and Model Number
1-d. Manufacturer's Specification Sheet

2. A statement of franchises, distributorships, dealerships, arrangements and agreements with manufacturers of equipment to be used for this work as specified above.

3. Complete floor plans, at scale of contract documents, showing the locations throughout the project of all receptacles, conduits, wire ways, tray, pull boxes, junction boxes, equipment racks, telephones, speakers and the PABX switch and other devices.

4. Complete system riser diagrams, showing all elevations, room numbers, conduit sizes, types and fills, box sizes and types, devices, equipment and rack designations.

5. Complete scaled (1/4" = 1") equipment rack elevation drawings, including equipment designation, manufacturer's name, and model number.

6. Run sheets or field wiring drawings: clearly show at each terminal point, the type of connector to be used and include point to point wiring details of each connector. Note where shields are connected and where they will float to ensure the integrity of the grounding system. Call out wire types and color-codes where appropriate.

1.07 DELIVERY, STORAGE AND HANDLING

A. Contractor shall bear the costs of all shipping to the site, and of all unusual storage requirements. Make appropriate arrangements, and coordinate with authorized personnel at the site, for the proper acceptance, handling, protection, and storage of equipment so delivered.

1.08 WARRANTY

A. Warranty Period: Warrant all of the work of this section to be free from defects in materials and workmanship for period of twelve months from the date of Owner acceptance or from the date of first usage of the work by Owner personnel. The first usage date shall be agreed to in writing by the owner and contractor within five (5) working days of first usage. Component warranty service shall apply to repairs only made necessary by normal component wear and proper component usage. The warranty service does not apply to any Owner furnished equipment and labor. Transportation of warranty substitutes, or test systems, equipment, devices, material, parts and personnel to and from the jobsite shall be at no expense to the Owner during the warranty period.

B. Inventory: Contractor shall maintain, within the fifty (50) air mile area, a reasonable inventory of all parts necessary to provide service according to the specified warranty requirements.

PART 2: PRODUCTS

2.01 GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS

A. All equipment shall be new and unused. All components and system shall be designed for uninterrupted duty. All equipment, materials, accessories, devices and their facilities covered by this specification or noted on contract drawings and installation specifications shall be the best suited for the intended use and shall be provided by a single manufacturer or if provided by different manufacturers, recognized as compatible by both manufacturers. For maintenance and operational standard equipment will be as follows.

2.02 EQUIPMENT MANUFACTURERS

A. Public address, loud speaking intercom, class change signaling and master clock system shall be:

Bogen Quantum Multicom IP System. Provide new ports to support new speakers.

2.03 PRODUCT DETAIL

A. Provide new Telephones of type to match existing used throughout the school.

B. Accessory Equipment:

1. Classroom speakers shall be Bogen, type to match existing.

2. Outside speakers shall be Bogen, type to match existing in vandal resistant enclosures.

3. All clocks shall be on master clock system and shall match existing.

C. Wiring Cables: See Drawings.

PART 3: EXECUTION

3.01 SYSTEM PROGRAMMING

A. Contractor shall compile all data needed (room names, room numbers, drawings with station locations, etc.) to program system. System programming shall not be limited to features specified in this Specification.

B. Wiring within console and cabinets shall be installed to conform to standard engineering practice, and shall be terminated on terminal strips having a terminal for each required external connection. Wiring shall be cabled, laced and securely fastened in place so that no weight is imposed on any equipment, control switches, or terminals. Wires carrying audio power shall be shielded. Input and output circuits and terminal strips shall be installed to provide separation necessary for proper operation. Wires shall be identified by number and chart.

C. Conduits for system and 120 volt AC system shall be bonded together at console and all cabinet racks.

D. 120 volt AC supply conductors shall be terminated directly on disconnects switches specified and in approved raceway.

E. There shall be 4'-0" of slack cable; cable shall not be left on floor, but neatly dressed in main backboard and each IDF.

3.02 TERMINAL CABINET MAKE-UP

A. Lines and cables within cabinets and on main terminal backboards shall be carefully cable-strapped. Cables shall be formed in rectangular configuration. Each cable shall be properly numbered in numerical order and shall maintain same number throughout site.

B. Conductors shall be color-coded and individual cables shall be rung out, and tagged with code markers equal to W.H. Brady Co. or E-Z Code wire markers. Each cable index strip shall be typed and installed on terminal cabinet door. Each index strip shall be covered with Zellerbach #R125, or equal, typed on "as-built" drawings.

C. Terminations and connections throughout system shall be on 110 series blocks, except at equipment, which requires removal for servicing. Connections to such equipment and cables shall be screw-terminal type or plug-in type. Cables shall be identified as to buildings and rooms served, and terminated in all terminal cabinets and backboards.

D. Cables to satellite terminal locations and or classrooms shall be terminated on 110 blocks. Provide 110 blocks as needed

E. Cables from auxiliary equipment shall be terminated on 110 blocks. Provide blocks as required, plus space for a future block.

F. Feeding cables at remote cross connect locations shall be terminated on 110 blocks.

G. Blocks shall be mounted in vertical rows only. Cable with lowest number shall be terminated on upper left side, with next cable in numerical order just below first cable and so on. When left side of first row of blocks is full, next cable in numerical order shall be terminated on the upper right side of first row of blocks, and so on.

H. Cable distribution rings for inside wiring cable and distribution cable shall be Dracon Industries #10941- 000, 10942-000 or 1094-000 size as required, or approved equal.

I. Contractor shall submit shop drawings to the Architect, for approval, indicating proposed wire tag designations for cables and terminal block layout for all terminal cabinets and backboard locations.

J. All CAT-5 conductors in all terminal cabinets, equipment rack, etc., shall be terminated on 110 punch blocks or approved equal.

3.03 GENERAL PERFORMANCE REQUIREMENTS

A. Reproduction of speech shall be clear, high fidelity, and with all frequencies within range of system faithfully reproduced with no detectable noise, hum, or distortion.

B. Reproduction shall be attained at sound levels sufficient to override noise levels typical for schools, to provide a thoroughly satisfactory and serviceable system.

C. Audio level of intercommunication system shall be attained at sound levels sufficient to override noise levels typical for schools, to provide a thoroughly satisfactory and serviceable system with a minimum of 70 dB isolation between public address and intercommunication signals.

3.04 INSPECTION AND TEST UPON COMPLETION

A. Checkout and final connections to the system shall be made by a factory-trained technician in the employ of a manufacturer of the products installed. In addition, factory trained technicians shall demonstrate operation of the complete system and each major component to the Owner.

B. System field wiring diagrams shall be provided to the owner by the system manufacturer prior to installation.

C. All materials and installation shall be guaranteed to be free of defects in material and workmanship for two years after final acceptance of installation and test.

D. Upon completion of the installation, four (4) copies of complete operational instructions shall be furnished, complete with record drawings. Instructions shall include part numbers and names, addresses, and telephone numbers of parts source. Final payment shall not be made until operational and maintenance manuals have been received.

E. Upon completion of the installation of the equipment, contractor shall provide to the owner a signed statement from the equipment manufacture that the system has been tested, and functions properly according to the specifications.

END OF SECTION

SECTION 275126
ASSISTIVE LISTENING SYSTEMS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 WORK INCLUDED

A. Assistive Listening Systems in Auditorium. System shall be composed of various components as specified.

1.03 REGULATORY REQUIREMENTS

A. Equipment and components furnished shall be of manufacturers latest model, UL listed. System shall be installed in compliance with local and State authorities having jurisdiction.

1.04 SUBMITTALS

A. Shop drawings shall include catalog cuts and technical data on components specified. Data shall be clearly marked and noted to identify model numbers, physical sizes and other pertinent information.

B. Indicate interfaces with equipment furnished by other Sections identifying numbers of wires, termination requirements, voltages, and other pertinent details. Responsibility for each end of interface shall be noted on Shop Drawings.

C. Shop Drawings shall indicate panel configurations, sizes and point-to-point circuit schematics.

1.05 QUALITY ASSURANCE

A. Work shall be done by qualified contractor holding C-10 and other licenses required.

B. Contractor must have successfully completed at least 10 projects of equal scope in the past 2 years, and have been in business of furnishing and installing clock and program systems of this type for at least 5 years.

C. Contractor must be a factory authorized distributor and service provider for the brand of equipment offered and shall provide proof upon request.

D. Contractor must maintain a fully equipped service organization capable of furnishing repair service to the equipment and shall maintain a spare set of all major parts for the system at all times.

E. Contractor must furnish a letter from the manufacturer of the equipment which certifies that the equipment has been installed according to factory intended practices and that the system is operating satisfactorily.

F. Provide all instruments for testing and demonstrate in the presence of the District's representative that all circuit and wiring tests are free of shorts and grounds and that the installation perform as per these specifications and manufacturers specifications.

G. System shall be installed in accordance with best trade practice by persons skilled in trade represented by the work, and in accordance with local building codes and applicable provisions of the California Electrical Code.

H. All electrical materials and equipment installed shall be of new manufacture, and shall bear the UL label.

1.06 WARRANTY

A. Contractor shall warrant completed system wiring and equipment to be free from inherent mechanical and electrical defects for a period of year from date of completed and certified test, or from date of first beneficial use.

PART 2: PRODUCTS

2.01 EQUIPMENT

Hearing Assistance System: FM hearing assistance system shall be as manufactured by Phonic Ear, Williams Sound, or equal, and shall be furnished with the following components:

Base Station: Williams Sound No. PPA-375 PRO mounted inside the amplifier cabinet. The base station shall operate in 72MHz - 76 MHz bands and shall be furnished with remote-mounted antenna to cover a minimum of 500 feet. Determine the best location for the antenna for optimum reception within the room, before installation.

Single-Channel Receiver: No. PPA-R35, for use by the listener with standard Walkman-style headset No. AT541. Receiver shall be capable of being clipped to a pocket or belt. Units shall be furnished with rechargeable nickel cadmium batteries and 40 receivers shall be furnished and transmitted to the OAR before Substantial Completion.

Battery Charger Organizer: No. CHG-1269A, unit shall be capable of storing or recharging up to 12 receivers at one time. The charger shall be capable of recharging the nickel cadmium batteries without removing the batteries from the receiver. A total of 4 battery chargers shall be furnished.

PART 3: EXECUTION

3.01 ACCEPTANCE

A. Acceptance will be given after successful testing.

B. Contractor shall submit to the District as a condition of final payment and acceptance 5 copies of service manuals including the following:

1. A detailed explanation of the operation of the system.

2. Instructions for routine maintenance.

3. Detailed instructions for repair of all major components of the system.

4. Pictorial parts list and part numbers.

5. Pictorial and schematic electrical drawings of system, including operating and safety devices, control panels, and all major components.

6. Installation instructions for all system components.

7. Program listing.

8. Final test report.

Assistive-listening Systems

- Assistive-listening systems shall be provided in accordance with CBC Section 11B-219 and shall comply with CBC Section 11B-706.

- The minimum number of receivers to be provided shall be equal to 4% of the total number of seats, but in no case less than two. 25 % minimum of receivers provided, but no fewer than two, shall be hearing-aid compatible in accordance with CBC Section 11B-706.3.

- If the systems provided is limited to specific areas or seats, then such areas or seats shall be within a 50-foot viewing distance of, and have a complete view of, the stage or playing area. CBC Section 11B-219.4.

- Assistive-listening system is permanent, not portable, to comply with CBC 11B-219.5.

END OF SECTION

SECTION 281600
INTRUSION DETECTION SYSTEM

PART 1: GENERAL

1.01 WORK INCLUDED

A. Provide an operable intrusion detection system. System shall entirely stand alone and be composed of 4 basic elements: detecting, processing, transmitting and receiving. Components are as follows:

1. Infrared motion detectors and associated power supplies, batteries, and cables.

2. Door switches and cables.

3. Controller, expansion modules, power modules and batteries.

4. Installation of power and signal circuits for all equipment, including associated raceway, wiring and terminal cabinets as required for a complete and operable system.

1.02 RELATED SECTIONS

A. Basic Materials and Methods: Section 260100.

1.03 SUBMITTALS

A. Manufacturer's Data: Catalog cuts, technical data and descriptive literature on all hardware components. Data shall be clearly marked and noted to identify specific ranges, model numbers, sizes and other pertinent data.

1.04 QUALITY ASSURANCE

A. License Required: In addition to C-10 Contractor's license, alarm system installing Contractor shall have a valid state burglar alarm permit and shall state number with material submittal.

PART 2: PRODUCTS

2.01 MATERIALS

A. Infrared Motion Detectors:

1. Where indicated in the middle of a room motion sensors shall be ceiling mounted, 360 degree type by 60 feet diameter coverage. Sensor shall be “Detection Systems, Inc.” #DS938.

2. Ceiling mounted 90 degree motion sensors shall be broad range, 45 ft x 60 ft, “Detection Systems, Inc.” #DS9018i. Where long and narrow type range is required, use #DS928i.

3. Wall mounted motion sensor shall be “Detection Systems, Inc.”, #DS775 with #B328 gimbal mount.

4. Use location check meter to determine optimum location of detectors.

B. Door Switches:

1. Door switch shall be recess mounted, high security magnet type and shall be Flair Electronics MSS 100-8TW for steel doors and RMS-56TW for wood doors, or approved equal. A J-box shall be installed 6" above each door switch facing inside of a room.

C. Cables:

1. Zone and power cables shall be No. 22 AWG. Zone cables shall be, as follows:

a 2 pairs West Penn 251, for dry location.

b 2 pair West Penn AQC355 for wet location.

2. Door switch wire shall be same as zone cables. Larger size conductor shall be used when higher mechanical strength is required.

3. Combus cables shall be shielded.

4. Keypad cable shall be 4 pair #22.

5. Phone line cord shall be North Supply #S-480976 or 8/C standard cable with molded conductor.

6. Power cable shall be 2 #12 for 120 VAC and 2 #18 for 16 VAC.

7. All wire shall meet FR-1 Flame Test and shall be UL listed.

8. All wire and cables shall be indexed with a code marker and identified on a sheet, copy of which shall be left in equipment and placed in as-built data.

9. All wire and cables shall be installed in raceway.

D. Controller:

1. The school has an existing DMP Security System. Provide enough loop expanders to provide for a separate zone for each device (detector or door switch) with minimum of 8 spares. Controller shall be furnished with a low voltage transformer and one stand-by battery sized for a minimum of 6 hours back-up protection.

E. Loop Expanders:

1. Loop Expanders, wire with shielded cables.

2. The loop expanders shall be housed in a sheet metal cabinet. Cabinet shall have provisions for installation of a key flush lock keyed to District Standards.

F. Relay Output Module:

1. Relay output module shall have form C relay programmable outputs. Fore each panel, provide minimum of 3 programmable relay contacts - common alarm, common trouble and spare.

G. Liquid Crystal Display Keypads:

1. The school has an existing Keypad controller.

H. Telephone Connectors: RJ 38 x phone jacks and receptacles.

I. Provide high Db horns in weatherproof and tamperproof housings.

PART 3: EXECUTION

3.01 SYSTEM INSTALLATION AND OPERATION REQUIREMENTS

A. Motion detectors shall be "on" at all times, unless noted otherwise.

B. Motion detector shall be located generally as shown on drawings and adjusted in the field to achieve optimum location.

C. Provide lock-on device on all circuit breakers serving security equipment. Provide the 120 volt circuits as required.

3.02 WIRING INSTALLATION

A. Provide all 120V wiring, as required, for all equipment in conduit. Low voltage wiring from transformer to controller shall be in raceway. Wiring from sensor to controller or terminal cabinet shall be in raceway.

B. All wiring shall conform to the State Electrical Codes, Title 8, Title 24, and National Electrical Code.

3.03 WIRE TERMINATING

A. All conductors shall be equipped with spade lugs at terminations in terminals, motion detection units and controllers. All splices shall terminate on terminal blocks and shall take place at terminal cabinets only. All wire shall be color coded, using colors consistent with use.

1. All wire shall have code marker tags and be indexed in all equipment and noted on as-built drawings, also on index sheet or cards placed in equipment and in as-built data folder.

2. Leave an index sheet or card in all terminals and equipment cabinets.

B. Provide terminal boxes with terminals for termination of wiring even though they may not indicated on Drawings. Adequate spacing shall be provided on bolted terminals for lead separation.

3.04 TESTING

A. The Intrusion Detection System shall detect entry through a door-switched door or motion of a body taking more than 2 steps in an area secured with motion detection equipment. System shall be complete and properly operating prior to calling for test. The Inspector and Contractor shall walk test system before or after normal building hours, holidays or Saturdays at District's option and Contractor shall make minor necessary adjustments to system in presence of the Inspector. Contractor shall coordinate time of test with the District Inspector. When all zones have been tested and found to be acceptable to the Inspector, a time test shall be performed.

END OF SECTION

SECTION 283100
FIRE ALARM SYSTEMS

The requirements of the General Conditions and Supplementary General Conditions apply to this section.

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specifications collectively apply to work of this Section.

1.02 WORK INCLUDED

A. Section Includes:

1. The work under this section includes all labor, material, equipment, supplies, labor, testing, and accessories required to furnish and install a complete Fire Alarm System as indicated on the drawings and as specified herein.

2. It is the intent of the Drawings and Specifications for the Contractor to provide and install a complete, fully operational, and tested system.

3. All miscellaneous system components including, but not limited to control panels, digital communicator, alarm detection devices, alarm initiation devices, alarm indicating devices, remote power supplies, terminal cabinets, terminal blocks, conduits, wires, programming, testing, etc, as well as any other related items, shall be furnished and installed complete under this section, such that the system shall perform all functions listed herein in compliance with all of the specified requirements.

4. The complete installation shall conform to the following codes:

1. 2019 California Electrical Code (CEC), Part 3, Title 24 C.C.R.

2. 2019 California Mechanical Code (CMC), Part 4, Title 24 C.C.R.

3. 2019 California Plumbing Code (CPC), Part 5, Title 24 C.C.R.

4. 2019 California Energy Code, Part 6, Title 24 C.C.R.

5. 2019 California Historical Building Code, Title 24 C.C.R.

6. 2019 California Fire Code, Part 9, Title 24 C.C.R.

7. 2019 California Existing Building Code, Title 24 C.C.R.

8. 2019 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 C.C.R.

9. 2019 California Referenced Standards Code, Part 12, Title 24 C.C.R.

10. Local codes and ordinances.

11. Division of State Architect.

B. Related Sections:

1. Section 260100: Basic Materials and Methods.

2. Section 260533: Conduit

3. Section 260519: Wire and Cable

1.03 SYSTEM REQUIREMENTS

A. Fire detection system shall continually supervise and monitor the following initiating, signaling, and monitoring circuits:

1. Manual fire-pull stations.

2. Smoke and heat detectors, monitor modules, relay modules, etc.

3. Alarm signaling circuits including alarm, horns and visual alarm units.

4. Annunciators.

5. Power supplies and batteries.

6. Voice communications panels.

B. System controls shall be UL listed for power limited applications in accordance with California Electrical Code.

C. The fire alarm devices and equipment shall be listed for installation for the fire alarm control panel to which they are being connected.

D. System labels and devices programming addresses shall be based on actual signage and building labeling as currently exist.

E. The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

F. The facility shall have an emergency voice alarm communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported. Message generator(s) shall be capable of automatically distributing up to eight (8) simultaneous, unique messages to appropriate audio zones within the facility based on the type and location of the initiating event. The Fire Command Center (FCC) shall also support Emergency manual voice announcement capability for both system wide or selected audio zones, and shall include provisions for the system operator to override automatic messages system wide or in selected zones.

G. The system shall be support additional, alternate Fire Command Centers, which shall be capable of simultaneous monitoring of all system events. Alternate Fire Command Centers shall also support an approved method of transferring the control functions to an alternate Fire Command Center when necessary. All Fire Command Centers shall be individually capable of assuming Audio Command functions such as Emergency Paging, audio zone control functions, and Firefighter's Telephone communication functions.

H. Each designated zone shall transmit separate and different alarm, supervisory and trouble signals to the Fire Command Center (FCC) and designated personnel in other buildings at the site via a multiplex communication network.

I. The fire alarm system shall be manufactured by an ISO 9001:2008 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

J. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installion shall be in compliance with the UL listing.

K. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final checkout and to ensure the systems integrity.

L. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).

2. Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.

3. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.

4. Speaker circuits may be controlled by NAC outputs built into the amplifiers, which shall function as addressable points on the Digital Audio Loop.

5. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone whichever is greater.

6. Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.

7. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system. Two-way emergency telephone communication circuits shall be supervised for open and short circuit conditions. Speaker circuits shall be electrically supervised for open and short circuit conditions. If a short circuit exists on a speaker circuit, it shall not be possible to activate that circuit.

8. Audio amplifiers and tone generating equipment shall be electrically supervised for abnormal conditions. Digital amplifiers shall provide built-in speaker circuits, field configurable as four Class B (Style Y), or two Class A (Style Z) circuits.

9. Digital amplifiers shall be capable of storing up to two minutes of digitally recorded audio messages and tones. The digital amplifiers shall also be capable of supervising the connection to the associated digital message generator, and upon loss of that connection shall be capable of one of the following system responses:

    a. The digital amplifier shall automatically broadcast the stored audio message.

    b. The digital amplifier shall switch to a mode where a local bus input on the digital amplifier will accept an input to initiate a broadcast of the stored message. This bus input shall be connected to a NAC on a local FACP for the purpose of providing an alternate means of initiating an emergency message during a communication fault condition.

    c. Speaker circuits shall be either 25 VRMS or 70VRMS. Speaker circuits shall have 20% space capacity for future expansion or increased power output requirements.

    d. Two-way emergency telephone (Fire Fighter Telephone) communication shall be supported between the Audio Command Center and up to seven (7) remote Fire Fighter's Telephone locations simultaneously on a telephone riser.

    e. Means shall be provided to connect FFT voice communications to the speaker circuits in order to allow voice paging over the speaker circuit from a telephone handset.

f. The digital audio message generator shall be of reliable, non-moving parts, and support the digital storage of up to 32 minutes of tones and emergency messages, shall support programming options to string audio segments together to create up to 1000 messages, or to loop messages and parts of messages to repeat for pre-determined cycles or indefinitely.

1.04 CERTIFICATION

A. Certification: Installation of fire alarm system shall not begin until Shop Drawings, including State Fire Marshal listing numbers of fire alarm components, are submitted and reviewed by the Architect. Written certification by fire alarm equipment distributor or manufacturer shall be submitted to the Architect stating that system and its component parts are as approved and listed by the State Fire Marshal, and that the design conforms to requirements set forth in CBC.

1.05 PERFORMANCE

A. System shall be fully programmable, configurable, and expandable in the field without special tools or PROM programmers and shall not require replacement of memory ICs. Installer shall provide a CD of all system installed software, site specific system programming and all information and tools required to re-program or modify the system.

1.06 SYSTEM FUNCTIONAL OPERATION

A. When a fire alarm condition is detected by one of the system alarm initiating devices, the following functions shall occur:

1. System alarm LED shall flash.

2. Local sounding device in panel shall be activated.

3. The LCD display shall indicate type of device, custom label location label and point status alarm condition.

4. Appropriate change of status message shall be transmitted to remote annunciator(s).

5. Automatic programs assigned to alarm point shall be executed and associated indicating devices and relays activated.

6. UDACT (Universal Digital Alarm Communicator Transmitter) shall activate.

B. Trouble and Supervisory Conditions.

1. When any trouble condition is detected the following functions shall occur:

    a. System trouble LED shall flash.

    b. Local sounding device in panel shall be activated.

    c. The LCD display shall indicate the type of trouble and custom label location associated with the trouble condition and its location. Unacknowledged alarm messages shall have priority over trouble messages. If such an alarm is displayed, then trouble messages shall not be displayed.

    d. Appropriate message shall be transmitted to remote annunciators.

    e. UDACT shall activate.

2. When any supervisory condition occurs such as a sprinkler valve tamper, the following function shall occur:

    a. System supervisory LED shall flash.

    b. Local sounding device in panel shall be activated.

    c. Appropriate message shall be transmitted to remote annunciators.

    d. UDACT shall activate.

C. Activation of control panel ACKNOWLEDGE switch in response to a single new alarm, trouble or supervisory condition shall silence panel sounding device and change system alarm, trouble, or supervisory LED from flashing to steady-ON. If additional new alarm, trouble, or supervisory conditions exist in the system; activation of this switch shall advance display to next alarm, trouble, or supervisory condition that exists, and shall not silence local audible device or change LED to steady until new conditions have been so acknowledged. New alarm conditions shall always be displayed before new trouble conditions. Occurrence of a new alarm, trouble, or supervisory condition shall cause panel to resound, and sequences as described above, shall repeat.

D. Activation of the signal silence switch shall cause appropriate notification (indicating) appliances and relays to return to normal condition. Selection of notification appliance circuits and relays silenced by this switch shall be fully programmable.

E. Activation of system reset switch shall cause electronically latched initiating devices or zones, as well as associated output devices and circuits, to return to normal condition after sixty seconds of alarm. If alarm conditions exist in system after system reset switch activation, system shall then re-sound alarm conditions as indicated hereafter.

F. Activation of lamp test switch shall turn on LED indicators, LCD display, and local sounding device in panel, and then return to previous condition.

G. Fire alarm indicating appliances may be silenced, after one minute, by operating signal silence switch at the FACP or by use of key supervised alarm silence switch at remote annunciators. A subsequent zone alarm shall reactivate signals. Fire alarm audible indicating appliances shall be automatically silenced after 4 minutes of operation; visual indicating appliances shall not extinguish at system reset or automatically after 4 minutes of operation. Fire sprinkler flow alarm bells shall not silence until the contacts in the fire sprinkler flow switch return to the normal non-alarm state. Appropriate signage must be installed on or next to the sprinkler alarm bell.

H. Initiation and indicating circuits shall be monitored for open/short circuit and ground fault conditions, these conditions shall be indicated on the Fire Alarm Control Panel and Annunciator displays while remaining circuits continue to operate normally.

I. All notification appliance circuits shall be silenceable for testing purposes by authorized persons. Protected pass-codes, keys, or another secure method that does not require entering into the system programming shall be used.

1.07 POWER REQUIREMENTS

A. The fire alarm control panel and remote power supply shall receive 120 VAC power, 60 Hz, through a dedicated 20 amps circuit. Circuit breaker protection for the dedicated fire alarm power circuits shall be equipped with a handle lock-on device, the breaker handle shall be colored red and labeled “FIRE ALARM”. Clearly label the Electrical panel name, location and circuit number on the inside of the fire alarm control panel and all remote power supplies using a p-touch style labeling system. Transient voltage surge suppression shall be provided at the 120VAC input terminal.

B. System shall be provided with sufficient battery capacity to operate entire system upon loss of normal 120 VAC power, in a normal quiescent mode, for a period of 24 hours with 5 minutes of alarm indication at end of this period for horns and 15 minutes for voice communication system speakers. System shall automatically transfer to standby batteries upon power failure. Battery charging and recharging operations shall be automatic. Batteries, once discharged, shall recharge at a rate to provide a minimum of 70 percent capacity in 12 hours.

C. Circuits requiring system operating power shall be 24 VDC and shall be individually protected at control panel.

1.08 SUBMITTALS

A. Component Plan Submittal: Availability and listing for its application shall be verified for all system components before presentation of the submittal. Include the following information and details as applicable:

1. Installer name, address, telephone number.

2. List of system components, equipment and devices, including manufacturer model numbers, quantity and California State Fire Marshal listing numbers, mounting heights, and symbols.

3. Current copies of manufacturer specification sheets for equipment and devices indicated. Highlight or identify the specific components on Catalog cut sheets.

4. Voltage Drop Calculations: Include the following information for the worst case:

    a. Point-to-point or Ohms law calculations.

    b. Zone used in calculations.

    c. Voltage drop percent. Voltage drop shall not exceed manufacturer's requirements. If voltage drop exceeds 10 percent, indicate manufacturer listed operating voltage ranges for equipment and devices.

    d. Speakers and amplifier calculations.

5. Battery types, amp hours, and load calculations including the following:

    a. Normal operation: 100 percent of applicable devices for 24 hours to equal control panel amps plus list of amps per device that draw power form the panel during standby power condition including, but not limited to, zone modules, detectors and devices as identified.

    b. Alarm condition: 100 percent of voice communication speakers for 15 minutes and 100 percent of horns and bells for 5 minutes to equal control panel amps plus list of amps per device that draw power from panel during alarm condition including, but not limited to, the following:

        (1) Zone modules.
        (2) Signal modules.
        (3) Detectors.
        (4) Signal devices.
        (5) Annunciator.
        (6) Other devices as identified.

    c. Normal operation plus alarm operation load calculation shall include total amp hours required and total amp hours provided.

6. Provide one copy of testing procedures.

B. Shop Drawings: Provide Shop Drawings, in the same size as the design Drawings, Shop Drawings shall include the following:

1. Provide drawing scale, elevations of all system enclosures, and actual layout of the Fire Alarm Control Panel, power supply, annunciator, and all main system components.

2. Site Plan indicating devices and equipment to be monitored or supervised; and main equipment such as control panels, power supplies, annunciators, and components such as outdoor wall-mounted horns, pull boxes, underground pull boxes, wiring routes on buildings exterior and underground locations. In each conduit or raceway run indicate conduit sizes, and quantities and type of wires.

3. Complete battery calculations, and voltage drop calculation shall be included; these calculations shall be based on the devices maximum UL current rating.

4. One line drawing for the entire system network indicating all system components and wiring. The one line diagram shall show but not be limited to panel to panel interconnections, conductors gauge and quantity, conduit size and type (designation) and specific function.

5. System panel one-line drawings indicating the quantity and type (designation) of conductors entering and exiting the fire alarm terminal cabinet in each building (enclosure) for initiating, notification, or other command control functions required for complete system operation:

    a. Individual floor/building plan view drawings indicating all device locations including end of line resistors “EOLR” in accordance with the legend provided.

    b. Individual point addresses for all initiation and notification devices.

    c. Device “typical” wiring diagrams. These drawings shall indicate specific termination details for all peripheral equipment and/or interface devices.

6. Provide interfacing with equipment furnished by others including voltages, and other required coordination items.

7. Each of the pictorial diagrams included shall appear identical to the products they are intended to depict, in order to speed installation of the system, and to enhance the accuracy of the installation Work. Typical wiring diagrams or catalog sheets are not permitted.

8. Background Drawings with device locations of DSA approved drawings are available in electronic format and may be obtained from the Architect. Contractor is solely responsible for the accuracy and completeness of shop drawings. Buildings that are not part of the contract shall be clearly identified “NOT IN CONTRACT”. Shop Drawings shall be prepared in the latest version of AutoCAD.

9. Other installation and coordination drawings specifically related to this section shall be included as follows:

   a. Size A (8-1/2 inch x 11 inches) and size B (11 inch x 17 inch) shall be bound into the manual.

   b. Larger drawings shall be folded and inserted into transparent envelopes and bound into the manual.

10. Installation and coordination drawings for items in other sections shall be included with submittal of Shop Drawings. Submit blue line copies and one reproducible copy of installation and coordination drawings.

C. In addition to the above requirements, provide submittals to meet any additional requirements of DSA.

1.09 QUALITY ASSURANCE

A. Installer shall have successfully completed at least 5 projects of equal scope in the past 5 years, and have been in business of furnishing and installing fire alarm systems of this type for at least 5 years. Installer shall use apprentices with certified Life Safety Blue Card Holders.

B. Installer shall be a factory authorized distributor and service provider for the brand of equipment offered and shall provide documentation to the Architect upon request.

C. Installer shall maintain a fully equipped service organization capable of furnishing repair service to the equipment and shall maintain a spare set of major parts for the system at all times.

D. Installer shall furnish a letter from manufacturer of equipment certifying equipment has been installed according to factory standards and that system is operating properly.

E. Certifications: Installer shall submit certification from the equipment manufacturer indicating that installer is an authorized representative of the equipment manufacturer and is trained on network applications.

F. All materials and equipment installed shall be new except as specifically shown on the drawings.

G. All of the fire alarm equipment, devices and wiring in this specification including control panel, remote power supplies, detectors, modules, horns, strobes, fire alarm wires, etc., shall be furnished and installed by the Authorized Factory Distributor of the equipment. Furnish a letter from the manufacturer of all major equipment, which certifies that the installer is an authorized distributor and that the equipment has been installed according to factory intended practices. Furnish a written guarantee from the manufacturer that they will have a service representative assigned to this area for the life of the equipment. All rough-ins including conduits, boxes, 120-volt power wiring may be installed by an electrician.

H. Contractor/Installer's electricians and fire/life safety technicians shall be certified in accordance with Labor Code sections 3099, and 3099.2, and section 209.0 of the California Code of Regulations.

I. System startup and testing shall be performed under the direct observation of the IOR and OAR. The Contractor at this time shall provide a legible half size reproduction of the original completed fire alarm red-line drawings (this copy will be retained by the Owner), an accurate copy of the fire alarm system points list, and a copy of the construction drawings on CD in AutoCad format,

J. Provide and install the most current software package available at the time of installation. At the time of Owner Acceptance of the installation, all equipment, including any and all updated software which is to include the appropriate operating system, pass-codes, electronic keys and program disks, manuals and cables employed in the installation of the system, shall be delivered to the OAR who will, in turn, forward the items to the District. In addition, when the programming software is available in disk format, a backup copy of the most up to date revision, in disk format, shall be delivered to the OAR at the completion of the project. A software license agreement shall be made available for the responsible Owner representative to sign at the time of training.

1.10 WARRANTY

A. The Fire Alarm Equipment Manufacturer shall provide a 3 year material warranty. Installer shall provide a 3 year labor warranty.

B. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer for a period of 5 years after expiration of the warranty.

PART 2: PRODUCTS

ACCEPTABLE MANUFACTURERS

Fire alarm equipment shall be standard products of the Notifier Co. ONIX Series. Catalog and model numbers listed are intended to establish type and quality of equipment and system design as well as operating features required. Deviations from intended functions of specified system are not permitted. Equipment shall not be ordered or installed until such equipment has been reviewed and approved by the Architect.

2.01 FIRE ALARM CONTROL PANEL (FACP) OR NETWORK NODES

A. Main FACP or network node shall be a NOTIFIER Model NFS2-3030 DVC and shall contain a microprocessor based Central Processing Unit (CPU) and power supply. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. In conjunction with intelligent Loop Control Modules and Loop Expander Modules, the main FACP shall perform the following functions:

1. Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.

2. Supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules.

3. Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed. In the event of CPU failure, all SLC loop modules shall fallback to degrade mode. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated Notification Appliance Circuits.

2.02 SYSTEM CAPACITY AND GENERAL OPERATION

A. The FACP shall be capable of communicating on Noti-Fire-Net over a Local Area Network (LAN) or Wide Area Network (WAN) utilizing a peer-to-peer, inherently regenerative communication format and protocol. The network shall support communication speed up to 100 Mb and support up to 200 panels / nodes per network.

B. The control panel shall be capable of expansion via up to 10 SLC loops. Each module shall support up to 318 analog/addressable devices for a maximum system capacity of 3180 points. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit 640-character liquid crystal display, individual, color coded system status LEDs, and a keypad for the control of the fire alarm system. Said LCD shall also support graphic bit maps capable of displaying the company name and logo of either thpany.

C. All programming or editing of the existing program in the system shall be achieved without interrupting the alarm monitoring functions of the fire alarm control panel.

D. The FACP shall be able to provide the following software and hardware features:

1. Pre-signal and Positive Alarm Sequence: The system shall provide means to cause alarm signals to only sound in specific areas with a delay of the alarm from 60 to up to 180 seconds after start of alarm processing. In addition, a Positive Alarm Sequence selection shall be available that allows a 15-second time period for acknowledging an alarm signal from a fire detection/initiating device. If the alarm is not acknowledged within 15 seconds, all local and remote outputs shall automatically activate immediately.

2. Smoke Detector Pre-alarm Indication at Control Panel: To obtain early warning of incipient or potential fire conditions, the system shall support a programmable option to determine system response to real-time detector sensing values above the programmed setting. Two levels of Pre-alarm indication shall be available at the control panel alert and action.

3. Alert: It shall be possible to set individual smoke detectors for pre-programmed pre-alarm thresholds. If the individual threshold is reached, the pre-alarm condition shall be activated.

4. Action: If programmed for Action and the detector reaches a level exceeding the pre-programmed level, the control panel shall indicate an action condition. Sounder bases installed with either heat or smoke detectors shall automatically activate on action Pre-Alarm level, with general evacuation on Alarm level.

5. The system shall support a detector response time to meet world annunciation requirements of less than 3 seconds.

6. Device Blink Control: Means shall be provided to turn off detector/module LED strobes for special areas.

7. NFPA 72 Smoke Detector Sensitivity Test: The system shall provide an automatic smoke detector test function that meets the sensitivity testing requirements of NFPA 72.

8. Programmable Trouble Reminder: The system shall provide means to automatically initiate a reminder that troubles exist in the system. The reminder will appear on the system display and (if enabled) will sound a piezo alarm.

9. On-line or Off-line programming: The system shall provide means to allow panel programming either through an off-line software utility program away from the panel or while connected and on-line. The system shall also support upload and download of programmed database and panel executive system program to a Personal Computer/laptop. A single change to one CPU database shall not require a database download to other CPUs.

10. History Events: The panel shall maintain a history file of the last 4000 events, each with a time and date stamp. History events shall include all alarms, troubles, operator actions, and programming entries. The control panels shall also maintain a 1000 event Alarm History buffer, which consists of the 1000 most recent alarm events from the 4000 event history file.

11. Smoke Control Modes: The system shall provide means to perform FSCS mode Smoke Control to meet NFPA-92A and 90B and HVAC mode to meet NFPA 90A.

12. The system shall provide means for all SLC devices on any SLC loop to be auto programmed into the system by specific address. The system shall recognize specific device type ID's and associate that ID with the corresponding address of the device.

13. Passwords and Users: The system shall support two password levels, master and user. Up to 9 user passwords shall be available, each of which may be assigned access to the programming change menus, the alter status menus, or both. Only the master password shall allow access to password change screens.

14. Block Acknowledge: The system shall support a block Acknowledge for Trouble Conditions.

15. Sensitivity Adjust: The system shall provide Automatic Detector Sensitivity Adjust based on Occupancy schedules including a Holiday list of up to 15 days.

16. Environmental Drift Control: The system shall provide means for setting Environmental Drift Compensation by device. When a detector accumulates dust in the chamber and reaches an unacceptable level but yet still below the allowed limit, the control panel shall indicate a maintenance alert warning. When the detector accumulates dust in the chamber above the allowed limit, the control panel shall indicate a maintenance urgent warning.

17. Custom Action Messages: The system shall provide means to enter up to 100 custom action messages of up to 160 characters each. It shall be possible to assign any of the 100 messages to any point.

18. Local Mode: If communication is lost to the central processor the system shall provide added survivability through the intelligent loop control modules. Inputs from devices connected to the SLC and loop control modules shall activate outputs on the same loop when the inputs and outputs have been set with point programming to participate in local mode or when the type codes are of the same type: that is, an input with a fire alarm type code shall activate an output with a fire alarm type code.

19. Read status preview - enabled and disabled points: Prior to re-enabling points, the system shall inform the user that a disabled device is in the alarm state. This shall provide notice that the device must be reset before the device is enabled thereby avoiding activation of the notification circuits.

20. Custom Graphics: When fitted with an LCD display, the panel shall permit uploading of a custom bit-mapped graphic to the display screen.

21. Multi-Detector and Cooperating Detectors: The system shall provide means to link one detector with up to two detectors at other addresses on the same loop in cooperative multi-detector sensing. There shall be no requirement for sequential addresses on the detectors and the alarm event shall be a result of all cooperating detectors chamber readings.

22. ACTIVE EVENT: The system shall provide a Type ID called FIRE CONTROL for purposes of air-handling shutdown, which shall be intended to override normal operating automatic functions. Activation of a FIRE CONTROL point shall cause the control panel to (1) initiate the monitor module Control-by-Event, (2) send a message to the panel display, history buffer, installed printer and annunciators, (3) shall not light an indicator at the control panel, (4) Shall display ACTIVE on the LCD as well a display a FIRE CONTROL Type Code and other information specific to the device.

23. NON-FIRE Alarm Module Reporting: A point with a type ID of NON-FIRE 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 a message at the panel LDC. Activation of a NON-FIRE point shall activate control by event logic but shall not cause any indication on the control panel.

24. Mass Notification Override: The system shall be UL 2572 listed for Mass Notification and shall be capable, based on the Risk Analysis, of being programmed so that Mass Notification/Emergency Communications events take precedence over fire alarm events.

25. Security Monitor Points: The system shall provide means to monitor any point as a type security.

26. One-Man Walk Test: The system shall provide both a basic and advanced walk test for testing the entire fire alarm system. The basic walk test shall allow a single operator to run audible tests on the panel. All logic equation automation shall be suspended during the test and while annunciators can be enabled for the test, all shall default to the disabled state. During an advanced walk test, field-supplied output point programming will react to input stimuli such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch the input. The 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.

27. Control By Event Functions: CBE software functions shall provide means to program a variety of output responses based on various initiating events. The control panel shall operate CBE through lists of zones. A zone shall become listed when it is added to a point's zone map through point programming. Each input point such as detector, monitor module or panel circuit module shall support listing of up to 10 zones into its programmed zone map.

28. Permitted zone types shall be general zone, releasing zone and special zone. Each output point (control module, panel circuit module) can support a list of up to 10 zones including general zone, logic zone, releasing zone and trouble zone. It shall be possible for output points to be assigned to list general alarm. Non-Alarm or Supervisory points shall not activate the general alarm zone.

29. 1000 General Zones: The system shall support up to 1000 general purpose software zones for linking inputs to outputs. When an input device activates, any general zone programmed into that device's zone map will be active and any output device that has an active general zone in its map will be active. It shall also be possible to use general zone as arguments in logic equations.

30. 1000 Logic Equations: The system shall support up to 1000 logic equations for AND, OR, NOT, ONLY1, ANYX, XZONE or RANGE operators that allow conditional I/O linking. When any logic equation becomes true, all output points mapped to the logic zone shall activate.

31. 100 trouble equations per device: The system shall provide support for up to 100 trouble equations for each device, which shall permit programming parameters to be altered, based on specific fault conditions. If the trouble equation becomes true, all output points mapped to the trouble zone shall activate.

32. Control-By-Time: A time based logic function shall be available to delay an action for a specific period of time based upon a logic input with tracking feature. A latched version shall also be available. Another version of this shall permit activation on specific days of the week or year with ability to set and restore based on a 24 hour time schedule on any day of the week or year.

33. Multiple agent releasing zones: The system shall support up to 10 releasing zones to protect against 10 independent hazards. Releasing zones shall provide up to three cross-zone and four abort options to satisfy any local jurisdiction requirements.

34. Alarm Verification, by device, with timer and tally: The system shall provide a user-defined global software timer function that can be set for a specific detector. The timer function shall delay an alarm signal for a user-specified time period and the control panel shall ignore the alarm verification timer if another alarm is detected during the verification period. It shall also be possible to set a maximum verification count between 0 and 20 with the "0" setting producing no alarm verification. When the counter exceeds the threshold value entered, a trouble shall be generated to the panel.

E. Network Communication

1. The FACP shall be capable of communicating on Noti-Fire-Net over a Local Area Network (LAN) or Wide Area Network (WAN) utilizing a peer-to-peer, inherently regenerative communication format and protocol. The network shall support communication speed up to 100 Mb and support up to 200 panels/nodes per network.

F. Central Processing Unit

1. The Central Processing Unit shall contain and execute all control-by-event (including Boolean functions including but not limited to AND, OR, NOT, ANYx, and CROSSZONE) programs for specific action to be taken if an alarm condition is detected by the system. Such control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost with system primary and secondary power failure.

2. The Central Processing Unit shall also provide a real-time clock for time annotation, to the second, of all system events. The time-of-day and date shall not be lost if system primary and secondary power supplies fail.

3. The CPU shall be capable of being programmed on site without requiring the use of any external programming equipment. Systems that require the use of external programmers or change of EPROMs are not acceptable.

4. The CPU shall provide an EIA-232 interface between the fire alarm control panel and the UL Listed Electronic Data Processing (EDP) peripherals.

5. The CPU shall provide two EIA-485 ports for the serial connection to annunciation and control subsystem components.

6. The EIA-232 serial output circuit shall be optically isolated to assure protection from earth ground.

G. Display

1. The system display shall provide a 640-character backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide eleven Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM, SECURITY, SUPERVISORY, SYSTEM TROUBLE, OTHER EVENT, SIGNALS SILENCED, POINT DISABLED, CONTROLS ACTIVE, and CPU FAILURE.

2. The system display shall provide a keypad with control capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels with up to ten (one Master and nine User) passwords shall be accessible through the display interface assembly to prevent unauthorized system control or programming.

H. Loop (Signaling Line Circuit) Control Module:

1. The Loop Control Module shall monitor and control a minimum of 318 intelligent addressable devices. This includes 159 intelligent detectors (Ionization, Photoelectric, or Thermal) and 159monitor or control modules.

2. The Loop Control Module shall contain its own microprocessor and shall be capable of operating in a local/degrade mode (any addressable device input shall be capable of activating any or all addressable device outputs) in the unlikely event of a failure in the main CPU.

3. Each Loop shall be capable of operating as a NFPA Style 4 (Class B) circuit.

4. The SLC interface board shall receive analog or digital information from all intelligent detectors and shall process this information to determine whether normal, alarm, or trouble conditions exist for that particular device. Each SLC Loop shall be isolated and equipped to annunciate an Earth Fault condition. The SLC interface board software shall include software to automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information may also be used for automatic detector testing and the automatic determination of detector maintenance requirements.

I. Digital Voice Command Center

1. The Digital Voice Command Center located with the FACP, shall contain all equipment required for all audio control, emergency telephone system control, signaling and supervisory functions. This shall include speaker zone indication and control, telephone circuit indication and control, digital voice units, microphone and main telephone handset.

2. Function: The Voice Command Center equipment shall perform the following functions:

   a. Operate as a supervised multi-channel emergency voice communication system.
   b. Operate as a two-way emergency telephone system control center.

   c. Audibly and visually annunciate the active or trouble condition of every speaker circuit and emergency telephone circuit.

   d. Audibly and visually annunciate any trouble condition for digital tone and voice units required for normal operation of the system.

   e. Provide all-call Emergency Paging activities through activation of a single control switch.

   f. As required, provide vectored paging control to specific audio zones via dedicated control switches.

   g. Provide a factory recorded "library" of voice messages and tones in standard WAV. File format, which may be edited and saved on a PC running a current Windows® operating system.

   h. Provide a software utility capable of off-line programming for the DVC operation and the audio message files. This utility shall support the creation of new programs as well as editing and saving existing program files. Uploading or downloading the DVC shall not inhibit the emergency operation of other nodes on the fire alarm network.

   i. Support an optional mode of operation with four analog audio outputs capable of being used with UL 864 fire-listed analog audio amplifiers and SLC controlled switching.

   j. The Digital Voice Command shall be modular in construction, and shall be capable of being field programmable without requiring the return of any components to the manufacturer and without requiring use of any external computers or other programming equipment.

   k. The Digital Voice Command and associated equipment shall be protected against unusually high voltage surges or line transients.

J. Power Supply:

1. The Main Power Supply shall operate on 120/240 VAC, 50/60 Hz, and shall provide all necessary power for the FACP.

2. The Main Power Supply shall provide the required power to the CPU using a switching 24 VDC regulator and shall incorporate a battery charger for 24 hours of standby power using dual-rate charging techniques for fast battery recharge.

3. The Main Power Supply shall provide a battery charger for 24 hours of standby using dual-rate charging techniques for fast battery recharge. The supply shall be capable of charging batteries ranging in capacity from 7-200 amp-hours within a 48-hour period.

4. The Main Power Supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.

5. The Main Power Supply shall be power-limited per UL864 requirements.

6. The Main Power Supply shall communicate power supply, line voltage, battery status and charger status to the local LCD display. Any abnormal condition shall be annunicated and logged to the system alarm history log.

7. Addressable Field Power Supply. The auxiliary addressable power supply is a remote 24 VDC power supply used to power Notification Devices and field devices that require regulated 24 VDC power. NOTIFIER model FCPS-24S6.

8. The addressable power supply for the fire detection system shall provide up to a minimum of 6.0 amps of 24 volt DC regulated power for Notification Appliance Circuit (NAC) power or 10.0 amps of 24 volt DC general power. The power supply shall have an additional 0.5 amp of 24 VDC auxiliary power for use within the same cabinet as the power supply. It shall include an integral charger designed to charge 12 - 200 amp hour batteries.

9. The addressable power supply shall provide four individually addressable Notification Appliance Circuits that may be configured as Class "A" or Class "B" circuits. All circuits shall be power-limited per UL 864 requirements.

10. The addressable power supply shall provide built-in synchronization for certain Notification Appliances on each circuit without the need for additional synchronization modules. The power supply's output circuits shall be individually selected for synchronization. A single addressable power supply shall be capable of supporting both synchronized and non-synchronized Notification Devices at the same time.

11. The addressable power supply shall operate on 120 or 240 VAC, 50/60 Hz.

12. The interface to the power supply from the Fire Alarm Control Panel (FACP) shall be via the Signaling Line Circuit (SLC) or other multiplexed means Power supplies that do not use an intelligent interface are not suitable substitutes. The required wiring from the FACP to the addressable power supply shall be a single unshielded twisted pair wire.

13. The addressable power supply shall supervise for battery charging failure, AC power loss, power brownout, battery failure, NAC loss, and optional ground fault detection. In the event of a trouble condition, the addressable power supply shall report the incident and the applicable address to the FACP via the SLC.

14. The addressable power supply shall have an AC Power Loss Delay option. If this option is utilized and the addressable power supply experiences an AC power loss, reporting of the incident to the FACP will be delayed. A delay time of zero, two, eight or sixteen hours shall be programmable.

15. The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be programmable.

16. The addressable power supply mounts in either the FACP backbox or it's own dedicated surface mounted backbox with cover.

17. Each of the power supply's four output circuits shall be programmed- for Notification Appliance Circuit or General Purpose 24 VDC power. Any output circuit shall be able to provide up to 2.5 amps of 24 VDC power.

18. The addressable power supply's output circuits shall be individually supervised when they are selected to be either a Notification Appliance Circuit when wired Class "A" or by the use of and end-of-line resistor. When the power supply's output circuit is selected as General 24 VDC power, the circuit shall be individually supervised when an end-of-line relay is used.

19. When selected for Notification Appliance Circuits, the output circuits shall be individually programmable for Steady, March Time, Dual Stage or Temporal.

20. When selected as a Notification Appliance Circuit, the output circuits of the addressable power supply shall have the option to be coded by the use of a universal zone coder.

21. The addressable power supply shall interface and synchronize with other power supplies of the same type. The required wiring to interface multiple addressable power supplies shall be a single unshielded, twisted pair wire.

22. An individual or multiple interfaced addressable power supplies shall have the option to use an external charger for battery charging. Interfaced power supplies shall have the option to share backup battery power.

K. Audio Amplifiers

1. The Audio Amplifiers will provide Audio Power for distribution to speaker circuits.

2. Multiple audio amplifiers may be mounted in a single enclosure, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).

3. The audio amplifier shall include an integral power supply, and shall provide built-in LED indicators for the following conditions:

   a. Earth Fault on DAP A (Digital Audio Port A)
   b. Earth Fault on DAP B (Digital Audio Port B)
   c. Audio Amplifier Failure Detected Trouble
   d. Active Alarm Bus input
   e. Audio Detected on Aux Input A
   f. Audio Detected on Aux Input B
   g. Audio Detected on Firefighter's Telephone Riser
   h. Receiving Audio from digital audio riser
   i. Short circuit on speaker circuit 1
   j. Short circuit on speaker circuit 2
   k. Short circuit on speaker circuit 3
   l. Short circuit on speaker circuit 4
   m. Data Transmitted on DAP A
   n. Data Received on DAP A
   o. Data Transmitted on DAP B
   p. Data Received on DAP B
   q. Board failure
   r. Active fiber optic media connection on port A (fiber optic media applications)
   s. Active fiber optic media connection on port B (fiber optic media applications)
   t. Power supply Earth Fault
   u. Power supply 5V present
   v. Power supply conditions - Brownout, High Battery, Low Battery, Charger Trouble

4. The audio amplifier shall provide the following built-in controls:

   a. Amplifier Address Selection Switches
   b. Signal Silence of communication loss annunciation Reset
   c. Level adjustment for background music
   d. Enable/Disable for Earth Fault detection on DAP A
   e. Enable/Disable for Earth Fault detection on DAP A
   f. Switch for 2-wire/4-wire FFT riser

5. Adjustment of the correct audio level for the amplifier shall not require any special tools or test equipment.

6. Includes audio input and amplified output supervision, back up input, and automatic switch over function, (if primary amplifier should fail).

7. System shall be capable of backing up digital amplifiers.

8. One-to-one backup shall be provided by either a plug-in amplifier card or a designated backup amplifier of identical model as the primary amplifier.

9. One designated backup amplifier shall be capable of backing up multiple primary amplifiers mounted in the same or adjacent cabinets.

10. Multi-channel operation from a single amplifier shall be supported by the addition of an optional plug-in amplifier card.

L. Audio Message Generator (Prerecorded Voice)/Speaker Control:

1. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a prerecorded voice message to all speakers in the building.

2. Actuation of any alarm initiating device shall cause a prerecorded message to sound over the speakers. The message shall be repeated four (4) times. Pre- and post-message tones shall be supported.

3. A built-in microphone shall be provided to allow paging through speaker circuits.

4. System paging from emergency telephone circuits shall be supported.

5. The audio message generator shall have the following indicators and controls to allow for proper operator understanding and control:

a. Lamp Test
b. Trouble
c. Off-Line Trouble
d. Microphone Trouble
e. Phone Trouble
f. Busy/Wait
g. Page Inhibited
h. Pre/Post Announcement Tone

M. Controls with associated LED Indicators:

1. Speaker Switches/Indicators

a. The speaker circuit control switches/indicators shall include visual indication of active and trouble status for each speaker circuit in the system.

b. The speaker circuit control panel shall include switches to manually activate or deactivate each speaker circuit in the system.\

2. Emergency Two-Way Telephone Control Switches/Indicators

a. The emergency telephone circuit control panel shall include visual indication of active and trouble status for each telephone circuit in the system.
b. The telephone circuit control panel shall include switches to manually activate or deactivate each telephone circuit in the system.

N. Remote Transmissions:

1. Provide local energy or polarity reversal or trip circuits as required.

2. The system shall be capable of operating a polarity reversal or local energy or fire alarm transmitter for automatically transmitting fire information to the fire department.

3. Provide capability and equipment for transmission of zone alarm and trouble signals to remote operator's terminals, system printers and annunciators.

4. Transmitters shall be compatible with the systems and equipment they are connected to such as timing, operation and other required features.

O. Field Programming

1. The system shall be programmable, configurable and expandable in the field without the need for special tools, laptop computers, or other electronic interface equipment. There shall be no firmware changes required to field modify the system time, point information, equations, or annunciator programming/information.

2. All field defined programs shall be stored in non-volatile memory.

P. Specific System Operations

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.

2. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 0 to 60 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.

Q. System Point Operations:

1. Any addressable device in the system shall have the capability to be enabled or disabled through the system keypad or video terminal.

2. System output points shall be capable of being turned on or off from the system keypad or the video terminal.

3. Point Read: The system shall be able to display the following point status diagnostic functions without the need for peripheral equipment. Each point shall be annunciated for the parameters listed:

   a. Device Status.
   b. Device Type.
   c. Custom Device Label.
   d. Software Zone Label.
   e. Device Zone Assignments.
   f. Analog Detector Sensitivity.
   g. All Program Parameters.

4. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 4000 system events. Each of these events will be stored, with time and date stamp, until an operator requests that the contents be either displayed or printed. The contents of the history buffer may be manually reviewed; one event at a time, and the actual number of activations may also be displayed and or printed. History events shall include all alarms, troubles, operator actions, and programming entries.

5. The history buffer shall use non-volatile memory. Systems which use volatile memory for history storage are not acceptable.

6. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent system detector and shall analyze the detector responses over a period of time.

7. If any intelligent detector in the system responds with a reading that is below or above normal limits, then the system will enter the trouble mode, and the particular Intelligent Detector will be annunciated on the system display, and printed on the optional system printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

8. The system shall include the ability (programmable) to indicate a "pre-alarm" condition. This will be used to alert maintenance personal when a detector is at 80% of its alarm threshold in a 60 second period.

2.04 SYSTEM COMPONENTS

A. Universal Digital Alarm Communicator Transmitter (UDACT). The UDACT is an interface for communicating digital information between a fire alarm control panel and an UL-Listed central station.

1. The UDACT shall be compact in size, mounting in a standard module position of the fire alarm control cabinet. Optionally, the UDACT shall have the ability for remote mounting, up to 6,000 feet from the fire alarm control panel. The wire connections between the UDACT and the control panel shall be supervised with one pair for power and one pair for multiplexed communication of overall system status. Systems that utilize relay contact closures are not acceptable.

2. The UDACT shall include connections for dual telephone lines (with voltage detect), per UL/NFPA/FCC requirements. It shall include the ability for split reporting of panel events up to two different telephone numbers.

3. The UDACT shall be capable of transmitting events in 4+2, SIA, and Contact ID.

4. Communication shall include vital system status such as:

a. Independent Zone (Alarm, trouble, non-alarm, supervisory)
b. Independent Addressable Device Status
c. AC (Mains) Power Loss
d. Low Battery and Earth Fault
e. System Off Normal
f. 12 and 24 Hour Test Signal
g. Abnormal Test Signal (per UL requirements)
h. EIA-485 Communications Failure
i. Phone Line Failure

5. The UDACT shall support independent zone/point reporting when used in the Contact ID format. In this format the UDACT shall support transmission of up to 3,064 points. This enables the central station to have exact details concerning the origin of the fire or response emergency.

6. The UDACT shall be capable of being programmed with the same programming utility as the host FACP, and saved, edited and uploaded and downloaded using the utility. UDACT shall be capable of being programmed online or offline. The programming utility shall also support upgrading UDACT operating firmware.

7. The UDACT shall be capable of generating Central Station reports providing detailed programming information for each point along with the central station point address.

8. An IP or IP/GSM Communicator option shall be provided to interface to the UDACT and be capable of transmitting signals over the internet/intranet or Cellular (GSM) network to a compatible receiver.

2.05 GATEWAY & WEBSERVER OPTIONS

A. Webserver: The system shall support a webserver allowing remote connection via the Internet or Intranet. Authorized users will have the ability to view panel/network history, event status and device properties. The webserver shall also support sending event information via email or text to up to 50 registered users, the webserver shall be available from the fire alarm control panel manufacturer.

B. Web Portal Interface: The system shall be capable of being interfaced with a web portal to integrate with Inspection and Service Manager utilities. The web portal and inspection and service manager utilities shall be available fr om the fire alarm control panel manufacturer.

2.06 ADDRESSABLE DEVICES – GENERAL

A. Addressable devices shall provide an address-setting means using rotary decimal switches. Addressable devices that require the address be programmed using a programming utility are not an allowable substitute.

B. Addressable devices shall use simple to install and maintain decade, decimal address switches. Devices shall be capable of being set to an address in a range of 001 to 159.

C. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute. Addressable devices that require the address be programmed using a special tool or programming utility are not an allowable substitute.

D. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute. Addressable devices that require the address be programmed using a special tool or programming utility are not an allowable substitute.

E. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.

F. Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.

G. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust sensitivity.

H. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72.

I. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications. The system shall also support an intelligent programmable sounder base, the programmable sounder base shall be capable of providing multiple tones based on programming and at a minimum be capable of providing a Temp-4 tone for CO (Carbon Monoxide) activation and a Temp-3 tone for fire activations and be capable of being synchronized with other programmable sounder bases and common area notification appliances; 85 DBA minimum.

J. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).

K. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.

L. Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.

M. A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.

N. Addressable modules shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. An optional surface mount Lexan enclosure shall be available.

2.07 PERIPHERAL DEVICES AND EQUIPMENT

A. Manual Stations: Interior Use: Station shall be Notifier, addressable semi-flush, non-breakable glass type. Station housing shall be fabricated of die-cast aluminum with reset lock and key.

B. Smoke Detectors: Smoke Detectors shall be Notifier Model No. FAPT-851 addressable smoke detectors. Provide base Model No. B710LP. Detector shall be microprocessor based, using a combination of photoelectric, and thermal sensing technologies. The smoke detector shall have its loop number and electronic address permanently and clearly labeled onto the device base using a p-touch type labeling system. The label shall be visible without removing the detector head.

C. Automatic Heat Detectors shall be combination rate-of-rise and fixed-temperature type. When fixed-temperature portion is activated, units shall provide visual evidence of such operation (LED). Addressable Heat detectors shall be Notifier Model No. FST-851R or equal. Provide base Model No. B-710LP. The location of the heat detector must be clearly marked below the ceiling and the detector must be readily accessible. The heat detector shall have its electronic address permanently and clearly labeled onto the device and be readily accessible. For spaces where the normal ambient temperature can reach temperatures as high as 150^0 F. such as in attic spaces, use Notifier FST-851H with base B-710LP. The heat detector shall have its loop number and electronic address permanently and clearly labeled onto the device using a p-touch labeling system. The label shall be visible without removing the detector head.

D. Monitor Modules:

1. Monitor module shall be Notifier Model No. FMM-1 or equal. Module shall connect a supervised zone of conventional initiating devices, N.O. dry contact devices, including 4-wire smoke detectors, to one of SLC loops. Monitor module shall install in a 4-inch square by 2-1/8 inch deep electrical box. The module shall have its loop number, electronic address, and function label on the front cover using a P-Touch type labeling system.

2. Monitor module shall provide address-setting means using rotary decimal switches and shall store an internal type of device. An LED shall be provided which shall flash under normal conditions indicating that monitor module is operational and in regular communication with control panel.

E. Control Modules:

1. Control module shall be Notifier Model No. FCM-1 or equal. Module shall be used to connect a conventional indicating appliance or MR type isolation relay to one of the SLC loops. Control module shall install in a standard 4-inch square by 2-1/8 inches deep electrical box. Audio/visual/relay power shall be provided by a separate loop from main control panel or from supervised remote power supplies. The module shall have its loop number, electronic address, and function label on the front cover using a p-Touch type labeling system. Provide and install System Sensor Model A77-716B or equal power supervision relay to monitor 24 volt DC power.

2. Control module shall provide address-setting means using rotary decimal switches and shall store an internal identifying code which control panel shall use to identify type of device. An LED shall be provided which shall flash under normal conditions, indicating that control module is operational and in regular communication with control panel.

F. Relay Modules:

1. Relay Module shall be Notifier FRM-1 the module shall provide as a minimum one set of form “C” dry contacts and have its loop number, electronic address, and function labeled on the front cover using a P-Touch type labeling system.

2. Provide and installed a buffer relay that is part of the control system if controlled circuit(s) exceeds the voltage or current rating of the relay module.

G. Isolator Modules:

1. Isolator module shall be Notifier, Model No. ISO-X or equal. Module shall isolate wire-to-wire circuits on an SLC loop in order to limit number of other modules or detectors that are incapacitated by short circuit fault. If a wire-to-wire short occurs, isolator shall automatically open-circuit SLC loop. When short is corrected, isolators shall automatically reconnect isolated section of SLC loop.

2. Isolator module shall not require address setting, although isolators will electrically reduce capacity of loop by 2 detectors or module addresses. Isolator module will install in a standard 4-inch deep electrical box. It shall include a single LED that shall flash to indicate that isolator is operational and shall illuminate steadily to indicate that a short has been detected and isolated.

H. Strobes: All strobes shall be products of the same manufacturer. In order to establish a standard of quality.

1. Strobe indicating appliances shall be System Sensors, wall or ceiling mounted units as shown on the drawings, standard candela output or high candela output. Devices shall be UL listed. Entire unit shall be red finish. Strobe light shall have a clear Lexan lens. Strobes shall meet ADA and UL 1971 requirements. The strobe shall provide a selectable minimum light intensity of 15, 30, 60, 75, 90, 110, 135, 150, or 185 Candela as indicated on the Drawings to meet or exceed requirements of ADA and UL 1971. Strobes shall be mounted on manufacturer recommended outlet boxes.
2. Strobe synchronization modules shall be System Sensors or equal, to be installed in conjunction with two or more strobes located in same room or corridor or as indicated on Drawings. (Strobe synchronization modules must be compatible with installed strobes).

I. Serially Connected Remote Annunciator

1. The annunciator shall communicate to the fire alarm control panel via an EIA 485 (multi-drop) two-wire communications loop. The system shall support two 6,000 ft. EIA-485 wire runs. Up to 32 annunciators, each configured up to 96 points, may be connected to the connection, for a system capacity of 3,072 points of annunciation.

2. An EIA-485 repeater shall be available to extend the EIA-485 wire distance in 3,000 ft. increments. The repeater shall be UL864 approved.

3. Each annunciator shall provide up to 96 alarm and 97 trouble indications using a long-life programmable color LED's. Up to 96 control switches shall also be available for the control of Fire Alarm Control Panel functions. The annunciator will also have an "ON-LINE" LED, local piezo sounder, local acknowledge and lamp test switch, and custom zone/function identification labels.

4. Annunciator switches may be programmed for System control such as, Global Acknowledge, Global Signal Silence, Global System Reset, and on/off control of any control point in the system.

5. An optional module shall be available to utilize annunciator points to drive EIA-485 driven relays. This shall extend the system point capacity by 3,072 remote contacts.

6. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.

7. Annunciator shall have a microphone.

J. SpectrAlert Advance Speakers

1. The Speaker appliance shall be System Sensor SpectrAlert Advance. The speaker shall be listed to UL 1480 for Fire Protective Signaling Systems. It shall be a dual-voltage transformer speaker capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F. It shall mount to a 4 x 4 x 2 1/8-inch back box.

2. A universal mounting plate shall be used for mounting ceiling and wall speaker products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate.

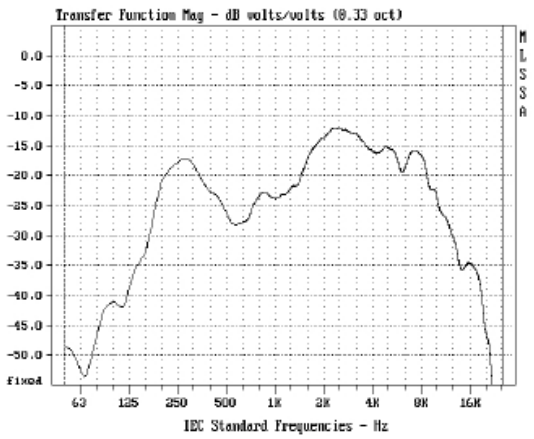
3. Speakers shall be plug-in and shall have the ability to check wiring continuity via a shorting spring on the universal mounting plate. The shorting spring shall also provide tamper resistance via an open circuit if the device is removed. Speaker design shall isolate speaker components to reduce ground fault incidents.

4. The speaker shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models shall have a maximum sound output of 86 dB at 10 feet and shall incorporate an open back construction.

5. All notification appliances shall be backward compatible.

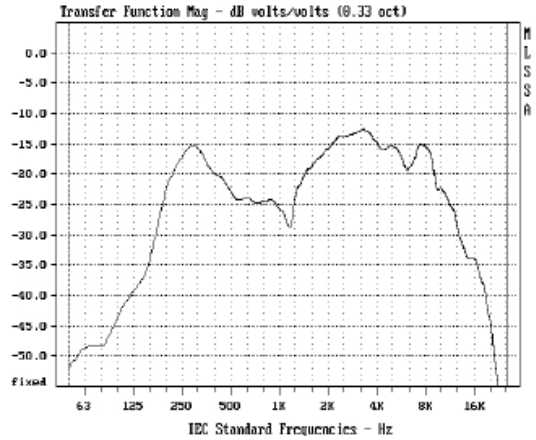
Ceiling Speaker

Wide Band Frequency Response



Wall Speaker

Wide Band Frequency Response



Note: The wide band frequency response is derived using MLS methods

K. SpectrAlert Advance Speaker Strobes

1. The Speaker Strobe appliance shall be System Sensor SpectrAlert Advance Speaker Strobe. The speaker strobe shall be listed to UL 1971 and UL 1480 and be approved for fire protective signaling systems. It shall be a dual-voltage transformer speaker strobe capable of operation at 25.0 or 70.7 nominal Vrms. The speaker shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature between 32°F and 120°F. It shall mount to a 4 x 4 x 2 1/8-inch back box.

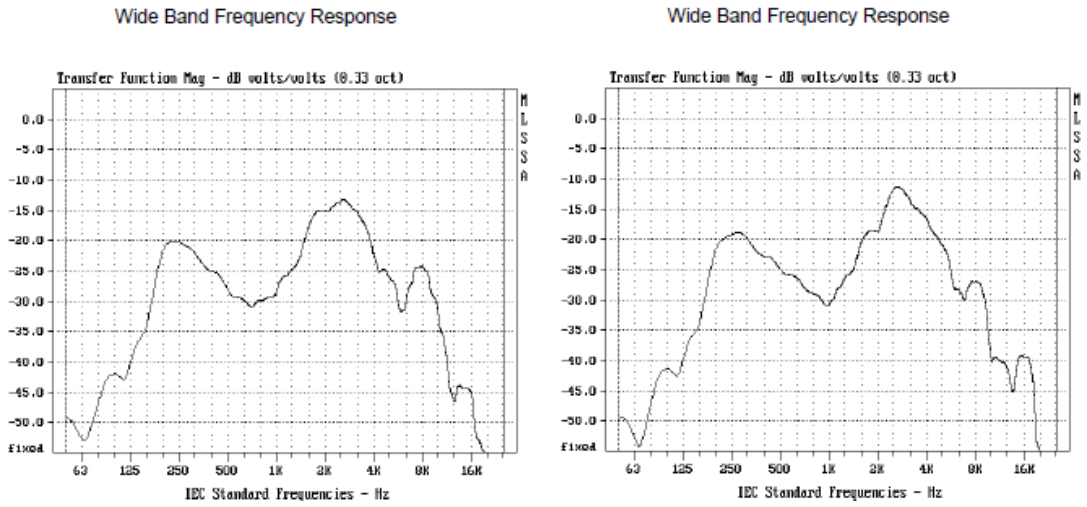
2. A universal mounting plate shall be used for mounting ceiling and wall speaker strobe products. The notification appliance circuit and amplifier wiring shall terminate at the universal mounting plate. Also, SpectrAlert Advance speaker strobes and the Sync•Circuit™ Module MDL3 accessory, if used, shall be powered from a non-coded notification appliance circuit output and shall operate on a nominal 12 or 24 volts (includes fire alarm panels with built in sync). When used with the Sync•Circuit Module MDL3, 12-volt rated notification appliance circuit outputs shall operate between 8.5 and 17.5 volts; 24-volt rated notification appliance circuit outputs shall operate between 16.5 to 33 volts. If the notification appliances are not UL 9th edition listed with the corresponding panel or power supply being used, then refer to the compatibility listing of the panel to determine maximum devices on a circuit.

3. Speaker strobes shall be plug-in and shall have the ability to check wiring continuity via a shorting spring on the universal mounting plate. The shorting spring shall also provide tamper resistance via an open circuit if the device is removed. Speaker strobe design shall isolate speaker components to reduce ground fault incidents.

4. The speaker strobe shall have power taps (from ¼ watt to 2 watts) and voltage that are selected by rotary switches. All models shall have a maximum sound output of 86 dB at 10 feet and shall incorporate an open back construction. The strobe shall consist of a xenon flash tube with associated lens/reflector system and operate on either 12V or 24V. The strobe shall also feature selectable candela output, providing options for 15 or 15/75 candela when operating on 12V and 15, 15/75, 30, 75, 110, or 115 when operating on 24V. The strobe shall comply with NFPA 72 and the Americans with Disabilities Act requirement for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range.

5. All notification appliances shall be backward compatible.

Ceiling Speaker Strobe Wall Speaker Strobe



Note: The wide band frequency response is derived using MLS methods

6. Strobe lights shall meet the requirements of the ADA, UL Standard 1971and be fully synchronized.

PART 3: EXECUTION

3.01 GENERAL

A. Fire alarm system shall not be used for any purpose other than fire alarm functions.

3.02 SYSTEM INSTALLATION

A. Installation shall confirm but not limited to CFC Section 907.7 through 907.7.5.2 and NFPA 72.

B. Install required conductors to devices indicated on Drawings. Provide required conductor terminations to devices for a complete system to function as specified and indicated on Drawings. Refer to Section 260519: Wire and Cable, for installation and color coding requirements.

C. Splices are not allowed in junction boxes. Terminations shall be in terminal cabinets or on equipment terminals. There shall not be any splicing in underground boxes, no exception.

D. Conductors shall be installed within conduits, boxes, and terminal cabinets in a totally enclosed installation. Furnish and install conductors required to connect incoming and outgoing circuits, including spare conductors, to terminal strips within terminal cabinets.

E. Wiring within equipment and terminal cabinets shall be installed to conform to contract documentation and NFPA 72 standards, and shall be terminated on terminal blocks having terminals for required connections. Wiring shall be cabled, laced, and securely fastened in place so that no weight is imposed on equipment or terminals.

F. Install required terminal blocks within terminal cabinets. Terminal blocks shall be installed on inside back of cabinets only, not on side. Incoming wiring shall be terminated on the left side of terminal blocks; outgoing wiring shall be terminated on the right side of the terminal blocks.

G. Conductors shall be color-coded per specification section 260519 Low Voltage wires and tagged with code markers at terminal cabinets, and equipment. A wire index shall be typed and installed on terminal cabinet doors. Index shall be covered with clear plastic adhesive covers. Wiring shall be identified as to building and location of devices in the index.

H. Wiring within equipment and terminal cabinets shall be carefully strapped, and shall be formed in rectangular configuration. Wires shall be properly numbered in numerical order and shall maintain same number throughout the Project site.

I. Complete installation shall comply with local building codes and applicable provisions of the California Electrical Code, California Fire Code and the NFPA 72 National Fire Alarm Code.

J. Location of outlet boxes and equipment on Drawings is approximate, unless dimensions are indicated. Do not scale Drawings to determine locations and routing of conduits and outlet boxes. Location of outlet boxes and equipment shall conform to architectural features of the building and other Work already in place, and must be ascertained in the field before the start of Work.

K. Drawings generally indicate Work to be provided, but do not indicate all bends, transitions or special fittings required to clear beams, girders or other Work already in place. Investigate conditions where conduits are to be installed, and furnish and install required fittings.

L. Provide p-touch label of approximately 1 inch wide with red lettering for each initiating device that is hidden from view. Tags shall indicate the name and type of device: Heat Detector, or Duct Smoke Detector. Tags shall be permanently attached on access panel or t-bar grid which is used to access a hidden device.

M. Provide and install adjacent to each annunciator a neatly drawn site map showing all rooms with designations and buildings with names as programmed into the system. This map shall be sized to allow (normal vision) reading of the designations, names etc. A map so reduced in size to the point of not being readable will not be acceptable. This map shall include symbols indicating the locations of all installed fire sprinkler flow switches, riser shut off valves, post indicating valves and manual pull stations. Provide a symbol list on the map for the symbols used. The site map shall be placed into a suitably sized dark colored wood or metal frame with a glass document face cover. The frame shall be attached to the wall with a minimum of two screws into the wall material with the appropriate anchors.

3.03 SYSTEM OPERATION

A. Unless otherwise specified, but not limited to actuation of manual stations, smoke detectors, heat detectors, linear heat or smoke detectors, or water-flow switches shall cause the following operations to occur:

1. Activate audible circuits.

2. Actuate strobe units until the panel is reset or strobe circuit time-out.

3. UL listed central station shall be notified via – Universal Digital Alarm Communicator Transmitter (UDACT).

3.04 TESTING

A. A 48 hour notice shall be provided to the IOR before final testing.

B. Testing of fire detection system shall be as required by CFC 901.2.1 (Prior to request testing from Local Fire) and by the State Fire Marshal and local authorities having jurisdiction. Installer is responsible for identifying required testing, coordinating, scheduling, and conducting tests before Substantial Completion. Tests shall include the following:

1. Operation of all signal-initiating devices (smoke detectors, heat detectors, pull stations etc.).

2. Operation of all indicating devices (speakers and alarm strobes).

3. Operation of all system features under normal operation.

4. Operation of all system supervisory features.

5. Operation of all system features on standby power, with primary power turned off.

6. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

7. Open initiating device circuits and verify that trouble signal actuates.

8. Open signaling line circuits and verify that trouble signal actuates.

9. Open and short notification appliance circuits and verify that trouble signal actuates.

10. Open and short (wire only) network communications and verify that trouble signals are received at network annunciators or reporting terminals.

11. Ground initiating device circuits and verify response of trouble signals.

12. Ground signaling line circuit and verify response of trouble signals.

13. Ground notification appliance circuit and verify response of trouble signals.

14. Check alert tone to alarm notification devices.

15. Check installation, supervision, and operation of intelligent smoke detectors.

16. Alarm conditions that the system is required to detect shall be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

17. When the system is equipped with optional features, consult the manufacturer manual to determine proper testing procedures.

C. Upon completion of installation of fire alarm equipment, provide to the OAR a signed, written statement confirming that fire alarm equipment was installed in accordance with the Specifications, Shop Drawings, instructions and directions provided by the manufacturer.

D. Demonstrate in presence of the IOR that circuit and wiring tests are free of shorts and grounds and that installation performs as specified herein and within manufacturer's guidelines.

E. Software Modifications:

1. Provide the services of a factory trained and authorized technician to perform system software modification, upgrades or changes. Response time of the technician to the Project site shall not exceed 24 hours.

2. Provide hardware, software, programming tools, and documentation necessary to modify the fire alarm network on the Project site. Modification includes: addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modification on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being provided.

F. Complete the inspection and testing form as required by CFC / 907.9 and NFPA 72, and submit one copy of the completed form to the Architect and IOR.

3.05 OPERATING/SERVICE MANUALS

A. Deliver to OAR, 3 copies of service manuals including the following:

1. Installation manuals, programming manuals and user manual if applicable for every control panel, control panel power supply, FACP input/output/relay or control module, auxiliary power supply, UDACT, remote NAC extender power supply, door holder power supplies, all installed annunciators, initiating and indicating devices and all addressable monitor, relay and control modules. Catalog cut sheets are not acceptable.

2. A printed copy of the system configuration as programmed, including all system labeling codes, and passwords.

3. An electronic copy on compact disk of the system configuration program

4. Final test report.

5. Detailed explanation of the operation of the system.

6. Instructions for routine maintenance.

7. Detailed wiring diagram for the connection of relays, addressable monitor, control or relay modules as applied in the interfacing of peripheral systems or equipment to the fire alarm system.

8. An electronic copy (CD) of the posted site/fire alarm map in Auto-Cad and pdf formats.

9. A single reproducible set of record drawings reflecting the system exactly as it was installed including exact location of components.

10. Provide codes and passwords for fire alarm system at testing.

3.06 SYSTEM USER AND MAINTENANCE PERSONNEL TRAINING

A. Before Substantial Completion, provide one instruction period for the Project site based Owner operators and system users.

1. The instruction period shall be scheduled and coordinated by the OAR.

3.07 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.08 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION

SECTION 311000
SITE CLEARING

1.0 GENERAL

1.01 SUMMARY

A. This Section requires the selective removal and subsequent off-site disposal of the following:

1. Removal and offsite disposal of grass and root mat.

2. Demolition of asphalt concrete and pavements as indicated on the drawings to straight, neatly saw cut surface.

3. All other removals which may or may not been shown on plans as required for the project construction.

1.02 SITE CONDITIONS

A. Protections: Contractor shall provide temporary barricades and other forms of protection to protect general public from injury due to demolition work.

B. Traffic: Conduct demolition operations and debris removal to ensure minimum interference with roads, streets, walks, bike paths, and other adjacent occupied or used facilities. Access must be coordinated with District's Representative.

C. Utility Services: Maintain all existing utilities to remain in service and protect them against damage during demolition operations.

D. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations and County Air Pollution Control District pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as flooding and pollution.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (Green Book), latest edition.

2.0 PRODUCTS (NOT APPLICABLE)

3.0 EXECUTION

3.01 DEMOLITION

A. General: Perform demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with governing regulations.

B. Provide services for effective air and water pollution controls as required by County Air Pollution Control District regulations.

C. Prior to commencing grading operations, soil containing debris, organics, pavement, or other unsuitable materials, shall be stripped from the foundation and pavement areas. Demolition areas shall be cleared of old foundations, slabs, abandoned utilities, tree roots, and soil disturbed during the demolition process. Depressions or disturbed areas left from the removal of such material shall be replaced with compacted fill under observation by the Geotechnical representative.

3.02 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from Project site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose of off site.

B. If hazardous materials are encountered during demolition operations, contact District's Representative.

C. Burning of removed materials is not permitted on project site.

3.03 HAZARDOUS MATERIALS

A. Except as otherwise specified, in the event Contractor encounters on the Project site material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), or other hazardous materials which have not been rendered harmless, Contractor shall immediately stop Work in the area affected and report the condition to the District's Representative in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Contractor if in fact the material is asbestos, PCB, or other hazardous materials and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos, PCB, or other hazardous materials, or when such materials have been rendered harmless.

B. Construction involving asbestos cement (transite) pipe shall be performed by qualified personnel in accordance with the standards and specifications set forth by American Water Works Association (AWWA), the Occupational Safety and Health Act (OSHA) and the Environmental Protection Agency (EPA), as well as location jurisdictional codes.

3.04 CLEANUP AND REPAIR

A. General: Upon completion of demolition work, remove tools, equipment and demolished materials from site.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to existing condition prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by demolition work.

END OF SECTION

SECTION 312000
EARTHWORK

1.00 GENERAL

1.01 SUMMARY

A. Section includes: Excavation, Compaction and Fill.

1.02 REFERENCE

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Geotechnical Engineering and Geohazards Report, Southern Kern Unified School District Rosamond High School Cafeteria Project, dated June 14, 2022, File No. 300234-002, Doc. No. 22-06-705 prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork in compliance with applicable requirements of governing authorities having jurisdiction.

1. Standard Specifications for Public Works Construction (SSPWC), latest edition.

2. CAL/OSHA Construction Safety Order Requirements.

B. Soil Testing Service

1. The District will engage a soil testing service to include testing soil materials proposed for use in the Work and for quality control testing during grading operations.

2. Samples of materials shall be furnished to the testing service by the Contractor at least one week before their anticipated use.

3. Work for this Section includes smoothing out areas for density tests and otherwise facilitate testing work, as directed.

4. Shoring Systems: Pre-engineered systems, clearly labeled as such, may be used. Refer to the Geotechnical Study for further requirements.

1.04 PROJECT CONDITIONS

A. The Contractor shall visit the site and familiarize himself with existing site conditions.

B. Additional test borings and other exploratory operations may be made by the Contractor at no cost or liability to the District.

C. Existing Utilities:

1. Where uncharted or incorrectly charted piping or other utilities are encountered during excavation, consult District 's Representative immediately for directions. Cooperate with the District's Representative in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the District's Representative at no cost to the District. Disturbed trench sections shall be replaced in kind.

2. Contractor to coordinate with the District 's Representative to obtain all required permits and schedule inspections.

D. Protection of Subgrade: Do not allow equipment to pump, rut, or disturb subgrade, stripped areas, or other areas prepared for Project.

E. Contractor shall implement measures to prevent soil erosion, and where possible, sediment shall be retained onsite.

F. Contractor shall implement all necessary recommendations contained in the Geotechnical Study.

2.00 PRODUCTS (Not Applicable)

3.00 EXECUTION

3.01 SITE PREPARATION

A. General:

1. Remove vegetation, improvements, or obstructions interfering with installation of new construction. Transport and legally dispose of off site. Removal includes stumps and roots. Contractor shall utilize the best construction method to minimize the erosive effect from the removal of site vegetation.

2. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction. Paint cuts over one inch in size with tree pruning compound. Care shall be taken so as not to scar any area of the tree's bark.

3. In order to protect from sediment transfer or contamination from urban run-off during construction, the following grading and erosion control practices shall be followed:

a. If grading occurs during the rainy season (November through April), sediment traps, barriers, covers or other methods shall be used to reduce erosion and sedimentation.

b. Excavated materials shall not be deposited or stored where the material can be washed away by high water or storm run-off.

c. Grading operations on site shall be conducted so as to prevent damaging effects of sediment production and dust on the site and on adjoining properties.

d. When vegetation has to be removed on site, the methods shall be one that minimizes the erosive effects from the removal.

e. Exposure of soil to erosion by removing vegetation shall be limited to the area required for construction operations. The construction area shall be fenced to define the project.

f. Temporary mulching, seeding, or other suitable stabilization shall be used to protect areas during construction or other land disturbance activities on site.

g. Topsoil, removed from the surface in preparation for grading and construction activities on Campus is to be stored on or near the site and protected from erosion while grading operations are underway, provided that such storage may not be located where it would cause suffocation of root systems of trees to be preserved. After completion of such grading, topsoil is to be restored to exposed cut and fill embankments of building pads so as to provide a suitable base of seeding and planting.

h. Sediment basins, sediment traps, or similar control measures shall be installed before extensive clearing and grading operations begin for site development.

i. Water or dust palliatives shall be applied to exposed earth services as necessary to control dust emissions.

j. Revegetation or stabilization of exposed earth surfaces shall take place as soon as possible.

B. Removals

1. Clear the site of trees, shrubs, and other vegetation, which is indicated to be removed.

2. Completely remove stumps, roots, and other debris to avoid problems with future utilities.

3. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.

4. Existing fills, soil containing debris, organics, pavement, or other unsuitable materials shall be excavated and removed prior to commencing grading operations. Demolition areas shall be cleared of old foundations, slabs, abandoned utilities, landscaping, and soils disturbed during the demolition process. Depressions or disturbed areas left from the removal of such material shall be replaced with compacted fill.

5. The limits and depths for removal of existing fill materials shall be evaluated by project soils engineer during grading.

6. Revegetation or stabilization of exposed earth surface shall take place as soon as possible.

C. Removal of Improvements

1. Remove above-grade and below-grade improvements necessary to permit construction and other work as indicated.

2. Remove from site and legally dispose of off-site, existing fill materials, soil debris, or other unsuitable materials prior to commencing grading operations.

3.02 EXCAVATION

A. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown, within a tolerance of plus or minus 0.04 foot.

B. Excavation for Planting Areas: Conform to cross-sections, elevations and dimensions shown, within a tolerance of plus or minus 0.10 foot.

3.03 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area, under the provisions of the Geotechnical Study.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the percentages of maximum dry density specified in the Geotechnical Study and in accordance with ASTM D1557-91 method of compaction.

C. Moisture Control:

1. When moisture content of exposed scarified soil and/or full material is below that sufficient to achieve recommended compaction, water shall be added to the soil and/or fill. While water is being added, soil shall be bladed and mixed to provide relatively uniform moisture content throughout the material.

2. When moisture content of exposed scarified soil and/or fill material is excessive, material shall be aerated by blading or other methods. Fill placed in pavement areas shall be compacted at near optimum moisture content. Jetting is not permitted for compaction.

3.04 FILL

A. In all excavations, use satisfactory excavated or borrow material sampled and tested by the District 's Testing Laboratory. Fill selection shall be per Geotechnical Study.

B. Fill excavations as promptly as Work permits, but not until completion of the following:

1. Acceptance by District's Representative of construction below finish grade including, where applicable, waterproofing, damp-proofing, and drainage pipe.

2. Examination, testing, approval and recording locations of underground utilities.

3. Removal of concrete formwork.

4. Removal of shoring and bracing and backfilling of voids with satisfactory materials.

5. Removal of trash and debris.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

7. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

C. Continual dust control, as required by the District, and in accordance with County Air Pollution Control District's Standards shall be required for the project construction.

3.05 GRADING

A. General: To provide support for building floor slabs, all existing fill and unsuitable natural soils shall be excavated and replaced as properly compacted fill.

B. Compaction: After grading, compact subgrade surfaces to the depth and percentage of compaction for each area classification.

C. Fill placement and grading operations shall be performed only under the observation of the District 's Testing Laboratory.

D. The exterior grades around building areas shall be sloped to drain away from the buildings to prevent ponding of water adjacent to foundations.

E. Grading operation shall be conducted so as to prevent damaging effects of sediment product and dust on the site and adjoining properties.

3.06 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Transport excess excavated material and legally dispose of off site.

3.07 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: District 's Testing Laboratory will observe, test and approve subgrades and fill layers before further construction Work can be performed. The District's Representative will determine the frequency of tests. Subgrade: Allow at least one field density test of subgrade to be made for every 2000 sq. ft. of paved area, but in no case less than 3 tests.

B. Field examination and testing will be performed by the District 's Testing Laboratory. The Contractor shall cooperate with such testing and shall give the District's Representative advance notice of grading scheduling.

C. Frequency of Tests for Trenching: As specified in Geotechnical Study Section 8 and as determined by the District's Representative.

D. If in the opinion of the District's Representative, based on soil testing reports and observations, subgrades or fills which have been placed are below specified density, provide corrective work as specified at no additional expense to the District, and pay for retesting of the soil.

3.08 PROTECTION

A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work as specified, with retesting, prior to further construction.

END OF SECTION

SECTION 312333
TRENCHING AND BACKFILLING

1.00 GENERAL

1.01 SUMMARY

A. Excavating trenches for construction of utilities.

B. Trench backfill materials.

C. Backfilling and compacting requirements.

1.02 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Geotechnical Engineering and Geohazards Report, Southern Kern Unified School District Rosamond High School Cafeteria Project, dated June 14, 2022, File No. 300234-002, Doc. No. 22-06-705 prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.03 SUBMITTALS

A. Materials source.

B. Sand equivalent test reports per ASTM D2419.

C. Certificates.

D. Drawings for shoring, bracing, sloping, or other provisions for worker protection for any excavation shall conform to the requirements of the CAL/OSHA Construction Safety Orders Requirements.

1.04 EXISTING UTILITIES

A. Drawings show existing major underground utilities from reference drawings. Prior to excavation, the Contractor shall notify the District's Representative to obtain any additional information which may be applicable to the Work.

B. Any incident of a utility being inadvertently damaged by the Contractor shall be immediately shutoff and then be immediately repaired by the Contractor at no cost to the District.

C. Contractor to pothole all utility connections and verify exact size, location and material prior to beginning construction and notify engineer of any discrepancies.

2.00 MATERIALS

2.01 APPROVALS

A. Imported material shall be approved by the District's Representative prior to being brought to the site. Provide a sample of the material in sufficient quantity for the District's Representative's use in evaluating the material.

2.02 TRENCH BACKFILL MATERIAL

A. Sand bedding shall have a sand equivalent (SE) of 30 or greater. The SE shall be evaluated during grading. Materials shall conform to the specification of the Geotechnical Study.

B. Backfill material shall conform to the requirements of Section 217-2 of the SSPWC.

C. Aggregate base course shall be per Plan.

D. Topsoil removed from trenches shall be stockpiled at locations approved by the District's Representative.

2.03 SOURCE QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Representative.

3.00 EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.02 TRENCH EXCAVATION

A. All saw cutting shall be neat, straight cuts and shall conform to Section 306-3 of the SSPWC. All cuts shall be square unless otherwise specifically noted on plans.

B. Trench excavation shall conform to Section 306-3 of the SSPWC and the following requirements:

1. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel. Suitable excavations shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustments to line and grade shall be made by scraping away or filling in with sand under the body of the pipe and not by wedging or blocking.

2. If the trench is excavated below the required grade, correct any part of the trench excavated below the grade, at no additional cost to the District per the Geotechnical Study. Place the backfill material over the full width of trench in compacted layers not exceeding 6 inches deep to the established grade with allowance for the pipe base. If shoring is required, the trenches shall be shored and braced in accordance with the Trench Construction Safety Orders of the Division of Industrial Safety.

3. When subgrade is encountered that in the opinion of the District's Representative is unsuitable for pipe support, the District's Representative may order the excavation to be carried to an approved depth below the bottom of the pipe and backfilled with sand, to the lines and grades shown on the drawings and specified by the District's Representative.

4. The minimum width of the trench at the top of the pipe zone shall be as necessary to install the pipe. The utility lines shall be centered in the trench. In the event of (1) actual physical interference between existing crossing subsurface utilities and the proposed utility lines and (2) vertical discrepancy in connecting proposed utility lines to existing utility system, a minimum clearance of 0.5 feet between the utility line and the crossing, interfering utility shall be provided, unless otherwise indicated on the plans.

5. Where existing utilities or tree roots are to be protected, trench excavation shall be by hand. No mechanical excavating equipment shall be used within 6 inches of any utility or root.

6. Trenching machinery may be used for excavations provided the specified trench width can be maintained.

3.03 TRENCH BACKFILL

A. Pipe bedding and trench backfill materials: pipe bedding shall be either crushed rock or sand as specified on the plans. Sand bedding and backfill for utilities shall consist of material having a sand equivalent of at least 30. The backfill material shall be placed within the pipe zone that extends from the bottom of the pipe to at least 12 inches above the top of the pipe for the full width of the trench. The horizontal distance between the spring line of the pipe and the side walls of the trench shall be such that bedding material can be properly placed and compacted below the haunches of the pipe. Pipe bedding and pipe zone backfill shall be compacted to at least 95 percent relative compaction. Backfill material placement shall conform to provisions of Geotechnical Study.

B. Trench backfill placed above the pipe zone shall consist of suitable onsite or imported soil per Geotechnical Study. Mechanical compaction of trench backfill shall be performed and water consolidation (jetting) methods of compaction shall not be permitted. Trench backfill in landscape areas shall be compacted to a minimum of 90 percent relative compaction or per landscape specifications.

C. Trench Backfilling shall conform to the requirements of Sections 306-12 of the SSPWC and Geotechnical Study:

1. During the process of laying pipe in trenches, sufficient material shall be carefully placed and hand tamped about the pipe to hold it firmly to established line and grade. Oversized material, broken rock or shale, if encountered, shall not be used for backfill.

2. No motor driven mechanical compacting equipment shall be used over pipelines until the backfill has been compacted to 12 inches over the crown of the pipe.

3. All backfill material shall be deposited in horizontal layers not exceeding the thickness specified in Section 306-12 of the SSPWC and not exceeding 8 inches in thickness. The distribution of materials shall be such that all material following compaction and consolidation will form a homogeneous mass free of voids, pockets, streaks or other imperfections. Backfilling shall be done with earth free from lumps, hardpan, chunks, paving material, organic matter or other deleterious substances.

4. Jetting of bedding or backfill material to obtain specific moisture content or for compaction shall not be permitted. If encountered, existing fill in the utility excavation shall be excavated and recompacted or removed and replaced with new fill materials per requirements of Section 2.02.

5. Compaction of all backfill material for trenches, pavements or structures, shall be per provisions of the Geotechnical Study. Appropriate warning detector tape shall be placed over all utilities.

6. Prior to final cleanup or resurfacing, the District's Representative shall take compaction tests in any backfill area and at any depth, with the Contractor providing equipment and operator to assist in such test. If any such compaction test fails, the Contractor shall correct such failure and pay for any retesting that is required. The District's Representative shall make as many tests as he feels is required to receive a satisfactory and acceptable job.

3.04 STOCKPILING

A. Stockpiling of imported materials or excavated materials shall direct surface water away from approved stockpile site to prevent erosion.

B. After stockpiles are removed, leave area in a clean and neat condition.

3.05 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by District's Representative.

END OF SECTION

SECTION 321123
AGGREGATE BASE COURSES

1.00 GENERAL

1.01 SUMMARY

A. Aggregate base course for curbs, gutters, sidewalks, and fire access driveway.

1.02 RELATED SECTIONS

A. Section 312000 Earthwork.

B. Section 321216 Asphalt Concrete Paving.

C. Section 321600 Curbs, Gutters, Sidewalks, and Driveways.

1.03 REFERENCES

A. Standard Specifications for Public Works (SSPWC), latest edition.

B. ASTM Standards.

C. State Standard Specifications (SSS), Caltrans, latest edition.

D. Geotechnical Engineering and Geohazards Report, Southern Kern Unified School District Rosamond High School Cafeteria Project, dated June 14, 2022, File No. 300234-002, Doc. No. 22-06-705 prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.04 SUBMITTALS:

A. Submit material samples and reports in accordance with requirements of District.

B. Submit samples in sufficient quantities for material testing.

2.00 PRODUCTS

2.01 MATERIALS

A. Aggregate Base Material shall be Class 2 Aggregate Base conforming to SSS Section 26-1.02A. Aggregate Base shall have a minimum sand equivalence of 22 and a minimum R-value of 78 and shall be free of organic materials and other deleterious substances.

B. Aggregate Base materials used within building areas shall be free of asphaltic materials.

3.00 EXECUTION

3.01 EXAMINATION

A. Verify substrate has been inspected; gradients and elevations are correct, and dry.

3.02 AGGREGATE BASE PLACEMENT

A. Aggregate base placement shall conform to the provisions of the SSPWC, Section 301-2.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

D. Where the required aggregate base thickness is 6 inches or less, the watered base may be spread and compacted in one layer. Where the required thickness is more than 6 inches, the aggregate base material shall be spread and compacted in 2 or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches.

E. Aggregate base course shall be dense and unyielding upon proof-rolling with full water truck.

3.03 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch.

B. Scheduled Compacted Thickness shall conform to the provisions of the SSPWC Section 301-2.2.

3.04 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Testing Laboratory. Compaction testing will be performed in accordance with ASTM D1557, latest edition.

B. If tests indicate work does not meet specified requirements, remove work, replace and retest at Contractor's expense.

END OF SECTION

SECTION 321216
ASPHALT CONCRETE PAVING

1.00 GENERAL

1.01 SUMMARY

A. Asphaltic concrete paving for parking lots and driveway pavements.

1.02 RELATED SECTIONS

A. Section 312000 Earthwork.

B. Section 321123 Aggregate Base Course.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. ASTM Standards.

C. Geotechnical Engineering and Geohazards Report, Southern Kern Unified School District Rosamond High School Cafeteria Project, dated June 14, 2022, File No. 300234-002, Doc. No. 22-06-705 prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.04 SUBMITTALS

A. Submit asphalt concrete mix design(s) for approval of the District Representative.

1.05 TESTING AND INSPECTION

A. Testing and inspection of asphalt pavement mix(es) and testing of placed stabilizing base course and asphalt pavement will be performed by the District's Testing Laboratory. Testing and inspection will be performed so as to minimize disruption of work.

B. Allow the District's Testing Laboratory access to the mixing plant for verification of weights or proportions, character of materials used and determination of temperatures used in the preparation of asphaltic concrete mix.

2.00 PRODUCTS

2.01 GENERAL

A. Provide the aggregate base, and bituminous surface conforming to the requirements of the Standard Specifications for Public Works Construction (SSPWC).

2.02 PAVING MATERIALS

A. Asphalt Concrete: Asphalt concrete material shall be C2-PG 70-10 per SSPWC Section 203-6. The grading and proportioning of aggregates shall be such that the combined mineral aggregate conforms to the specified requirements.

B. Asphalt Emulsion: SSPWC Section 203-3, Grade SS-1h.

C. Prime Coat: Grade SC-70 per SSPWC Section 203-2.

D. Aggregates for base course shall conform to requirements of Specification Section 32 11 23, Aggregate Base Course.

2.03 ASPHALT PAVEMENT MIX

A. Combine mineral constituents in proportions to produce a mixture conforming to requirements of the SSPWC Section 203-6.

B. Percentage by weight of asphalt cement in mixture shall be in accordance with SSPWC Section 203-6.

C. Maintain thorough and uniform mixture.

D. Bring asphalt and mineral constituents to required temperatures before mixing. Ensure aggregates are sufficiently dry so as not to cause foaming in mixture.

3.00 EXECUTION

3.01 GENERAL

A. Execute Work in accordance with SSPWC Section 302 and the Geotechnical Study.

3.02 PREPARATION

A. Ensure grading of subgrade to required elevation. Subgrade preparation shall be per SSPWC Section 301.

B. Before final rolling, shape entire section, add additional sub-soil if necessary, and compact subgrade to provide grades, elevation and cross-section indicated. Points of finished subgrade surface shall be within 0.04 foot of elevations indicated on the Drawings.

3.03 BASE COURSE

A. Place aggregate base in accordance with requirements of SSPWC Section 301 and to the thickness shown on the Drawings. Grade and compact in 6-inch layers to at least 95 percent of compaction (ASTM D1557).

3.04 MAINTENANCE

A. Maintain the base course until the asphaltic pavement is in place. Maintenance shall include drainage, rolling, shaping and water as necessary to maintain the course in proper condition. Maintain sufficient moisture at the surface to prevent a dusty condition. Areas of completed base course that are damaged shall be conditioned, reshaped and re-compacted in accordance with the requirements of the Specifications without additional cost to the District.

3.05 TACK COAT

A. Prior to the application of the asphalt concrete, a paint binder (tack coat) shall be applied to all surfaces of walkway, curbs, gutters, manholes and drainage structures which will be in contact with asphalt pavement per SSPWC Section 302-5.4.

B. Coat surfaces of catch basins which are to remain free of asphalt with oil, or provide equivalent protection, to prevent asphalt adhesion.

3.06 PRIME COAT

A. Prior to the application of the asphalt concrete, a prime coat shall be applied at a rate of 0.20 to 0.40 gallons per square yard.

3.07 ASPHALT CONCRETE

A. Requirements: The bituminous concrete shall consist of mineral aggregate, uniformly mixed with bituminous material in a central plant in accordance with SSPWC Section 203-6. The percentage of asphalt binder shall be in accordance with SSPWC Section 203-6. The mixing plant and construction equipment shall conform to the requirements of SSPWC Sections 203-6 and 302-5.

B. Placing: Deliver bituminous mixtures to the work site temperatures specified in SSPWC Section 302-5.5. Spread and place in accordance with SSPC Section 302-5.5. Asphalt surface shall be fog-sealed.

C. Compaction: Initial or breakdown rolling and the final rolling of the uppermost layer of the asphalt concrete shall be in accordance with SSPWC Section 302-5.6. Compaction by vehicular traffic shall not be permitted.

3.08 JOINING PAVEMENT

A. Carefully make joints between old and new pavements or between successive days work in such manner as to insure a continuous bond between old and new sections of the course in accordance with SSPWC Section 302.

B. Expose and clean edges of existing pavement. Cut edge to straight, vertical surfaces. Paint all joints with a uniform coat of tack coat before the fresh mixture is placed. Prepare joints in the new pavement in accordance with SSPWC Section 302-5.7.

3.09 JOINING NON-PAVED AREAS

A. Where paving will join landscape or other non-hardscape area a redwood header shall be installed.

3.10 TOLERANCES

A. Flatness: Maximum variation of 1/8 inch when measured with a 10-foot straight edge.

B. Variation from True Elevation: Within 1/4 inch.

3.11 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Testing Laboratory.

B. Field inspection and testing will be performed by the District's Testing Laboratory. The Contractor shall cooperate with such testing and shall give the District Representative advance notice of paving scheduling. Sufficient "Advance Notice" shall be determined by the District Representative.

C. If tests indicate materials do not meet specified requirement, replace material and retest at no additional cost to the District.

D. Frequency of Test: As determined by the District's Testing Laboratory.

3.12 PROTECTION

A. After placement, protect pavement from mechanical injury.

END OF SECTION

SECTION 321600
CURBS, GUTTERS, SIDEWALKS

1.00 GENERAL

1.01 SUMMARY

A. Concrete for curbs, gutters, sidewalks.

1.02 RELATED SECTIONS

A. Section 312000 – Earthwork

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Geotechnical Engineering and Geohazards Report, Southern Kern Unified School District Rosamond High School Cafeteria Project, dated June 14, 2022, File No. 300234-002, Doc. No. 22-06-705 prepared by Earth Systems Pacific and shall be superseded by the most current version.

C. ASTM Standards.

1.04 SUBMITTALS

A. Submit the following:

1. Product Data: Provide data on admixtures and curing compounds.

2. Concrete mix design(s).

3. Certificates from the batch plant.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with the SSPWC, latest edition; and ASTM Standards, latest edition.

B. Obtain cementitious materials from same source throughout.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F or surface is wet.

2.00 PRODUCTS

2.01 FORM MATERIALS

A. Form Materials: Section 303-5 of the SSPWC.

2.02 CONCRETE MATERIALS

A. Concrete Material for Curbs and Walks (Path of Travel):

1. Class 520-C-2500. Portland cement concrete per Standard Specifications for Public Works Construction Section 201-1.

2. Concrete reinforcements shall be constructed per the Project Plans and Specifications.

B. Concrete Material for Traffic Loaded Concrete:

1. Class 560-C-3250 or 565-C-3250P. Portland cement concrete per Standard Specifications for Public Works Construction Section 201-1.

2. Concrete reinforcements shall be constructed per the Project Plans and Specifications.

2.03 ACCESSORIES

A. Curing Compound shall conform to SSPWC Section 201-4. Pigmented compound shall not demonstrate any residual coloring of the concrete after one week.

2.04 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C94.

B. Use accelerating admixtures in cold weather only when approved by the District's Representative. Use of admixtures will not relax cold weather placement requirements.

C. Use calcium chloride only when approved by the District 's Representative.

D. Use set retarding admixtures during hot weather only when approved by the District 's Representative.

2.05 CONCRETE REINFORCEMENT

A. Concrete reinforcement shall conform to SSPWC Section 201-2.

2.06 SOURCE QUALITY CONTROL

A. Provide certificates of compliance from the batch plant.

3.00 EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support imposed loads.

B. Verify gradients and elevations of subgrade are correct.

3.02 PREPARATION

A. Moisten subgrade to minimize absorption of water from fresh concrete. Over-excavate subgrade to a depth of 1 feet below existing or finish grade whichever is deeper. Scarify excavation bottom to 6", moisture condition to near or over optimum moisture content and recompact to 90% relative compaction. Place engineered fill in lifts, compacted to 90% relative compaction with upper 1 foot compacted to 95% relative compaction in parking and drive areas. Refer to geotechnical report for site subgrade preparation recommendations.

B. Coat surfaces of catch basin frames with oil to prevent bond with concrete pavement.

C. Notify District's Representative a minimum of 24 hours prior to commencement of concrete placement operations.

3.03 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with SSPWC Section 303-5.

B. Install ½" thick fiberboard expansion joint and snap cap. Seal with Sikaflex self-leveling sealant after removal of snap cap (typical).

C. Construct weakened plane joints conforming to SSPWC Section 303-5.4.3, 1 ¼" inch deep, at intervals not exceeding 12 feet.

D. The top edges of curbs shall have 0.5" radius.

3.05 FINISHING

A. Concrete finishes shall be per SSPWC Section 303-5.5.

B. Portland cement concrete paving in all accessible routes of travel shall have slip resistant finish.

C. Walkway grades in excess of 5% shall conform to requirements of Section 11B-401 of the latest edition of the California Building Code.

D. Place curing compound in accordance with SSPWC Section 303-5.6 on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.06 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District’s Testing Laboratory.

B. District 's Testing Laboratory will perform slump and compressive strength tests.

C. Contractor shall maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.07 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, vandalism and mechanical injury.

B. It is the Contractor's responsibility to replace all concrete work subject to vandalism and graffiti at no extra cost to the District.

END OF SECTION

SECTION 323113
COLORBOND® CHAIN LINK FENCE AND GATES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. DIVISION 01 - GENERAL REQUIREMENTS: Drawings, quality, product and performance requirements, general and supplemental conditions apply as applicable to the project and project documents.

1.2 SUMMARY

A. This Section includes industrial/commercial chain link fence and gates specifications:

1. Polymer coated steel chain link fabric

2. Polymer coated galvanized steel framework and fittings

3. Gates: swing and cantilever slide

4. Installation

B. Related Sections:

1. 01 33 23 Shop Drawings, product data

2. 01 43 13 Manufacturers Qualifications

3. 03 30 53 Miscellaneous Cast in Place Concrete

4. 25 50 00 Integrated Automation [pertinent to gate operator access control]

5. 31 22 19 Finish Grading

1.3 REFERENCES

A. ASTM F552 Standard Terminology Relating to Chain Link Fencing

B. ASTM F567 Standard Practice for Installation of Chain Link Fence

C. ASTM F626 Specification for Fence Fittings

D. ASTM F668 Specification for Polymer Coated Chain Link Fence Fabric

E. ASTM F900 Specification for Industrial and Commercial Swing Gates

F. ASTM F934 Specification for Standard Colors for Polymer-Coated Chain Link

G. ASTM F1043 Specification for Strength and Protective Coatings of Steel Industrial Chain Link Fence Framework

1.4 SUBMITTALS

A. Shop drawings: Site plan showing layout of fence location with dimensions, location of gates and opening size, cleared area, elevation of fence, gates, footings and details of attachments.

B. Material samples: When required, provide representative samples of chain link fabric, framework and fittings.

C. Specification Changes: May not be made after the date of bid.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Framework, posts, rails, fabric, and fittings for chain link fence system:

1. **MERCHANTS METALS**®
www.merchantsmetals.com
Tech-Info@merchantsmetals.com
Phone: (888) 260-1600

2.2 CHAIN LINK FABRIC

A. Steel Chain Link Fabric: Per plans.

C. Class 2b fused and adhered

D. Color - black compliance with ASTM F934.

1. Fabric Selection Table: Steel chain link mesh sizes and gauges produced in one piece widths 3 feet (910 mm) to 12 feet (3660 mm)

Mesh Size In. (mm)		**9 gauge core** 0.148 in.				**Notes**
		3.76 mm				N/A = Not applicable for
2 (50)		yes				industrial/commercial
1 ¾ (44)		yes				applications
1 (25)		yes				N/M = Not manufactured
5/8 (16)		yes				*12 ga. only per F668
1/2 (13)		yes				
3/8 (10)		N/M				
		1290 lbf				Wire Break Strength
		(5740 N)				

2. Fabric selvage:

Standard fabric selvage for 2 in (50 mm) mesh
K&K for added safety for play and park applications
Fabric less than 72 in (1.8 m), knuckle finish top and bottom, K&K.

2.3 ROUND STEEL PIPE FENCE FRAMEWORK

A. Round steel pipe and rail: Cold-rolled electric-resistance welded pipe in accordance with ASTM F1043 Materials Design Group IC **(LG-40)**, minimum steel yield strength 50,000 psi (344 MPa). Type B external coating, hot dip galvanized zinc 0.9 oz/ ft² (305 g/m²) with a clear polymeric overcoat, Type D interior 90% zinc-rich coating having a minimum thickness of 0.30 mils (0.0076 mm).

1. Line post 2-3/8'' OD

2. End, Corner, Pull post 2-7/8'' OD

3. Top, brace, bottom and intermediate rails, 1-5/8'' OD

B. Typical post and rail size for normal Commercial / Industrial applications

Item	**Fence Height**	**Outside Diameter Inches (mm)**		**F1043-IC (LG-40) Weight lb/ft (kg/m)**
Line post	4 to 8 ft. (1.8 to 2.4 m) over 8 to 12 ft. (2.4 to 3.7 m)	2.375 (60.3) 2.875 (73.0)		3.12 (4.64) 4.64 (6.91)
Terminal post	4 to 8 ft. (1.8 to 2.4 m) over 8 to 12 ft. (2.4 to 3.7 m)	2.875 (73.0) 4.000 (101.6)		4.64 (6.91) 6.56 (9.78)
Rails		1.660 (42.2)		1.84 (2.74)

D. **COLORBOND**® Polymer Coated Pipe: Polymer coated pipe shall have a [PVC or Polyester] coating fused and adhered to the exterior zinc coating of the galvanized pipe in accordance with ASTM F1043. The minimum thickness of the PVC coating shall be 10-mils (0.254 mm), for polyester 3 mils (0.0076 mm). Color to match fabric [green] [brown] [black] per ASTM F934.

Framework Wind Load Caution:
Fences containing windscreens or privacy slats and fences greater than 8 feet (2.4 m) in height using, 1 in. (25 mm) mesh or smaller - recommend a wind load force analysis for post selection and post spacing. See Chain Link Manufactures Institute – Wind Load Guide CLFMI: WLG 2445. A interactive Wind load Fence Post Calculator is available at www.wheatland.com]

2.3 TENSION WIRE

A. **COLORBOND**® Polymer Coated Steel Tension Wire: 7 gauge core (0.177 in.)

1. Class 2b, fused and adhered,

A. the chain link fabric Class 2b fused and adhered.

2.4 FITTINGS

A. Tension and Brace Bands: Galvanized pressed steel complying with ASTM F626, minimum steel thickness of 12 gauge (0.105 in.) (2.67 mm), minimum width of 3/4 in. (19 mm) and minimum zinc coating of 1.20 oz/ft² (366 g/m²). Secure bands with 5/16 in. (7.94 mm) galvanized steel carriage bolts.

B. Terminal Post Caps, Line Post Loop Tops, Rail and Brace Ends, Boulevard Clamps, Rail Sleeves: In compliance to ASTM F626, pressed steel galvanized after fabrication having a minimum zinc coating of 1.20 oz/ft² (366 g/m²).

C. Tension Bars: In compliance with ASTM F626. Galvanized steel one-piece length 2 in. (50 mm) less than the fabric height. Minimum zinc coating 1.2 oz. /ft² (366 g/m²).
*[Bars for 2 in. (50 mm) and 1 ¾ in. (44 mm) mesh shall have a minimum cross section of 3/16 in. (4.8 mm) by 3/4 in. (19 mm)]
*[Bars for 1 in. (25 mm) mesh shall have a cross section of 1/4 in. (6.4 mm) by 3/8 in. (9.5 mm)]
*[Small mesh 3/8 in. (10 mm), 1/2 in. (13 mm) and 5/8 in. (16 mm) shall be attached (sandwiched) to the terminal post using a galvanized steel strap having a minimum cross section of 2 in. (51 mm) by 3/16 in. (4.8 mm) with holes spaced 15 in. (381 mm) on center to accommodate 5/16 in. (7.9 mm) carriage bolts which are to be bolted thru the strap the mesh and thru the terminal post.]

D. **COLORBOND**® [Polymer Coated Color Fittings: In compliance with ASTM F626, minimum coating thickness 0.006 in. (0.152 mm) fused and adhered to the zinc coated fittings] [Match color to fence system]

2.5 TIE WIRE and HOG RINGS

A. Basic commercial / industrial applications - specify 9 gauge steel galvanized core ties and hog rings

B. Added security or fence containing privacy slats specify 9 gauge core (0.148) (3.76 mm) steel Galvanized Before Weave (GBW) with preformed power fastened wire ties and preformed hog rings having minimum zinc coating 1.20 oz/ft² (366 g/m²) per ASTM F626.

C. Polymer coated **COLORBOND**®, match the coating, class and color to that of the chain link fabric>

2.6 SWING GATES

A. Swing Gates: Galvanized steel pipe welded fabrication in compliance with ASTM F900. Gate frame members 1.900 in. OD (48.3 mm) <Insert pipe specification> [ASTM F 1083 schedule 40 galvanized steel pipe] or [ASTM F1043 Group IC **(LG-40)** galvanized steel pipe] Frame members spaced no greater than 8 ft. (2440 mm) apart vertically and horizontally. Welded joints protected by applying zinc-rich paint in accordance with ASTM Practice A780. Positive locking gate latch, pressed steel galvanized after fabrication. Galvanized malleable iron or heavy gauge pressed steel post and frame hinges. Provide lockable drop bar and gate holdbacks with double gates. <Match gate fabric to that of the fence system> Gateposts per ASTM F1083 schedule 40 galvanized steel pipe. <Select the gatepost diameter from table 2.9 B> <Insert diameter and weight> <**COLORBOND**® Polymer coated gate frames and gateposts; match the coating type and color to that specified for the fence framework. Moveable parts such as hinges, latches and drop rods may be field coated using a liquid polymer touch up> <electrically operated gates must comply with ASTM F2200 and UL325>

B. Gateposts: Regular Grade ASTM F1083 Schedule 40 pipe

Gate fabric height up to and including 6 ft. (1.2m)		
Gate leaf width	**Post Outside Diameter**	**Weight**
Up to 4 ft. to 10 ft. (1.2 to 3.05 m)	2.875 in. (73.0 mm)	5.79 lb/ft (8.6 kg/m)
over 10 ft. to 18 ft. (3.05 to 5.5 m)	4.000 in. (101.6 mm)	9.11 lb/ft (13.6 kg/m)
Gate fabric height over 6 ft. to 12 ft. (1.2 to 2.4m)		
Gate leaf width		
up to 6 ft. (1.8 m)	2.875 in. (73.0 mm)	5.79 lb/ft (8.6 kg/m)
over 6 ft. to 12 ft. (1.8 to 3.7 m)	4.000 in. (101.6 mm)	9.11 lb/ft (13.6 kg/m)
over 12 ft. to 18 ft. (2.4 to 5.5 m)	6.625 in. (168.3 mm)	18.97 lb/ft (28.2 kg/m)
over 18 ft. to 24 ft. (5.5 to 7.3 m)	8.625 in. (219.1 mm)	28.58 lb/ft (42.5 kg/m)

A. Tension wire: Shall be installed 4 in. (101.6 mm) up from the bottom of the fabric. Fences without top rail shall have a tension wire installed 4 in. (101.6 mm) down from the top of the fabric. Tension wire to be stretched taut, independently and prior to the fabric, between the terminal posts and secured to the terminal post.

3.3 CHAIN LINK FABRIC INSTALLATION

Chain Link Fabric: Install fabric to the framework maintaining a ground clearance of no more than 2 inches (50 mm). Attach fabric to the terminal post by threading the tension bar through the fabric; secure the tension bar to the terminal post with tension bands and carriage bolts spaced no or rail and attached to a fabric wire picket on each side of the post or rail by twisting the tie wire around the fabric wire picket two full turns, cut off excess wire and bend over to prevent injury. Secure the fabric to the tension wire by crimping hogs rings around a fabric wire picket and tension wire.

END OF SECTION

SECTION 328400
PLANTING IRRIGATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General Conditions and Supplementary Conditions apply to this section.

1.2 WORK INCLUDED

A. Supply material, pipe, pipe fittings, automatic valves, wiring, and labor to install a fully automatic sprinkler system. Restore any existing landscaping disturbed during the installation.

1.3 RELATED SECTIONS

A. Section 329300 - Landscaping

1.4 QUALITY ASSURANCE & REQUIREMENTS

A. Obtain and pay for any and all permits and inspections as required.

B. Follow manufacturer's directions and detailed drawings in all cases when the manufacturers of products used in this contract furnish directions covering points not included in the drawings and specifications.

C. All local, municipal and state laws, and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the Contractor. Anything contained in these specifications shall not be construed as conflicting with any such rules and regulations, or the requirements of the same. However, when these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by such rules and regulations, the provisions of these specifications and drawings shall take precedence.

D. Superintendent:

1. A superintendent satisfactory to the Owner's Representative shall be present on the site at all times during progress of the work.

2. Do not change the Superintendent except with the consent of the Architect.

3. The Superintendent shall be authorized to represent the Contractor.

E. Explanation of Drawings:

1. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. Carefully investigate the structural and finish conditions affecting this work and plan work accordingly, furnishing such offsets, fittings, sleeves, etc., as may be required to meet site conditions. Drawings are generally diagrammatic and indicative of the work to be installed. Install the work in such a manner as to avoid conflicts between irrigation systems, planting and architectural features.

2. The word Architect as used herein refers to the Owner's authorized representative.

3. Furnish and install all work called for on the drawings by notes or details whether or not specifically mentioned in the specifications.

4. Do not install the irrigation system as shown on the drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in engineering. Bring such obstructions or differences to the attention of the Architect. Failure to do so will mean the Contractor is responsible for any revisions necessary.

5. Do not purchase or install materials as noted in legend on drawing when it is obvious there is an oversight or discrepancy. Failure to obtain prior material approval may result in rejection by the Architect. The Contractor will be responsible for any revisions necessary due to his failure to bring material discrepancies to the attention of Architect, or failure to comply with material submittals.

6. Coordinate as necessary the work of this Section which is allied with the work of other trades.

7. It is the intent of the drawings and specifications to describe a complete irrigation system providing uniform water coverage. If the plans or specifications appear in any way to be incomplete, misleading, conflicting, or subject to misinterpretation, it is the Contractor's responsibility to bring these concerns to the Architect's attention before bidding. If the Contractor fails to do so, the Contractor must accept the Architect's interpretation and any potential related financial impact that may occur.

F. Electrical wiring, controls, motors, and devices shall be Underwriters Laboratories listed, and labeled U.L.

1.5 SUBMITTALS

A. Material List:

1. Furnish the articles, equipment, materials, or processes specified by name in the drawings and specifications. Substitution is allowed only with prior written approval of the Architect.

2. Submit complete material list prior to performing any work. Material list shall include the manufacturer name, model number and description of all proposed materials and equipment.

3. Equipment or materials installed or furnished without prior approval of the Architect may be rejected and the Contractor required to remove such materials from the site at the Contractor's own expense.

4. If equipment proposed for use is as specified, a material list ONLY is required, and it is UNNECESSARY to submit manufacturer descriptive catalogs with submittal.

B. Record Drawings:

1. Provide and maintain up to date and complete project record documents (set of blueline prints). Update daily and show all changes from the original drawings and specifications, as well as exact "as-built" locations, and sizes and types of equipment. Prints for this purpose may be acquired from the Architect. Keep this set of drawings on site and use only for such recording.

2. These drawings shall also serve as work progress prints and shall be the basis for measurement and payment for work completed. Drawings must be available at all times for site reviews, in a location designated by the Architect. Should the record blueline progress prints be unavailable for review or fail to be up to date at the time of any site reviews (refer to Section 3.02-B-3 - Observation Schedule), it will be assumed no work has been completed and the Contractor will be assessed the cost of that site visit at the current billing rate of the Architect. No other inspections will take place until payment of that assessment.

3. Make neat and legible notations daily on the record progress prints as the work proceeds, showing the work as actually installed. Should equipment location differ from plan, indicate the new location in a graphic manner, matching the original symbols in the irrigation legend.

4. Before the final site review, transfer all information from the record prints to computer-generated reproducible drawings (or other approved method), and submit these reproducible drawings along with related CAD disk to the Architect for approval prior to preparing controller chart.

5. Dimension the following locations from two permanent points of reference (building corners, sidewalks, road intersections, etc.):

   a. connection to water lines

   b. gate valves

c. automatic controller(s) within project limit of work

d. backflow prevention unit(s) within project limit of work

e. tracer wires (main line routing)

f. remote control valves

g. quick coupling valves

h. main line routing (every 50 ft.) and all directional turns.

i. sleeves and conduits

j. quick couplers

6. On or before the date of the final site review, deliver the updated and completed reproducible drawings to the Architect. Delivery of these drawings does not relieve the Contractor of responsibility for furnishing any required information that may have been omitted from the prints.

C. Controller Charts:

1. Record as-built drawings must be approved by the Architect before controller charts are prepared.

2. Provide two controller charts for each controller installed.

3. The chart shall show the area controlled by the automatic controller and shall be the maximum size controller door will allow.

4. The chart shall be based on a record drawing, reduced to the maximum size that will fit inside controller housing (printed on two sides if required for graphic clarity).

5. The chart shall be a photocopy or black line print with colors to differentiate areas of coverage for each hydro-zone, using pastel or transparent colors.

6. When completed and approved, hermetically seal the chart between two pieces of plastic (thickness of each piece being minimum 10 mils).

7. These charts must be completed and approved prior to final acceptance of the irrigation system. Installation will not be accepted without charts.

D. Operation and Maintenance Manuals:

1. Prepare and deliver to the Architect within 10 calendar days prior to completion of construction two hardcover three ring binders containing the following information:

a. Index sheet stating Contractor's address and telephone number

b. List of equipment with names, addresses, and telephone numbers of local manufacturer representative

c. Catalog and parts sheets regarding material and equipment installed under this contract

d. Warranty statement

e. Complete operating and maintenance instruction on all major equipment

2. In addition to these maintenance manuals, instruct Owner's maintenance personnel regarding operation of major equipment and show written evidence to the Architect at the conclusion of the project that this service has been rendered.

E. Equipment to be Furnished:

1. Supply as part of this contract the following tools:

a. Two keys for opening valve boxes

b. One quick coupler key and matching hose swivel (per five quick coupling valves)

c. One 5 foot valve key for operation of gate valve

3. Turn over this equipment to the Owner at the conclusion of the project. Before final acceptance can occur, written evidence that the Owner has received materials must be shown to the Architect.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Exercise care in handling, loading, unloading, and storing p.v.c. pipe and fittings. Transport p.v.c. pipe in a vehicle which allows the length of pipe to lie flat, to avoid undue bending or concentrated external load at any point. Any section of pipe dented or damaged must be discarded or, if installed, must be replaced with new piping.

B. Cover any pipe stored outdoors to protect it from sunlight.

1.7 SUBSTITUTIONS

A. To request substitution of any equipment or material in lieu of equipment or material listed on the irrigation drawings and in the specifications, provide the following information to the Architect for approval:

1. Statement indicating the reason for making the substitution, using a separate sheet of paper for each requested substitution

2. Descriptive catalog literature and performance charts (if available) for each requested substitution

3. Hydraulic calculations for proposed substitution, as applicable

4. Itemized list of proposed substitution(s), noting difference in material and labor costs between substitution and item originally specified

5. Written confirmation that Owner has received any credit resulting from approved substitution (with a copy sent to Architect)

B. Approval of any substitution or alternate will be based on information and/or samples provided by the Contractor.

C. Responsibility for the total performance of any substitution to equal or surpass the item originally specified in every respect rests with the Contractor.

D. If the Architect determines the substitution has proven to be unsatisfactory, it shall be removed and replaced with the originally specified item as part of the work of this contract (both materials and labor).

E. The Architect shall be solely responsible for accepting or rejecting any substitution as equal to equipment and materials listed on the irrigation drawings and in the specifications.

1.8 WARRANTY

A. Sprinkler irrigation system warranty shall be according to the following form. The general and supplementary conditions of these specifications shall be filed with the Owner or his representative prior to acceptance of the irrigation system.

B. Manufacturer warranties do not relieve the Contractor of his liability under the warranty. Such warranties only supplement the warranty.

C. Include a copy of the warranty form in the Operations and Maintenance Manual.

D. The following warranty form shall be typed on Contractor's letterhead:

WARRANTY FOR SPRINKLER IRRIGATION SYSTEM

We hereby warranty that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the drawings and specifications, ordinary wear and tear, unusual abuse or neglect excepted. We agree to repair or replace any defects in material or workmanship which may develop during a period of one year from the date of acceptance, and also to repair or replace any damage resulting from the repairing or replacing of such defects, at no additional cost to the Owner.

We will perform such repairs or replacements within three days after receipt of written notice. In the event of our failure to perform such repairs or replacements within a reasonable time after receipt of written notice from Owner, we authorize the Owner to proceed to complete said repairs or replacements at our expense and we will pay the costs and charges therefor upon demand.

PROJECT:

CONTRACTOR:

ADDRESS:

PHONE NO.:

BY:

DATE OF ACCEPTANCE:

BY:

1.9 TEMPORARY REPAIRS

A. The Owner reserves the right to make temporary repairs as necessary to keep the sprinkler system equipment in operating condition. The exercise of this right by the Owner will not relieve the Contractor of responsibilities under the terms of the guarantee as herein specified.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use only new materials of manufacturer and type noted on drawings and as specified herein, or approved equal.

2.2 PIPE & FITTINGS

A. Pressure main line piping and fittings sizes 2 inches and smaller shall be p.v.c. Schedule 40.

B. Pressure main line piping and fittings sizes 2-1/2 inches to 4 inches shall be p.v.c. class 315.

C. Non-pressure lines (in-line drip tubing header lines) shall be p.v.c. Schedule 40. (1/2 inch pipe is not permitted.)

D. Non-pressure lines (buried) shall be p.v.c Schedule 40. (1/2 inch pipe is not permitted.)

E. Non-pressure lines (on-surface) shall p.v.c. Schedule 40, u.v.r. (ultra-violet resistant) (1/2 inch pipe is not permitted)

F. Sleeves or conduit lines smaller shall be p.v.c. Schedule 40.

G. All p.v.c. pipe and fittings shall conform to following specific requirements:

1. P.v.c. (Solvent Weld)

a. Pipe shall be manufactured from virgin polyvinyl chloride compound in accordance with ASTM D 1784 or ASTM D 2241, cell classification 12454 B, hydrostatic design stress rating not less than 2,000 p.s.i.

b. Fittings (solvent weld or thread) shall be standard weight, Schedule 40, side gated, injection molded p.v.c., complying with ASTM D 1784, cell classification 13454 B, including threads when required.

2. P.v.c. nipples shall be Schedule 80, with molded threads.

3. All p.v.c. pipe must bear the following markings:

a. Manufacturer name

b. Nominal pipe size

c. Schedule or class

d. Date of extrusion

4. Solvent cement and primer for p.v.c. solvent-weld pipe and fittings shall be of type and installation method prescribed by the manufacturer.

5. Surface installed p.v.c. pipe and fittings shall be schedule 40 and contain additional compound for ultra-violet resistance.

6. Solvent vement and primer for p.v.c. solvent-weld pipe and fittings shall be of type and installation method prescribed by the manufacturer.

H. In-Line Emitter Tubing and Accessories:

1. Tubing is a continuous self-cleaning, recycled content, pressure compensating dripline with built-in check valve and be Cupron® copper oxide infused for root intrusion deterrent. This low volume dripline has integral and evenly spaced pressure compensating check valve emitters welded to the inside of the tubing that is made with recycled content and is available with emitter discharge rate of 0.53 gallons per hour [GPH]) evenly spaced at 12” on center.

2. Each emitter shall have the ability to independently regulate discharge rates, with an inlet pressure range of 21.8 - 58 pounds per square inch (psi), at a constant flow and with a manufacturer's coefficient of variability of 0.03 or less. Recommended operating pressure shall be between 21.8 - 58 psi. The emitter discharge rate shall be 0.53 gallons per hour (G.P.H.) utilizing a combination of turbulent flow and reduced pressure compensation by molded silicone diaphragm. The emitters shall be capable of continuously cleaning themselves while in operation and have an anti-siphon feature which prevents debris from entering outlet at system shutdown. The dripline shall be available with 12" spacing between emitters unless otherwise specified. For subsurface installation, tubing depth shall be 4" to 6". Maximum system pressure shall be 58 psi for maximum fitting integrity. Filtration shall be 120 mesh or finer. Bending radius shall not be smaller than 7" in order to avoid kinking of tubing.

3. Fittings shall be constructed in one of the following end configurations:
Barbed insert fittings only,
Male pipe threads (MPT) with barbed insert fittings, or
Female pipe threads (FPT) with barbed insert fittings.

4. All fittings shall be constructed of injection molded, brown plastic having a nominal outside dimension of 17mm (0.56"). Female and male threaded ends shall be capable of mating to standard PVC pipe with tapered threads.

F. Brass Pipe and Fittings:

1. Brass pipe shall be 85 percent red brass, American National Standard Institute (ANSI), Schedule 40 screwed pipe.

2. Fittings shall be medium brass, screwed 125 pound class.

G. Copper Pipe and Fittings:

Pipe shall be Type K, hard tempered.

Fittings shall be wrought copper, solder joint type.

Joints shall be soldered with silver solder, 45 percent silver, 15 percent copper, 16 percent zinc, 24 percent cadmium, solidus at 1125 F. and liquidus at 1145 F.

2.3 SMALL TURF SPRINKLER HEADS

A. Sprinklers shall be similar in all respects to type noted in legend on drawing.

B. Heads shall have screw adjustments.

C. Nozzle shall rise a minimum of 6 inches.

D. Body shall be equipped with a built-in check valve.

E. Provide pressure compensating screens (pcs) as noted on drawing.

F. Provide variable arc nozzles as necessary in irregular corners and due to planting area configuration.

G. Use pressure regulating type heads where noted.

2.4 ROTARY SPRINKLER HEADS

A. Heads shall be gear driven pop-up sprinkler heads, with rubber cover and built-in check valve.

B. Part circle heads shall have variable arc setting.

C. Nozzles shall be matched precipitation type as noted on plan.

2.5 TRACER WIRES

A. Install No. 14 polyethylene coated copper tracer wire with all non-metallic irrigation main lines, Paige P7079D or equal.

2.6 ELECTRICAL (LOW VOLTAGE)

A. Make connections between controller and remote control valves using direct burial AWG-UF 600 volt wire, insulation thickness 3/64 inch, utilizing low density, high molecular weight polyethylene insulation.

B. Waterproof splices (where permitted) using King Connectors or equal, and house in a box. Boxes for other irrigation uses may be utilized for this purpose when approved by Architect.

C. Wire shall be minimum #14 UF 600 volt underground wiring. Common wire shall be white, and all other wires any color except white.

D. All low voltage wires installed on-structure shall be installed inside conduit. Conduit provided under electrical section. Installation shall be coordinated with General Contractor prior to start of construction.

E. No multi-wire cables will be accepted.

2.7 GATE VALVES

A. Valves 3 inches and smaller shall be ASTM B 62 bronze body, 150 pound saturated steam rated with screwed joints, non-rising stem, screwed bonnet, and solid disc, unless otherwise noted on drawings. Provide with hand wheel.

2.8 QUICK COUPLING VALVES

A. Valves shall have brass body, 150 pound class, with 3/4 inch female threads opening at base permitting operation with a special connecting device (coupler) designed for this purpose.

B. Coupler threads shall be lug type.

C. Provide with rubber-like vinyl hinge cover.

2.9 REMOTE CONTROL VALVES

A. Valve shall be spring-loaded, packless diaphragm activated, normally closed type with a glass-filled nylon body, equipped with flow control and pressure regulation capabilities when noted on drawing.

B. Valve solenoid shall be 24 volt a.c. 4.5 watt maximum, 500 mili-amp maximum surge, corrosion-proof, stainless steel construction, epoxy encapsulated to form a single integral unit.

C. Valve shall be equipped with an internal bleeder to permit operation in the field without power at the controller.

2.10 VALVE BOXES

A. Valve boxes shall be fabricated from a durable plastic material resistant to weather, sunlight and chemical action of soils, with green covers.

B. Remote control valves shall be installed in rectangular plastic boxes, NDS Products or approved equal, with bolt down hinged covers.

C. Gate valves and quick coupling valves shall have 10 inch round plastic boxes with exterior as required to properly protect valve, NDS Products or approved equal.

2.11 TREE IRRIGATORS/BUBBLER HEADS

A. Bubbler heads shall be similar in all respects to type shown in detail and sprinkler legend.

B. Provide assemblies as indicated on drawings (including vents) for tree well applications.

C. Use Teflon tape on all threaded fittings.

D. Install bubbler head away from walkway to minimize pedestrian hazard and unsightly conditions whenever possible.

E. Nozzles shall be as specified in legend.

F. Install check valve on riser as required for low head drainage.

G. Provide pressure compensating screens (pcs) as noted on drawing.

H. Refer to typical spacing of heads per drawing and adjust as required for actual field conditions.

2.12 BACKFLOW PREVENTION UNITS

A. Backflow preventer shall be designed to operate on a "reduced pressure" principle and be equipped with gate valves and two field test cocks (supply and discharge sides).

B. Pressure regulator at backflow unit shall be a brass unit, type and size as noted on drawing.

C. Wye strainers at backflow prevention units shall be 125 pound class cast brass with 40 mesh monel screen, unless otherwise noted on drawing.

D. The backflow enclosure shall be of a vandal and weather resistant nature manufactured entirely of marine grade aluminum alloy 5052-H52, with a wall thickness of 1/8 inch. The mounting base shall be manufactured entirely of stainless steel. The main housing shall be of solid sheet construction punched on the sides with a rectangular pattern for viewing backflow operation. The length of the enclosure shall be expandable to allow for site adjustment. The enclosure shall have a mounting lip on one end and a locking mechanism on the other end. The mounting base shall be submerged into the concrete a minimum of 2 inches. Position the enclosure 2-1/2 inches above the concrete for drainage purposes. The locking mechanism shall be full release type which allows for complete removal of the enclosure from its mounting base without the use of tools. The handle controlling the locking mechanism shall be concealed within the surface of the enclosure and provide for either a single or dual padlock system.

(INSULATED)

The backflow enclosure shall be of a vandal and weather resistant nature manufactured entirely of marine grade aluminum alloy 5052-H52, with a wall thickness of 1/8 inch. The mounting base shall be manufactured entirely of stainless steel. The main housing shall be of solid sheet construction with a minimum R-8 rigid sheet insulation on the top and sides. A flexible rubber insert formed into a loop to provide dead air space shall be installed along the bottom. The length of the enclosure shall be expandable to allow for site adjustment. The enclosure shall have a mounting lip on one end and a locking mechanism on the other end. The mounting base shall be submerged into the concrete a minimum of 2 inches. Position the enclosure 2-1/2 inches above the concrete for drainage purposes. The locking mechanism shall be of the full release type which allows for complete removal of the enclosure from its mounting base without the use of tools. The handle controlling the locking mechanism shall be concealed within the surface of the enclosure and provide for either a single or dual padlock system.

2.13 AUTOMATIC CONTROLLER

A. Controller shall be fully automatic and capable of operating the required number of stations, flow sensors, master valves, and rain sensors. Controller shall be wall mount type, in a housing with locking hinged cover. Fuse and chassis ground all controller components. Automatic controller shall include the following:

1. Surge protection.

2. Copper clad lightning protection device (specific type to be coordinated with General Contractor).

3. Permanent connection outside controller housing for quick connection of remote hand-held radio controls.

4. Remote rain switch assembly mounted on the side of enclosure, with interconnect wire harness pre-wired through a bypass switch into the controller and to the terminal strip.

5. Master valve relay assembly pre-wired to the terminal strip. If more than one controller is served off master valve, provide additional relays for each such controller.

6. Rain sensing bypass assembly consisting of a sensing bypass module mounted to the terminal strip, capable of handling up to one rain sensor zone.

B. Mount the controller inside a stainless steel, vandal-resistant enclosure with a stainless steel pre-drilled removable backboard, controller, terminal strip, and 120 volt outlet. Provide 120 volt duplex box with an on/off switch and 120 volt receptacle. Metal conduit shall run from the 120 volt supply to the controller housing. All power within the housing shall be properly phased. Provide a pre-wired terminal strip clearly indicating the proper points of connection of all appropriate wiring. Enclosure shall be manufactured by V.I.T. Strong Box, model number SB-16SSW, or equal. Controller pad shall be per manufacturer recommendation, or shall conform to requirements of governing authority if these requirements exceed manufacturer recommendation.

C. Provide the controller assembly with a terminal strip clearly marking the positions for one rain sensor device. Wire the terminal strip through clearly marked on/off switches mounted on the face of the controller to provide sensing bypass capability

D. Controller assembly package shall be supplied and enclosure assembly manufactured by or approved equal, carrying a five year warranty on the entire assembly (including controller).

2.14 MASTER VALVE

A. Master valve shall be spring-loaded, packless diaphragm activated, normally open type with brass body, equipped with flow control and pressure regulation capabilities when noted on drawing.

2.15 FLOW SENSOR

A. Flow sensor size shall be based on the lowest flow demand through the sensor, with the piping size per dimensions noted in construction detail. Verify size of sensor with Manufacturer Representative.

B. Install sensor per manufacturer's recommendations. Retain a factory-trained representative to check installation and perform start-up services, including adjustment of all equipment. Provide Owner with proof of compliance.

PART 3 - EXECUTION

3.1 SITE CONDITIONS

A. All scaled dimensions are approximate. Check and verify all dimensions per Architect's approval prior to proceeding with work under this section.

B. Exercise extreme care in excavating and working near existing utilities. Coordinate excavations with underground service alert and utility companies. Damage to utilities caused by operations or neglect shall be repaired at Contractor’s expense. Check existing utility drawings for locations.

C. Coordinate installation of sprinkler irrigation materials, including pipe, so there will be NO interference with utilities or other construction, or difficulty in planting trees, shrubs, and ground covers.

D. Carefully check all grades to ensure work on the sprinkler irrigation system may safely commence.

3.2 PREPARATION

A. Water Supply:

1. The Owner will provide new meters and pay all costs incurred.

2. Connect sprinkler irrigation system to water supply points of connection as indicated on the drawings. Verify exact location on site, prior to start of construction.

3. Connections as shown on drawings are approximate. Minor deviations (plus or minus 20 feet) required by actual site conditions shall be a part of this contract.

4. Coordinate connection to meters, water outlets, etc. with General Contractor and other trades on site to ensure proper connection, prior to start of construction.

5. Coordinate pipe crossing hardscapes, walks, etc., with appropriate trades to minimize disturbance to finish product. If a preferable route is noted on site, contact Architect to discuss alternative and obtain approval of same.

B. Observation Schedule:

1. Notify the Architect in advance for the following observation meetings, according to the time indicated:

a. Pre-job conference - 5 days

b. Backflow assembly and automatic controller location - 48 hours

c. Pressure supply line and control wire installation and testing - 48 hours

d. Lateral line and sprinkler installation - 48 hours

e. Coverage test - 48 hours

f. Final site review - 5 days

2. When observations are conducted by other than the Architect, show evidence in writing when and by whom these observations were made.

3. Maintain a set of current and up to date plans on the job site at all times. No site observations will commence without record drawings and current plans. In the event the Contractor calls for a site visit without record drawings, without current plans, without completing previously noted corrections, or without preparing the system for said visit, he shall be responsible for reimbursing the Architect based on his current billing rates per hour (portal to portal, plus transportation costs) for the inconvenience. No subsequent site visits will be scheduled until this charge has been paid.

C. Physical Layout:

1. All piping or equipment shown diagrammatically on drawings outside planting areas shall be installed inside planting area whenever possible, to exact dimensions noted in construction details unless otherwise approved.

2. Prior to installation, stake out all pressure supply line routing and sprinkler head locations.

3. Entire layout shall be approved by Architect prior to installation.

3.3 INSTALLATION

A. Piping:

1. Install all plastic pipe and fittings according to manufacturer instructions.

2. All lines shall have a minimum clearance of 6 inches from each other and from lines of other trades. Parallel lines shall not be installed directly over one another.

3. Coordinate installation of piping shown through walls as required with General Contractor to avoid penetrating walls if possible. If penetration is necessary, coordinate and waterproof.

4. Install concrete thrust blocks in accordance with pipe manufacturer recommendations for pressure supply piping 3 inches and larger.

5. Scale of drawing may not permit indicating all sleeves and conduits required. Provide sleeves and conduits for all piping or low voltage wires under paved and on-structure areas. Refer to sections that pertain to sleeving material, size, etc.

6. All major plumbing work using copper pipe shall be performed by a licensed and bonded Plumbing Contractor. Irrigation Contractor shall obtain all permits required.

7. Coordinate installation of piping shown through walls as required with General Contractor to avoid penetrating walls if possible. If penetration is necessary, coordinate and waterproof.

8. Scale of drawing may not permit indicating all sleeving required. Provide sleeves for all piping under paved areas. Refer to sections that pertain to sleeving material, size, etc.

B. Trenching:

1. Excavate trenches to required depths. Follow approved layout for each system.

2. Trench bottom shall be flat to ensure piping is supported continuously at prepared grade.

3. Where lines occur under paved areas, consider dimension to be below the subgrade.

4. Provide minimum coverage as follows:

a. Pressure supply lines (2 inches and smaller): 18 inches, unless otherwise noted on drawing.

b. Pressure supply lines (2-1/2 inches to 3 inches): 24 inches, unless otherwise noted on drawing.

c. Pressure supply lines under paving (2 inches and smaller): 24 inches, unless otherwise noted on drawing.

d. Pressure supply lines (2-1/2 inches to 3 inches): 30 inches, unless otherwise noted on drawing.

e. Non-pressure lines: 12 inches, unless otherwise noted on drawing.

f. Non-pressure lines under paving: 18 inches, unless otherwise noted on drawing.

g. Control wire: 18 inches, unless otherwise noted on drawing.

C. Tracer Wires:

1. Carefully place tracer wire on bottom of trench under vertical projection of pipe, avoiding stress from backfilling and running wire continuously throughout the length of pipe.

2. Tracer wire shall follow main line pipe and branch lines, terminating in a yard box with a gate valve that controls these main irrigation lines. Provide sufficient wire to reach surface grade, bending back end of wire to form a loop, and attach a Dymo-Tape type plastic label noting “TRACER WIRE.”

3. All splices shall be made using Scotch-lok or equal, encased in epoxy resin to provide a permanent U.L. approved watertight connection.

4. Record locations of tracer wires and their termination points on as-built drawings.

D. Backfilling:

1. Buried pipe in trenches shall be center loaded only until all required tests are performed. Carefully backfill trenches with approved excavated materials such as earth, loam, sandy clay, sand, or other approved materials free from large clods of earth or stones. Mechanically compact backfill in landscaped areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill must conform to adjacent grades without dips, depressions, humps or other surface irregularities.

2. Place fine granular material backfill on all lines initially. No foreign matter larger than 1/2 inch in size will be permitted in the initial backfill.

3. Flooding of trenches will be permitted only with approval of the Architect.

4. If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, lawn, planting, etc. are necessary, make all such adjustments without cost to the Owner.

E. Trenching and Backfill Under Paving:

1. Backfill trenches located in heavy clay soil under areas where paving, asphaltic concrete or concrete will be installed shall have sand 6 inches below and 3 inches above the pipe. Compact in layers to 95 percent compaction using manual or mechanical tamping devices. Compact trenches for piping to equal the compaction of the existing adjacent undisturbed soil and leave in a firm, unyielding condition. All trenches shall be flush with the adjoining grade. Pressure test all piping under paving prior to the paving work.

2. Install piping under existing walks by jacking, boring or hydraulic driving. Cut or break sidewalks and/or concrete as necessary and replace paving as a part of the contract cost. Obtain permission from the Architect to cut or break sidewalks and/or concrete. No hydraulic driving will be permitted under asphaltic concrete paving.

3. Coordinate installation of piping and sleeves under paved areas with General Contractor.

4. Install all p.v.c. piping crossing hardscape in a sleeve two pipe sizes larger than the piping, or as noted on drawing. Install wires under paving in separate sleeve of size required, or as authorized.

F. Assemblies:

1. Routing of sprinkler irrigation lines as indicated on the drawings is diagrammatic. Install lines and various assemblies to conform to details on plans.

2. Install NO multiple assemblies in plastic lines. Provide each assembly with its own outlet.

3. Perform all directional changes on pressure supply line using 45 degree elbows. No 90 degree elbows will be permitted without approval of Architect.

4. No more than one size may be used when reducing or increasing a fitting outlet, unless approved by Architect.

5. Install all assemblies specified herein in accordance with respective detail. In absence of detail drawings or specifications pertaining to specific items required to complete work, perform such work in accordance with best standard practice, with prior approval of the Architect.

6. Thoroughly clean p.v.c. pipe and fittings of dirt, dust and moisture before installation. Installation and solvent welding methods shall be as recommended by the pipe and fitting manufacturer.

7. On p.v.c. to metal connections, work the metal connections first. Use Teflon tape or approved equal on all threaded p.v.c. to p.v.c. and on all threaded p.v.c. to metal joints, with only light wrench pressure. Where threaded p.v.c. connections are required, use threaded p.v.c. adapters into which the pipe may be welded.

8. Verify exact location of all major equipment with the Architect before installation.

8. Install remote control valves in shrub areas and perpendicular to hardscape unless otherwise approved. Final location and configuration shall be approved by Landscape Architect prior to backfilling and finalizing installation.

9. Unless otherwise approved, locate quick coupling valves within 12 inches of hardscape or at separation between shrub and lawn areas. Final installed location to be approved by Landscape Architect prior to final installation.

12. Locate tree irrigators at each tree. Install as indicated on drawings, including vents, strainers, etc.

G. Automatic Controller:

1. Install per manufacturer instructions. Connect remote control valves to controller in numerical sequence shown on the drawings.

G. Flushing of System:

1. After all new sprinkler pipelines and risers are in place and connected, all necessary diversion work has been completed, and prior to installation of sprinkler heads, open the control valves and flush out the system using adequate pressure.

2. Install sprinkler heads only after the system has been flushed to the complete satisfaction of the Architect.

H. Sprinkler Heads:

1. Install the sprinkler systems per the drawings and according to their respective detail.

I. Valve Boxes:

1. Install all buried valves and equipment in the specified box.

2. Fill area under box with a minimum of 3 cubic feet of 3/4 inch gravel for remote control valves and two cubic feet for gate valves and quick coupling valves, before box is installed.

3. Attach identification tags to each remote control valve, showing number that corresponds with controller sequence. Tags shall be manufactured of polyurethane Behr Desopaid, yellow in color with black letters, 2-3/4 inches by 2-1/4 inches. When connecting to existing controller, sequence numbers shall match sequencing on existing controller. Exact sequence to be determined on site.

4. Brand sequence number of each valve in minimum 2 inch high numerals into box top.

5. Install valve boxes in shrub areas unless otherwise approved.

6. Install valve boxes square to one another and to edges of adjacent hardscape, unless otherwise approved by Architect.

J. Electrical Supply:

1. Place low voltage wiring in the same trench and alongside of main lines unless otherwise approved.

2. When more than one wire is placed in a trench, tape wires together at maximum 12 feet on center.

3. Provide a 12 inch expansion loop at each connection and directional change for low voltage wires and two feet for stub outs.

4. Use a continuous wire between controller and remote control valves. Except as otherwise approved, do not splice wire at any point. Enclose all approved splices in an U.L. approved junction box.

5. Provide each controller with separate ground wire.

6. Provide pull box for low voltage wires approximately every 200 feet along continuous lineal runs.

L. Protective Pipe Covering:

1. Clean buried pipe & fittings of all foreign substances and film.

2. Coat all surfaces with adhesive primer.

3. Wrap pipe & fittings with three layers of polyvinyl chloride tape. Overlap each layer approximately two thirds the width of tape without stretching.

4. Total wrap thickness shall be no less than 10 mils over all surfaces, with no voids.

5. Wrap all piping, fittings, and equipment noted to be frost protected with three layers of burlap, secured with one wrap of p.v.c. tape.

3.4 FIELD QUALITY CONTROL

A. Adjustment of the System:

1. Adjust all sprinkler heads and valves for optimum performance and to minimize overspray onto walks and roadways. Spray on buildings and/or windows is not permitted.

2. If it is determined that adjustments in the irrigation equipment will provide proper or more adequate coverage, make such adjustments prior to planting. Adjustments may include changes in nozzle sizes or trajectory of spray or degrees of arc, as may be required. Use variable arc nozzles where required.

3. Set all sprinkler heads perpendicular to finish grades unless otherwise designated on the plans, and at height and distance from walks, buildings, etc, as noted or as directed by Architect.

4. When using master flow sensors, determine exact flow rates and proper operating time to avoid water runoff for each control valve. Program this information into the controller, along with minimum flow of each valve and maximum flow for the largest valve. Provide a written copy of this data to Owner. Fault detection shall be 5 percent greater than actual flow. Show evidence in writing to the Architect at the conclusion of the project that this service has been rendered.

B. Testing of Irrigation System:

1. Test all pressure lines under hydrostatic pressure of 150 pounds per square inch or 50 pounds more than normal static pressure (whichever is greater), and prove watertight.

2. Testing of pressure main lines must occur prior to installation of electric control valves, quick couplers or any other equipment that might prevent a proper test from being performed.

3. Test all piping under paved areas under hydrostatic pressure of 150 pounds per square inch, and prove watertight prior to paving.

4. Sustain pressure in lines for minimum 4 hours, unless otherwise authorized. If leaks develop (more than 5 percent), replace joints and repeat test until entire system is proven watertight.

5. All hydrostatic tests shall be conducted only in the presence of the Architect or other duly authorized representative of the Owner. Do not completely backfill pipe until it has been inspected, tested and approved in writing.

6. Furnish necessary force pump and all other test equipment if permanent connection is unavailable.

7. When the sprinkler irrigation system is completed, perform a coverage test in the presence of the Architect to confirm that water coverage for planting areas is complete and adequate. Furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from plans, or where the system has been willfully installed as indicated on the drawings when it is obviously inadequate without notifying the Architect. This test shall be accomplished before any planting occurs.

8. Provide handheld walkie-talkie or personnel as necessary to accomplish this task expeditiously.

9. Upon completion of each phase of work, test and adjust entire system to meet site requirements.

10. Test any low voltage wiring more than 50 feet long installed under paving for continuity prior to paving.

C. Final Observation Prior to Acceptance:

1. Operate each system in its entirety for the Architect at time of final observation. Any items deemed unacceptable by the Architect due to noncompliance with the specifications and drawings shall be corrected to the complete satisfaction of the Architect.

2. Operate the following at conclusion of maintenance period to confirm proper performance:

a. automatic controller

b. remote control valves (entire system from controller)

c. rain sensor

d. master control valve & flow sensor assembly

3. Evidence must be shown to the Architect that the Owner has received all required equipment, controller charts, record drawings, etc. before final observation can occur.

D. Conclusion of Maintenance Period:

1. At end of maintenance period, submit written confirmation to Architect that the system is operating properly, as per final acceptance, and note any changes/adjustments made during maintenance period. Based on this, Architect may request additional site review.

3.5 RAIN SENSING EQUIPMENT

A. Locate in field as directed by the Architect.

B. Check the system to ensure that sensor are operating correctly (no fewer than four times over a 30-day period). Adjust or relocate rain sensing equipment as necessary.

C. Relocation of equipment as required shall be within 15 feet of original location and shall be a part of the work of this contract.

D. Show written data to the Architect at conclusion of the project that this service has been rendered.

3.6 FLOW SENSOR AND MASTER VALVE

A. Flow sensor and master valve shall be installed per construction detail on drawing and according to manufacturer recommendation.

3.7 EXISTING LANDSCAPING/IRRIGATION

A. Protect all existing landscaping. Any existing landscaping removed or damaged shall be properly replaced, including sod, as directed by the Architect.

B. Verify that fencing has been provided around trees, located at the dripline (line of furthest branch of tree plus 3 feet). Notify Architect to review and approve final location of the proposed irrigation system layout and trenching in the vicinity of existing trees to be retained.

C. Do not excavate or install irrigation materials or equipment within the dripline of existing trees. Do not permit sprinkler heads to spray onto or within 5 feet of the trunks of existing trees. Use all possible care to avoid injury to trees and tree roots. Excavate by hand in areas where 2 inch and larger roots occur. Tunnel under all roots 2 inches and larger in diameter and heavily wrap with burlap, to prevent scarring or excessive drying.

D. Do not use ditching machine within the dripline of existing trees. In no case shall more than two sides of an existing tree be trenched for irrigation lines. Confirm trenching locations at existing trees with Owner to obtain approval prior to trenching. Where roots are encountered outside the dripline, hand trim the wall of the trench adjacent to the tree, making clean cuts through. Paint roots 1 inch and larger in diameter with two coats of Tree Seal, or equivalent. Close trenches adjacent to tree within 24 hours. Where this is not possible, shade the side of the trench adjacent to the tree with burlap or canvas.

E. All existing irrigation not a part of this phase of construction shall be protected and kept operational during construction. Installing contractor shall coordinate with W.U.S.D. maintenance personnel, prior to start of construction to minimize or avoid unnecessary damage or disruption to normal operation of existing systems.

F. All damaged existing irrigation shall be repaired and or replaced to match existing conditions. W.U.S.D. maintenance personnel to approve all repair/replacements made.

G. Refer to plans for additional information.

3.8 MAINTENANCE

A. The entire sprinkler irrigation system shall be operated automatically for a period of seven days prior to any planting.

B. The Architect reserves the right to waive or shorten the operation period.

C. After maintenance period, demonstrate in presence of the Architect that the system is in proper operating order.

3.9 CLEANUP

A. Perform cleanup as each portion of the work progresses. Remove refuse and excess dirt from the site and sweep or wash down all walks and paving. Repair any damage to the work of others and return to original condition.

3.10 OPERATING INSTRUCTIONS

A. Train Owner's maintenance personnel in proper operation of all major equipment. Provide written confirmation of the person(s) so trained to the Architect.

B. During maintenance period, establish infiltration rate of soil in all areas (particularly slopes). Schedule automatic controller to not exceed saturation point, and program repeat cycles as required to meet landscape needs while avoiding runoff. At conclusion of maintenance period, provide a typed record of the watering schedules for each valve during maintenance, including various schedules due to seasonal changes.

3.11 SERVICES/DATA TO BE PROVIDED BY THE CONTRACTOR

A. Water schedules

B. Training of Owner's personnel in proper operation of all major equipment

C. Equipment to be supplied per Section 1.5, E.

END OF SECTION

SECTION 329300
PLANTS

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. Section Includes:

1. Plants.

2. Planting soils.

3. Tree stabilization.

4. Landscape edgings.

B. Related Sections:

1. Division 31 Section "Site Clearing" for topsoil stripping and stockpiling.

2. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.

3. Division 32 Section "Planting Irrigation " for turf irrigation.

4. Division 33 Section "Subdrainage" for below-grade drainage of landscaped areas, paved areas, and wall perimeters.

1.3 ALLOWANCES

A. Allowances for plants are specified in Division 01 Section "Allowances."

1. Perform planting work under quantity allowances and only as authorized. Authorized work includes work required by Drawings and the Specifications and work authorized in writing by Landscape Architect.

2. Notify Landscape Architect weekly of extent of work performed that is attributable to quantity allowances.

3. Perform work that exceeds quantity allowances only as authorized by Change Orders.

B. Furnish trees as part of tree allowance.

1.4 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Division 01 Section "Unit Prices".

1. Unit prices apply to authorized work covered by quantity allowances.

2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.5 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

F. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

G. Planting Area: Areas to be planted.

H. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

I. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

J. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

K. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

L. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

M. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

N. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.6 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.

3. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

B. Samples for Verification: For each of the following:

1. Manufactured Topsoil Backfill: 1 quart volume of manufactured topsoil required; in sealed plastic bags labeled with composition of materials by percentage of weight and source. Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

2. Organic Mulch: 1 quart volume of organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

3. Mineral Mulch (Decomposed Granite): 5 lb. of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on the site; provide an accurate indication of color, texture, and makeup of the material.

4. Weed Control Barrier: 12 by 12 inches.

5. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.

6. Root Barrier: Width of panel by 12 inches.

7. Artificial Turf: Manufacturer’s standard sample size.

C. Qualification Data: For qualified landscape installer. Include list of similar projects completed by installer demonstrating installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

D. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.

2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

F. Warranty: Sample of special warranty.

1.7 AGRICULTURAL SUITABILITY ANALYSIS OF SOIL

A. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory. Contractor shall collect soil from the existing front yard after significant grading work has been performed but prior to landscape work commencing. Soil reports shall be prepared by Soil and Plant Laboratory in Orange, CA (714) 282-8777 or Wallace Laboratories in El Segundo, CA (310) 615-0116 or equal.

B. Components of Soil Analysis:

1. Must include pH measurement in the Saturation Extract, Electrical Conductivity of the saturation extract and Sodium Adsorption Ratio of the saturation extract. The approved procedures are the following:

pH	Method 21
Saturation Extract	Method 2
Sodium Adsorption Ratio	Method 20b

Methods of the United States Salinity Laboratory as published in the Agricultural Handbook Number 60 entitled "Diagnosis and Improvement of Saline and Alkali Soils".

2. The following nutrients and elements must be determined with an American Society of Agronomy or Soil Science Society of America approved extraction method. Interpretation data must be given citing concentrations which are considered to be low, medium and high:

a. boron, calcium, copper, iron, magnesium, manganese, molybdenum, phosphorus, potassium, sodium, sulfur, and zinc.

b. The approved methods are those cited by the Council on Soil Testing and Plant Analysis and those methods currently published by Soil Science Society of America manuals, Communications in Soil Science and Plant Analysis, Soil Science and Soil Science Society of America Journal. Approved methods for phosphorus are Bray Pl, Bray P2, Olsen P, DTPA, ammonium acetate, and ammonium bicarbonate-DTPA. Approved methods for boron are hot water extract and ammonium bicarbonate-DTPA extract.

3. The saturation extract must be analyzed for calcium, magnesium, sodium, boron, chloride, phosphorus, nitrate and sulfate.

4. The following trace metals must be measured by the DTPA extract:

   aluminum, arsenic, cadmium, chromium, cobalt, lead, lithium, nickel, selenium, silver, strontium, tin and vanadium.

5. The presence of calcium carbonate and/or magnesium carbonate must be determined.

6. Soil Texture (gravel, sand, silt and clay) must be determined. Determine organic matter content by the measurement of organic carbon. The quality of the organic matter shall be determined by measuring organic carbon and total nitrogen.

7. Interpretation of nutritional deficiencies or excesses and potential toxicities must be given.

C. Copies of the soil test results shall be provided to the Landscape Architect for review and confirmation of final soil amendment program proposed by the Installer.

1.8 QUALITY ASSURANCE

A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1. Selection of trees will be made by Landscape Architect, who will tag plants at their place of growth before they are prepared for delivery.

C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 36 inches above the root flare for trees.

2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

D. Plant Material Observation: Landscape Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Landscape Architect of sources of planting materials seven business days in advance of delivery to site.

2. Contractor shall arrange for site observation/field visits with Landscape Architect:

a. At the time of tree and/or shrub plant delivery and layout but prior to planting.

b. At completion of substantial planting operations being completed for final inspection to establish the beginning of the 90 day maintenance period.

c. At the end of the 90 day maintenance period to determine acceptable turnover to the District for maintenance. Warranty time periods begin at the beginning of the 90 day maintenance period.

E. Substitutions: substitutions for indicated plant materials must be approved by the Landscape Architect prior to delivery and are made at no additional cost to the owner.

F. Pre-installation Conference: Conduct conference at project site.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing planting areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1.10 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.

b. Structural failures including plantings falling or blowing over.

2. Warranty Periods from Date of substantial completion:

a. Trees: 12 months.

b. Shrubs, Vines, and Ornamental Grasses: 6 months.

c. Ground Covers, Biennials, Perennials, and Other Plants: 6 months.

d. Annuals: 3 months.

3. Include the following remedial actions as a minimum:

   a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.

   b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.

   c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.

   d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.12 MAINTENANCE SERVICE

A. Initial Maintenance Service: Provide maintenance by skilled employees of landscape installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.

   1. Maintenance Period for Trees and Shrubs: 3 months from date of planting completion & once the first punch list has been completed by the Landscape Architect.

   2. Maintenance Period for Ground Cover and Other Plants: 3 months from date of planting completion & once the first punch list has been completed by the Landscape Architect.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

C. Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions of the equivalent climate zone as outlined in Sunset Western Garden Book before delivery.

2.2 INORGANIC SOIL AMENDMENTS

A. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

B. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.3 ORGANIC SOIL AMENDMENTS

A. Types of acceptable products are composts, manures, mushroom composts, straw, alfalfa, peat mosses, etc. low in salts, low in heavy metals, free from weed seeds, free of pathogens, and other deleterious materials.

B. Composted wood products are conditionally acceptable [stable humus must be present. Wood based products are not acceptable which are based on redwood or cedar.

C. Organic soil amendment shall contain the follow:

1. Humus material shall have an acid-soluble ash content of no less than 6% and no more than 20%.

2. The pH of the material shall be between 6 and 7.5.

3. The salt content shall be less than 10 millimho/cm @ 25° C. on a saturated paste extract.

4. Boron content of the saturated extract shall be less than 1.0 parts per million.

5. Silicon content (acid-insoluble ash) shall be less than 50%.

6. Calcium carbonate shall not be present if to be applied on alkaline soils.

7. Sludge-based materials are not acceptable.

8. Carbon:nitrogen ratio is less than 25:1.

9. The compost shall be aerobic without malodorous presence of decomposition products.

10. The maximum particle size shall be 0.5 inch, 80% or more shall pass a No. 4 screen for soil amending.

D. Maximum total permissible pollutant concentrations in amendment in parts per million on a dry weight basis:

arsenic	20	copper	150	selenium	50
cadmium	15	lead	200	silver	10
chromium	300	mercury	10	vanadium	500
cobalt	50	molybdenum	20	zinc	300
		nickel	100		

Higher amounts of salinity or boron may be present if the soils are to be preleached to reduce the excess or if the plant species will tolerate the salinity and/or boron.

2.4 FERTILIZERS

A. Triple Superphosphate: (0-45-0) – a minimum of 45 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Ammonium nitrate (34-0-0) – 17% nitrogen derived from ammoniacal nitrogen and 17% nitrogen derived from nitrate nitrogen.

2. Ammonium sulfate: (21-0-0) – 21% nitrogen derived from ammoniacal nitrogen.

3. Potassium sulfate (0-0-50) – 50% potash derived from sulfate of potash.

4. 12-12-12 fertilizer – 12% nitrogen, 12% phosphorus oxide and 12% potash.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Urea formaldehyde (38-0-0) – A class of insoluble nitrogenous materials slowly available to plants.

2. Sulfur-coated Urea – 40% Urea and 30% Sulfur coated with a sealant.

D. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 21 gram tablets.

2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.5 PLANTING SOILS

A. Planting Soil: shall be site native soil for planting on grade. Verify suitability of soil to produce viable planting soil by submitting a minimum of 3 separate soil samples to a testing laboratory such as Wallace Laboratories or Soil and Plant Laboratories. Soil samples (approximately 1 quart each) shall be taken from 3 distinct areas of the project from a depth of about 6” to 12” below the surface. Submit testing results to Landscape Architect for review and recommendations for modifications to the amendment rates shown below.

B. Site native soil shall be clean soil of roots, plants, sod, stones, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. It shall not be infested with nematodes or other undesirable disease-causing organisms such as insects and plant pathogens. Topsoil shall be friable and have sufficient structure in order to give good tilth and aeration to the soil.

1. *Gradation limits* - soil shall be a sandy loam, loam, or clay loam. The definition of soil texture shall be the USDA classification scheme. Gravel over ¼-inch in diameter shall be less than 20% by weight.

2. *Permeability Rate* - Hydraulic conductivity rate shall be not less than one inch per hour nor more than 20 inches per hour when tested in accordance with the USDA Handbook Number 60, method 34b or other approved methods.

3. *Fertility* - The range of the essential elemental concentration in soil shall be as follows:

	Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram dry weight basis
phosphorus	2 – 40
potassium	40 – 220
iron	2 – 35
manganese	0.3 – 6
zinc	0.6 – 8
copper	0.1 – 5
boron	0.2 – 1
magnesium	50 – 150
sodium	0 – 100
sulfur	25 – 500
molybdenum	0.1 – 2

Fertility - Concentration of nutrients for final acceptance:

	Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram dry weight basis
phosphorus	10 - 40
potassium	100 - 220
iron	24- 35
manganese	0.6 - 6
zinc	1 - 8
copper	0.3 - 5
boron	0.2 - 1
magnesium	50 - 150
sodium	0 - 100
sulfur	25 - 500
molybdenum	0.1 - 2

4. *Acidity* - The soil pH range measured in the saturation extract (Method 21a, USDA Handbook Number 60) shall be 6.0 - 7.9.

5. *Salinity* - The salinity range measured in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 0.5 - 2.5 dS/m.

6. *Chloride* - The maximum concentration of soluble chloride in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 150 mg/l (parts per million).

7. *Boron* - The maximum concentration of soluble boron in the saturation extract (Method 3a, USDA Handbook Number 60) shall be 1 mg/l (parts per million).

8. *Sodium Adsorption Ratio (SAR)* - The maximum SAR shall be 3 measured per Method 20b, USDA Handbook Number 60.

9. *Aluminum* – Available aluminum measured with the Ammonium Bicarbonate/DTPA Extraction shall be less than 3 parts per million.

10. *Soil Organic Matter Content* - Sufficient soil organic matter shall be present to impart good physical soil properties but not be excessive to cause toxicity or cause excessive reduction in the volume of soil due to decomposition of organic matter. The desirable range is 3% to 5%. The carbon:nitrogen ratio should be about 10. A high carbon:nitrogen ratio can indicate the presence of hydrocarbons or non-humified organic matter.

11. *Calcium Carbonate Content* - Free calcium carbonate (limestone) shall not be present for acid-loving plants.

12. *Heavy Metals* - The maximum permissible elemental concentration in the soil shall not exceed the following concentrations:

	Ammonium Bicarbonate/DTPA Extraction parts per million (mg/kilogram dry weight basis
arsenic	1
cadmium	1
chromium	10
cobalt	2
lead	30
mercury	1
nickel	5
selenium	3
silver	0.5
vanadium	3

If the soil pH is between 6 and 7, the maximum permissible elemental concentration shall be reduced 50%. If the soil pH is less than 6.0, the maximum permissible elemental concentration shall be reduced 75%. No more than three metals shall be present at 50% or more of the above values.

13. *Phytotoxic constituent, herbicides, hydrocarbons etc.* - Germination and growth of monocots and dicots shall not be restricted more than 10%. Total petroleum hydrocarbons shall not exceed 50 mg/kg dry soil measured per the modified EPA Method No. 8015. Total aromatic volatile organic hydrocarbons (benzene, toluene, xylene and ethylbenzene) shall not exceed 0.5 mg/kg dry soil measured per EPA Methods No. 8020.

C. Mix native soil on grade with the following soil amendments and fertilizers in the following quantities to produce planting soil per 1,000 sq. ft. and rototill to a 6" depth (FOR BIDDING PURPOSES ONLY – SOIL ANALYSIS RECOMMENDATIONS SHALL SUPERCEDE THESE QUANTITIES AND RATIOS):

1.	Ratio of Loose Compost to Topsoil:	4 cu. yds.
2.	Weight of Agricultural Gypsum:	30 lbs.
3.	Weight of Triple Superphosphate:	20 lbs.
4.	Weight of Commercial Fertilizer:	35 lbs.
5.	Weight of Slow-Release Fertilizer:	30 lbs.

If recommendations from the soils laboratory indicate the incorporation of additional materials, or the quantities of specified materials should be changed, submit a revised cost for the work based on unit costs provided.

D. Till the soil by rototilling or other approved method of blending in crossing directions to incorporate soil amendments evenly to a depth of 6" thoroughness of mix may be approved by the Landscape Architect.

E. Contractor shall not bury soils high in organic matter or use imported topsoils high in organic matter to depths greater than 6 inches.

F. Finish grade of all planting areas shall be 1 inch below grade of all types of adjacent pavement.

2.6 MULCHES

A. Mineral Mulch: Decomposed Granite – see plans. Decomposed granite work shall consist of furnishing and placing decomposed granite, including site preparation and edging, as shown on the plans and in conformance with these special provisions, and as directed by the Landscape Architect.

1. Decomposed granite shall be 3/8" minus material and shall conform to the following:

   Grading Requirements (AASHTO T11-82 and T27-82)

U.S. Sieve Size	Percent Passing
#3/8”	100
#4	95-100
#8	75-80
#16	55-65
#30	40-50
#50	25-35
#100	20-25
#200 to	5-15

2. Stabilized Decomposed granite shall be as described above and include a stabilizer binder:

   a. Patented, non-toxic, organic binder that is a colorless and odorless concentrated powder that binds decomposed granite or crushed 3/8” or ¼” minus aggregate.

   b. Product to have 64% pre-consumer recycled content.

   c. Product shall have 25 years’ experience at same formulation.

3. The color of decomposed granite shall be standard tan color. The Contractor shall submit a 5lb sample of decomposed granite to the Landscape Architect for approval prior to delivery of materials to the site.

2.7 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.

B. Weed control fabric shall conform to the following:

Specification	Minimum Requirement
Grab Tensile Strength	59 kg
Grab Elongation	60%
UV Resistance	70% @ 150 hours
Mass	102 grams/square meter

C. Staples shall be 50-mm wide, 200-mm in length, and 11 gauge wire.

D. A copy of the manufacturer’s product sheet together with instructions for installation shall be furnished to the Landscape Architect 5 days before installation.

E. A Certificate of Compliance for the weed control mat shall be furnished to the Landscape Architect in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

2.8 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.9 TREE STABILIZATION MATERIALS

A. Stakes and Guys:

1. Upright and Guy Stakes: Galvanized metal pipes, 2” diameter x 10ft. minimum length. All trees to be triple staked.

2. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.

a. “ArborTie”, Soft Polypropylene materials by Deep Root, Inc. San Francisco, California.

b. “Cinch” tie – 24” minimum length.

c. “Gro Strait” tire rubber ties minimum 18” wide, 14 gauge galvanized wire tie rails.

2.10 LANDSCAPE EDGINGS

A. Concrete mow strips: see Architect or Civil Engineer’s plans.

2.11 MISCELLANEOUS PRODUCTS

A. Root Barrier: Black, molded, modular panels manufactured with 50 percent recycled polyethylene plastic with ultraviolet inhibitors, 85 mils thick, with vertical root deflecting ribs protruding 3/4 inch out from panel, and each panel 24 inches wide.

B. Filter Fabric: Nonwoven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

C. Artificial Turf: Olive Lush product by Easy Turf (877) 838-1587 – Code: GF-LIT-R-O. Pile Yarn Type UV-Resistant Polyethylene – 3/8” gauge with a pile height of 1-5/8” and face weight of 65 oz.

D. Jute Matting: shall be of a uniform open plain weave, single jute yarn, not varying in thickness by more than one half its normal diameter. Jute matting shall be furnished in rolled strips as follows: Length, approximately 50 to 75 yards, width, 45 inches to 50 inches. Ludlow Soil Saver No. 48, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Landscape Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and existing plants from damage caused by other planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Landscape Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 STABILIZED DECOMPOSED GRANITE INSTALLATION

A. Verify proper drainage has been established allowing water to easily drain across the surface of the decomposed granite without leaving standing water or causing erosion.

B. Before proceeding with installation, notify the Landscape Architect if unsuitable site/base conditions exist.

C. Stabilizer shall be thoroughly pre-mixed at a rate of 15lbs per 1-ton of aggregate by the manufacturer's recommendations using an approved mechanical blending apparatus. Always blend stabilizer and aggregate dry.

D. After pre-blending, placed stabilized aggregate directly on prepared sub-grade. Level to desired grade and cross section. Depth of pathways shall be 3".

E. Watering: water heavily for full-depth moisture penetration of profile to activate the stabilizer. Apply 25-45 gallons of water per ton to achieve saturation. Randomly test for depth using a probing device which reaches full depth.

F. Contractor shall wait a minimum of 6-72 hours or until such time that the stabilized aggregate is able to accept compaction from a 1 to 5 ton roller without separation, plowing or any other physical compromise of the aggregate. If surface aggregate dries significantly quicker than the subsurface material, lightly mist the surface before compaction.

G. Compact stabilizer aggregate to 85% relative compaction by equipment such as; a 2 to 5 ton double drum roller making 3 to 4 passes. Do not use a vibratory plate compactor or vibration feature roller. If pumping or pancaking of the surface occurs, surface is still too wet to roll.

H. Take care in compacting surfaces when adjacent to planting and irrigation systems, use 8" or 10" hand tamp. Installation of stabilized aggregate greater than 3" thick shall be installed in lifts of approximately half the total depth.

I. Lightly spray surface area following compaction. Do not disturb aggregate surface with spray action.

J. Finished surface shall be smooth, uniform, and solid with no evidence of chipping or cracking. Loose material shall not be present on the surface after installation but may appear after use or environmental conditions. Any significant irregularities in path surface shall be repaired to the uniformity of the entire installation.

K. Contractor shall provide protection around surface during the drying period which may take 12 to 72 hours after completion depending on weather conditions. Irrigation may need to be restricted until the drying period is complete.

3.4 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply soil amendments and fertilizer per soil analysis recommendations on surface and thoroughly blend planting soil but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is muddy or excessively wet.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Additional Agricultural Suitability Soil Testing shall be performed within 3 to 5 days after soil amendment and watering has occurred. Three (3) samples shall be taken from similar but not exactly the same locations as before. Test results shall be submitted to the Landscape Architect for review and possible additional amendment recommendations. Planting operations can not begin until soil tests have been reviewed.

3.5 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for container-grown stock.

2. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.

3. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.

4. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.

5. Maintain supervision of excavations during working hours.

6. Keep excavations covered or otherwise protected when unattended by Installer’s personnel.

B. Subsoil and topsoil removed from excavations may be used as planting soil.

C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

2. Utility lines, pipes, and vaults.

D. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.6 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set container-grown stock plumb and in center of planting pit or trench with root flare 2 inches adjacent finish grades.

1. Use planting soil for backfill.

2. Carefully remove root ball from container without damaging root ball or plant.

3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

E. Water basins shall be constructed for plantings on slopes from available site soil and shall provide a large enough watering basin to fully surround the outside edge of the rootball and provide for a long term 6” of water depth during the establishment period.

3.7 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Landscape Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.8 SODDED TURF INSTALLATION

A. Complete fine grading and specified soil preparation before lawn installation.

B. Apply starter fertilizer per supplier’s recommendations.

C. Sod or Roll Sod: type, thickness, and areas of installation shall be in accordance with Drawings and Specifications.

D. Remove roll sod netting prior to installation.

E. Thickness of sod or roll sod shall be recommended thickness below finish grade. Complete soil conditioning and fine grading before installation. Do not operate heavy equipment over completed sub-grade. Sub-grade shall be moist when sod is installed. Install sod with closely fitted joints and stagger ends of strips. Plug opening with sod or topsoil.

F. Lightly irrigate within two hours after installing sod and before rolling. Roll seams and joints until sod is well bonded to sub-grade.

G. Water area thoroughly to penetrate sub-grade at least 8 inches. Repeat watering as necessary to keep sod moist until rooted in sub-grade. Protect sod areas against foot traffic until sod is well established. Replace damaged areas with new sod.

H. Sod installation shall be complete at least 12 weeks prior to the opening of school.

I. Repair of existing or newly installed sod area:

1. Rake, drag, float and roll seed bed as often as necessary to produce a true, uniform, and smooth seed bed. Remove debris, stones, etcetera.

2. Prior to any lawn installation, obtain approval on fine grading of bed for sod areas.

3. Water seed bed thoroughly until a moisture penetration of 8 inches is achieved.

4. Place new sod to fill in damaged areas so that no gaps, depressions, or rough edges are visible.

5. Irrigate immediately after completion and irrigate as frequently as necessary to assure establishment of the areas most vunerable to stress and temperature extremes.

6. Good turf coverage will be required before final acceptance of work.

7. Protect new sod from damage by erosion, trespass or any source. Safeguards and temporary fencing shall be erected where necessary, and precautions taken to prevent excessive runoff.

3.9 HYDROMULCH

A. Certification of Materials: The hydroseed applicator shall be responsible for submitting all seed bag certification tags and a signed certificate list of the quantity and type of materials used in the hydroseed installation.

B. Inspection: Site shall be properly prepared; weed control shall have been effective; coverage and other tests required in the Irrigation Section completed and depressions or other irregularities that resulted corrected; irrigation sprinklers shall have been programmed so its operation is compatible with the hydroseed work. Do not start seeding until all unsatisfactory conditions have been corrected.

C. Within three days after trees in turf areas have been planted, apply the hydroseed mixture.

D. Hydroseed Slurry Mix on Flat Ground will be a slurry mix containing mulch, seed, fertilizer and an organic stabilizer binder and green dye to insure even application:

1. Conwed 100% Wood Fiber at 2000 lbs. per acre.

2. Ecology Controls M-Binder at 150 lbs. per acre.

3. AM-120 Mycorrhizal Inoculum-Desert Suite at 60 lbs. per acre.

4. Seed Mix as specified – supplied by S&S Seeds

E. E.Hydroseed Slurry Mix on 2:1 slopes or greater will be a slurry mix containing mulch, seed, fertilizer and an organic stabilizer binder and green dye to insure even application:

1. Flexterra flexible growth medium at 3,500 lbs. per acre.

2. AM-120 Mycorrihizal inoculums at 60 lbs. per acre.

3. Tri C Humate at 800 lbs. per acre.

4. Seed Mix as specified – supplied by S&S Seeds

F. Hydroseed Slurry Mix of Athletic Turf Fields will contain a slurry mix containing mulch, seed, fertilizer, and an organic stabilizer binder and green dye to insure even application.

1. Agrono-Mulch: 1,500 lbs. / acre

2. Agrono-Tac binder: 120 lbs. / acre

3. Pre-Emergent Herbicide: Tupersan at 12 lbs. / acre

4. Seed rate: 15 lbs. / 1,000 sq. ft.

G. Hydro-Mulching Application:

1. Equipment: Hydraulic equipment used for the application of the fertilizer seed and slurry of prepared wood pulp shall be of the “Super Hydro-Seed” type as approved by the Landscape Architect. The equipment shall have a built-in agitation system and operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry containing not less than 40 lbs. of fiber mulch plus a combined total of 7 lbs. Fertilizer solids for each 100 gallons of water.

2. The slurry distribution lines shall be large enough to prevent stoppage and shall be equipped with a set of hydraulic spray nozzles which will have a minimum capacity of 1, 500 gallons, and shall be mounted on a traveling unit, either self-propelled or drawn by a separate unit, which will place the slurry tank and spray nozzle within sufficient proximity to the areas to be seeded.

3. Preparation: Prepare at site of the work.

   a. Add water to tank, with equipment operating at half-speed.

   b. When water level reaches height of agitator shaft and good recirculation has been established, add the seed.

   c. After adding the seed and when the tank is at least 1/3 filled with water, add the fertilizer.

   d. Increase to full speed when tank is ½ filled with water.

   e. Start adding wood pulp mulch; all to be added by the time tank is between 2/3 and 3/4 filled.

4. Application: Begin spraying as soon as tank is full.

   a. Apply slurry in an even uniform visible coat; use an arched stream in a sweeping motion so slurry will fall like rain allowing wood fibers to build on each other until a proper coating and required coverage has been achieved.

   b. Reseed any bare or damaged areas as required to provide proper coverage.

5. Time Limit for use of Slurry Mixture: Slurry mixture must be applied within four hours of mixing, or it will be rejected and removed from the project at the Contractor's expense.

6. Protection: Special care should be exercised by the Contractor in preventing any of the slurry to be sprayed inside any reservoir basin or onto drainage ditches and channels which may impede the free flow of rain or irrigation water. Any slurry spilled onto restricted areas shall be cleaned up at the Contractor's expense.

   a. It shall be the responsibility of the applicator to assure himself the site is properly prepared, the irrigation system is operating and programmed not to affect the results of his operations, and that the weed control has been effective.

   b. The applicator shall be responsible for notifying the Contractor and Architect if he feels that the site is not properly prepared.

   c. The applicator shall take responsibility for repairing all damage created by his equipment. Repairs shall be blended and floated to match surrounding areas and reseeded.

H. Watering: After hydromulching, all seeded areas shall be thoroughly watered with a fine spray. Lawns shall be kept continually moist by watering as often as required.

I. Seed shall be evenly sown at a time when little or no wind is blowing.

J. Reseeding: Any lawn areas that do not show a prompt germination of grass shall be re-seeded at 10 day intervals until an acceptable stand of grass is assured.

K. Clean-Up: Contractor shall remove all debris and equipment upon completion of operations and clean off all over-flow of hydromulch from walks, walls and fences.

L. After lawn or turf areas have been prepared and sown, erect enclosing protection fences.

   1. 1. Fences shall consist of 2 strands of #12 gauge galvanized wire strung on not less than 2 x 2 x 48" long stakes firmly driven into ground a minimum distance of 1'-0". Stakes shall be set at not more than 10'-0" centers with one wire 2" below top and the other 12" above ground. Upon notification by the District, Contractor shall remove fences and dispose of them off site.

3.10 TREE STABILIZATION

A. Install trunk stabilization as follows unless otherwise indicated:

   1. Upright Staking and Tying: Stake 15 gallon, 24-inch box, and 36-inch box trees – see detail on Sheet L2.02.

2. Use a minimum of three metal stakes of length required to penetrate at least 18-inches below bottom of backfilled excavation and to extend a minimum 6 ft. above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.

3. Space stakes equally around trees. Larger trees or low branch/multi-trunk trees shall be guyed.

4. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.11 ROOT-BARRIER INSTALLATION

A. Install root barrier where trees are planted within 48 inches of paving or other hardscape elements, such as walls, curbs, and walkways unless otherwise shown on Drawings.

B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for a distance of 5 feet in each direction from the tree trunk, for a total distance of 10 feet per tree. If trees are spaced closer, use a single continuous piece of root barrier.

1. Position top of root barrier flush with finish grade.

2. Overlap root barrier a minimum of 12 inches at joints.

3. Do not distort or bend root barrier during construction activities.

4. Do not install root barrier surrounding the root ball of tree.

3.12 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.13 PLANTING AREA TOPDRESSING

A. Decomposed Granite: apply at 2” layer of non-stabilized decomposed granite. Make adjustments in rough grading by keeping grades at least minimum below adjacent paved areas so finish grade can be flush with adjacent paving to reduce trip hazard.

B. Shall be applied to all shrub areas except turf and hydroseed slopes with jute netting.

C. Sloped Planting Areas: all planting areas with slopes greater than 4:1 shall receive a cover of jute netting for soil stabilization and erosion control.

3.14 EDGING INSTALLATION

A. Concrete Mow Strips: install concrete mow strips prior to planting all shrub or smaller plant materials but after tree and irrigation installation.

3.15 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.16 BANK STABILIZATION

A. Where non-turf slopes on banks exceed a grade of 4:1, or if so indicated on Drawings, one or more of following bank stabilization methods shall be used:

B. Jute Matting:

1. Surface of slopes receiving matting shall be smooth and sufficiently loose to permit bedding of mesh fabric.

2. Roll matting onto slope vertically or horizontally overlapping 2" at edge and 6" at end of rolls. Secure to ground with #12 gage steel wire staples 6" deep at 3'-0" maximum on center at seams and 2'-0" maximum on center at outer perimeter to hold matting down. Extend matting 2'-0" beyond toe of slope. Bury ends of roll 8" deep to anchor on top or toe of slope.

3. After matting is secured in place, tamp or roll with approved equipment to press firmly into soil. Matting shall be flush with ground surface over entire sloped area so that flow of water will be over matting.

4. Plant groundcover through matting.

5. Maintain jute matting in good condition until all work of landscape planting has been completed and accepted by the District. Repair eroded areas and replace and restaple loose or undermined matting.

6. In addition to above, refer to and follow recommendations of jute mesh manufacturer.

3.17 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.18 FINAL INSPECTION

A. Schedule the following inspections and notify the Landscape Architect and/or the District Inspector:

1. When lawn or turf areas are finished graded, ready for sodding.

2. When planting, sowing and all other indicated or specified work, except maintenance work, has been completed.

3. Final inspection at the completion of the maintenance period.

B. All plant materials shall be subject to inspection and approval of the District before planting.

C. After completion of all construction and planting operations, request for a check inspection. Allow at least two (2) calendar days notice prior to inspection. This inspection, with the approval of the District, will establish the start of the landscape maintenance period. If the Landscape Architect determines the work to be substantially complete and in conformance with the plans and specifications the Contractor will be advised that the basic maintenance period has started. In order to be substantially complete, at least the following must have been finished.

1. All fine grading, including elimination of low points that hold runoff.

2. A complete and operable irrigation system.

3. Installation of all plant materials.

4. Uniform germination of seeded areas.

5. Minor pick-up items may be completed during the basic maintenance period such as:

    a. Replacement of damaged or non-conforming plant material.

    b. Restaking or tying of trees.

    c. Removal of watering basins.

    d. Filling of settled areas caused by application of normal water.

    e. Reseeding of bare and sparse areas in the retention basin shall be done within 30 days of the start of maintenance period to insure at least 60 days of growth before requesting an end of maintenance inspection.

D. At the end of the 90 day minimum maintenance period and when all pick-up items have been completed, and a dense and uniform turf exists, the Contractor may request a final inspection. Allow at least (2) calendar days notice prior to inspection. The Contractor will be advised by the Landscape Architect at the final inspection that he will recommend that the work is or is not satisfactory.

    1. During the final inspection, the Landscape Architect will arrange with the Contractor to take an additional soil sample on site under the Landscape Architect's direction for testing of soil conditions after amendments and landscape operations are complete. Contractor shall be responsible for arranging the shipping of and cost of soil testing. Results and recommendations of the soil test shall be sent to the Landscape Architect and the Contractor shall follow soil amendment and corrective recommendations provided therein.

    2. If the work is satisfactory, the basic maintenance period will end on the date of the final inspection.

    3. If the work is unsatisfactory, the basic maintenance period will continue at no additional expense to the Owner until the work has been completed, inspected, and approved by the Landscape Architect.

E. Guarantee: All trees shall be guaranteed for one year or a yearly growing cycle depending on the time of planting. All plant materials shall be guaranteed for a period of at least 90 days following planting which die or decline as a result of the planting or maintenance operation. Guarantees as required by other sections of these specifications shall be in effect after final inspection and acceptance by the Owner.

F. Maintenance Period Extension: The Owner shall have the option to extend the maintenance period in 30 day increments for a maximum of 90 days. If the maintenance period is extended by the Owner, the unit price for the first 30-day maintenance periods.

3.19 MAINTENANCE

A. Contractor shall continuously maintain all areas included in Contract during progress of work, maintenance period, and until final acceptance of work.

B. Maintenance period shall be for a minimum of 90 calendar days.

C. If plant materials are not acceptable at end of Contract, maintenance shall be continued by Contractor until acceptance by the District.

D. Maintenance shall include continuous operations of watering, weeding, mowing, rolling, trimming, edging, cultivating, fertilizing, spraying, insect and pest control, re-seeding, replacement or any other operations necessary to ensure good normal growth. Contractor shall be responsible for applying lawn moth control sprays or other materials, as often as may be required to protect lawns and turf during entire Contract period.

E. During installation period and during maintenance period, Contractor shall be responsible for maintaining adequate protection for all areas. Any damaged plantings shall be replaced at Contractor's expense.

F. At completion of maintenance period all plant materials shall be live, healthy, undamaged and free of infestations.

G. All lawn areas shall be completely covered with growing grass at time of final acceptance, leaving no barren spots larger than 3" x 3". Inferior plantings shall be replaced and brought to a satisfactory condition before final acceptance of work. All areas shall be neatly raked and free of weeds.

H. Mowing: All turf areas shall be mowed with a hand propelled reel mower for the first cutting. The cutting blade shall be sharpened prior to the first cutting. The cutting height shall be set 2” above grade. All clippings shall be removed from turf after each mowing. The turf shall be mowed at least two times prior to final inspection, or as directed by the Landscape Architect.

I. Replacements: Contractor shall replace any and all plant materials and grass that is dead or damaged. Replacements shall meet requirements for original plantings.

J. All planted areas shall be kept free of debris and shall be cultivated and weeded at not more than 10 day intervals. Grass, when 3" high, shall be mowed to a 1-1/2" height. Once established, grass shall be mowed at least once per week during maintenance period.

K. Water all plantings adequately to ensure complete germination of seed and continued growth of plants.

L. In areas that do not have sprinkler coverage or which may require supplemental deep watering. This shall be accomplished by hose watering or temporary sprinklers on stands.

M. Adjust all sprinkler heads in each area and zone of exposure so that optimum amount of water is applied according to capabilities of equipment and system on site.

N. Chemical herbicides may be used to control weeds when approved by the District IPM Coordinator.

O. Weed Control On Groundcover And Shrub Beds: Apply pre-emergent herbicide after planting. Herbicide shall be approved for use by the State and County and shall have minimal detrimental effect on groundcover plants. Rate and method of application shall conform to the written recommendations of manufacturer.

P. Maintenance Fertilization Program for Entire Site:

1. Uniformly broadcast Sulfur-Coated Urea (37-0-0) at the rate of 5 lbs. per 1,000 sq. ft. approximately 45 days after planting, with repeat applications every 60-90 days or as growth or color indicate.

2. In Spring of the following year after planting, substitute a complete fertilizer such as 16-6-8, or equal, for the Sulfur-Coated Urea at the rate of 6 lbs. per 1,000 square feet.

Q. Lawn Areas - Turf Areas:

1. Upon observing any lawn spreading into shrubs or groundcover areas, Contractor shall initiate a program of mechanical removal and maintain this program throughout maintenance period.

2. Any lawn appearing in paved areas shall receive an application of soil sterilant with the approval of the District IPM Coordinator.

3. Lawn Weed Control: At first appearance of any broadleaf weed germinating in lawn areas, Contractor shall remove same. If weeds persist or if damage resulting from this operation becomes objectionable. Contractor shall control weed growth with a selective weed killer with approval of the District IPM Coordinator, and maintain such control throughout the maintenance period.

R. Pruning Trees, Shrubs and Groundcover Areas:

1. Pruning shall be performed only at direction of the District Tree Surgeon and only by a qualified pruner.

2. All pruning shears, saws, etc. shall be sterilized prior to pruning each tree by total immersion in a solution of mercuric chloride or formalin.

3. All cuts larger than 3/4" diameter shall be immediately sealed with a compound produced specifically for that purpose such as "Tree Seal".

S. Insect and Fungus Control: Contractor shall be alert for signs of insect presence or presence of damage from plant fungi. Upon locating such evidence, Contractor shall report matter to the District Pest Control Specialist and take remedial action as directed by the District IPM Coordinator

T. Every 30 days during the maintenance period, before the application of fertilizer, the contractor shall obtain an agricultural suitability test for each of the areas tested previously following the same methods. Test results shall be forwarded to the Landscape Architect for review in determining final acceptance.

3.20 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before substantial completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

END OF SECTION

SECTION 331000
WATER UTILITIES

1.00 GENERAL

1.01 SUMMARY

A. Pipe and fittings for site water lines.

B. Valves.

C. Fire Hydrant

D. Water meter

E. Backflow preventer.

1.02 RELATED SECTIONS

A. Section 312000 Earthwork.

B. Section 312333 Trenching and Backfilling.

1.03 REFERENCES

A. American Water Works Association Standards (AWWA).

B. Rosamond Community Services District - Design Standards.

C. Standard Specifications for Public Works Construction (Green Book), latest edition.

1.04 SUBMITTALS

A. Submit the following:

1. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories.

2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

3. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Turn over to the project manager one set of drawings with all deviations from the plans shown in neat, clean and readable red ink.

4. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

5. Disinfection Report:

a. Type and form of disinfectant used.

b. Date and time of disinfectant injection start and time of completion.

c. Test locations.

d. Name of person collecting samples.

e. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.

f. Date and time of flushing start and completion.

g. Disinfectant residual after flushing in ppm for each outlet tested.

6. Bacteriological Report:

a. Date issued, project name, and testing laboratory name, address, and telephone number.

b. Time and date of water sample collection.

c. Name of person collecting samples.

d. Test locations.

e. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.

f. Coliform bacteria test results for each outlet tested.

g. Certify water conforms, or fails to conform, to bacterial standards of AWWA C651 Section 7.1 Standard Conditions

7. Water Quality Certificate: Certify water conforms to quality standards of the District's Representative, suitable for human consumption.

1.05 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of piping mains, valves, connections, fire hydrant, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with Rosamond Community Services District Standards, AWWA, Standard Specifications for Public Works Construction California, Fire Code Chapters 5 & 33 and NFPA 24.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.07 QUALIFICATIONS

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years' experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by State of California.

C. Submit bacteriologist's signature and authority associated with testing.

1.08 DELIVERY AND STORAGE

A. Deliver and store valves in shipping containers with labeling in place.

2.00 PRODUCTS

2.01 GENERAL

A. All fire water lines shall be designed for a minimum working pressure of 305 psi unless otherwise indicated on plans. All fittings appurtenant piping materials shall be designed for a minimum working pressure of 305 psi unless otherwise indicated on plans.

B. All domestic water lines shall be designed for a minimum working pressure of 250 psi unless otherwise indicated on plans. All fittings appurtenant piping materials shall be designed for a minimum working pressure of 250 psi unless otherwise indicated on plans.

2.02 PIPE

A. Joints: Mechanical joints shall be used for the waterline construction unless otherwise shown on plans and standard details. Gaskets for mechanical joints shall be rubber conforming to ANSI/AWWA C111/A21.11.

B. Fittings: Fittings shall be ductile iron rated for 250 psi working pressure for domestic water lines and 305 psi working pressure for fire water lines. Mechanical joint fittings shall conform to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53-19. Lining for fittings shall be Plastic Engineering P.E.I. 100 epoxy to a minimum thickness of 10 mils. Fittings shall be wrapped with 6 mil. polyethylene sheet. Grease all underground nuts and bolts before wrapped with the polyethylene sheet.

C. Polyvinyl Chloride (PVC) potable water pipe: Pipe material shall be (Polyvinyl chloride (PVC) pressured pipe shall be manufactured in accordance with AWWA Standard Specification C-900).

2.03 GATE VALVES

A. Conform to AWWA C-509-01.

B. Gate valves shall be iron body, NRS valves with O-ring seals, and shall open when the stem is rotated counterclockwise. The valves shall be designed for a minimum working pressure of 250 psig, have a bronze stem, and have a cast iron wedge with styrene butadiene rubber permanently bonded to the wedge. The valves shall have full port openings for unobstructed flow, be designed for underground service, and be in full compliance with the latest revision of AWWA C509. The valve linings and coatings shall be in accordance with AWWA C210-84. Linings and coatings shall be factory applied. Valves shall be furnished with 2-inch square operating nut. Valve shall be wrapped with 6 mil. polyethylene sheet. Grease all underground nuts and bolts before wrapping with the polyethylene sheet.

2.04 FIRE HYDRANT

A. Fire hydrants shall be Mueller A-421A or Clow 850 (wet barrel only) or approved equal. 1 - 4 ½" and 2 - 2 ½" individually valved outlets

2.05 WATER METER

A. Any water meters shall be dictated per Rosamond Community Services District.

2.06 BACKFLOW PREVENTER

A. Make and model per plans.

2.07 ACCESSORIES

A. Concrete for Thrust Blocks: Contractor shall construct concrete thrust block per Rosamond Community Services District Construction Plates.

B. Thrust blocks shall be constructed to bear against undisturbed earth and shall not bear against adjacent pipe, fittings, or valves. Where concrete must be poured around adjacent pipe, a block out or a short pipe length shall be used such that a flexible joint exists within 12 inches of each side of thrust block, unless indicated otherwise on the plans. Concrete shall not be allowed to set in contact with pipe surfaces or to enter or come in contact with any joint.

C. Valve Appurtenances: The Contractor shall furnish and install all valve appurtenances. Provide two galvanized T-handled operating wrenches, 4 feet total length or as required to easily access valve from grade.

D. Valve box shall be Christy G5 traffic valve box with bolt down cast iron lid or approved equal. The cover shall be marked "water." The extension piece shall be 6" diameter minimum SDR 35.

E. Appropriate warning detector tape shall be placed over all utilities.

1. Underground detectable warning tape shall be placed over all non-metallic underground utilities.

2. 12-gauge copper continuous location wire shall be placed on all water mains.

F. Corrosion-Protection Encasement for Piping

1. Encasement for Underground Metal Piping and Fittings: AWWA C105, Polyethylene film, 10 mil minimum thickness, tube or sheet. Plastic wrap shall be clear or black. Purple wrap shall not be used.

3.00 EXECUTION

3.01 EXAMINATION

A. Maintenance records in accordance with NFPA 25.

B. Verify the existing water main sizes, class of pipes, and locations as indicated.

C. Verify piping system has been cleaned, inspected, and pressure tested.

D. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.02 PREPARATION

A. Remove scale and dirt, on inside and outside, before assembly.

B. Prepare pipe connections to equipment with flanges or unions.

3.03 BEDDING

A. Excavate pipe trench in accordance with Specification Section 31 23 33 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, compact to a minimum of 90 percent relative compaction.

C. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers to protect the pipe. Jetting is not permitted to obtain required compaction.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 INSTALLATION - PIPE

A. Route pipe in straight line.

B. Install pipe to allow for expansion and contraction without stressing pipe or joints.

C. Install access fittings to permit disinfection of water system.

D. Form and place concrete for thrust blocks at each elbow or change of direction of pipe main in accordance with Rosamond Community Services District Plans & Specifications.

E. Protect metal restrained joint components against corrosion by applying a bituminous coating by coating with non-oxide corrosion resistant greased 10 mil plastic wrap.

F. Establish elevations of buried piping to ensure cover conforming to District Standards. The minimum cover from the finish grade to the top of pipe is 30 inches for potable waterlines and 36 inches for fire waterlines, any shallower cover to clear with the existing utility crossings shall be reviewed and approved by the District's Representative.

G. Install 12-gauge copper continuous location wire over top of pipe.

H. Backfill trench in accordance with Specification Section 31 23 33.

I. Maintain separation of water main from sewer piping in accordance with the State Department of Health Services, Criteria for the Separation of Water Mains and Sanitary Sewers (Section 64630, Title 22 California Administrative Code), and State Regional Water Quality Control Board.

J. All pipe laid in trench which is to be left for further extension (i.e., end of work day) shall have its open end covered to protect from possible rodent intrusion.

3.05 INSTALLATION - VALVES

A. Set valves on solid bearing per Rosamond Community Services District Plans & Specifications.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

C. Install brass valve 1 ½" diameter tags and imprint valve number per District.

3.06 SERVICE CONNECTIONS

A. Not Applicable.

3.07 PRESSURE TEST OF WATER PIPING SYSTEM

A. Water piping system shall be pressure tested for 2 hours at 200 psi, with no allowable drop in water pressure.

B. All leakage tests shall be completed and approved prior to placing of permanent resurfacing.

C. Pressure test shall be witnessed by District's inspector.

3.08 DISINFECTION AND BACTERIA TESTING OF WATER PIPING SYSTEM

A. Water piping system shall be disinfected and flushed per AWWA Section C651.

B. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.

C. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.

D. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

3.09 TEST RECORDS

A. Records shall be in accordance with NFPA 13 & 24. Records shall be made of each piping system installation during the test. These records shall include:

1. Date of test.

2. Description and identification of piping tested.

3. Test fluid.

4. Test pressure.

5. Remarks to include such items as:

a. Leaks (type, location).
b. Repairs made on leaks.

6. Certification by Contractor and signed acknowledgment by the District's Representative.

3.10 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by District’s Representative.

B. Perform pressure test on potable water distribution system in accordance with Rosamond Community Services District Plans & Specifications except that there is no allowable leakage for the duration of the test.

1. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.

2. Examine exposed piping, fittings, valves, hydrants, and joints carefully during hydrostatic pressure test. Repair or replace damage or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.

END OF SECTION

SECTION 333000
SANITARY SEWERAGE UTILITIES

1.00 GENERAL

1.01 SUMMARY

A. Site sanitary sewerage piping, fittings, accessories and bedding.

B. Cleanouts.

1.02 RELATED SECTIONS

A. Section 312000 Earthwork.

B. Section 312333 Trenching and Backfilling.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction SSPWC (Green Book), latest edition.

B. ASTM Standards.

C. Rosamond Community Services District - Design Standards.

1.04 SUBMITTALS

A. Submit:

1. Product Data: Provide data indicating pipe, pipe accessories and appurtenances, and manhole covers.

2. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.

3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

4. Manufacturer’s Certificate: Certify that installers are certified for installing plastic pipe.

1.05 PROJECT RECORD DOCUMENTS

A. Submit Record Drawings: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 REGULATORY REQUIREMENTS

A. Conform to California Title 24 (CCR) Part 5, latest edition, for installation of the Work of this section.

B. Minimum separation distance and requirements between water, reclaimed water and sewer pipes per the State of California, Department of Health Services shall be established.

2.00 PRODUCTS

2.01 SEWER PIPE MATERIALS AND ACCESSORIES

A. Polyvinyl Chloride (PVC) Pipe for Gravity Sewer: ASTM 3034-SDR35 Ring-Tite Polyvinyl Chloride (PVC) gravity sewer pipe and fittings; inside nominal diameter as indicated on Drawings. PVC pipe shall use “locked-in” rubber sealing ring conforming to ASTM D-3212. Joints using flexible Elastomeric Seals. Minimum pipe stiffness at 5% deflection shall be 46 psi for all sizes when tested in accordance with ASTM Method of Test D2412.

2.02 CLEANOUTS

A. Form and cast-in-place, Class 618-CLE-4000 P concrete base pad, with provisions for sewer pipe end section.

B. Frame and cover shall be Christy G3 or equal, lettered “sewer”.

2.03 BEDDING MATERIALS

A. Refer to Specification Section 312333 Trenching and Backfilling for Bedding Material.

3.00 EXECUTION

3.01 EXAMINATION

A. Verify that trench cut and/or excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with granular fill.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.03 BEDDING

A. Excavate pipe trench in accordance with Specification Section 312333. Hand trim excavation for accurate placement of pipe to elevations indicated on drawings.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth, compact to minimum of 95 percent of maximum dry density.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 INSTALLATION - PIPE

A. Install pipe, fittings and accessories in accordance with manufacturer's instructions.

B. Sewer pipeline shall be placed from downstream to upstream beginning at the downstream connection to the existing sewers.

C. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Install bedding along sides and over top of pipe to minimum compacted thickness of 12 inches; compacted to a minimum of 95 percent of maximum dry density.

E. Refer to Specification Section 312333 for Trenching Requirements. Do not displace or damage pipe when compacting.

F. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers to protect the pipe.

3.05 INSTALLATION – CLEANOUTS

A. From bottom of excavation clean and smooth to correct elevation.

B. Establish elevations and pipe inverts for inlets and outlets as indicated on drawings.

C. Mount lid and frame level in grout, secured to cone section to elevation indicated on drawings.

3.06 FIELD QUALITY CONTROL

A. Preliminary Tests: The Contractor may perform any tests desired which are not harmful to the lines before backfilling is completed.

B. Cleaning: Before final tests are performed for acceptance of any sewer pipe, clean the pipe by inflatable rubber ball method.

C. Perform air pressure test per SSPWC Section 501-6.4.

D. Repairs, if necessary: If the leakage or infiltration is greater than the amount specified, the pipe shall be overhauled and re-laid if necessary, by the Contractor, at its own expense, until the joints will hold satisfactorily.

E. Regardless of the results of the above tests, any visible evidence of individual leaks shall be corrected by the Contractor to the satisfaction of the District's Representative.

F. Cleaning Sewer: After all backfilling, compaction testing and paving is completed, sewer lines shall be cleaned by Inflatable Rubber Ball Method, flushed and cleaned, before acceptance by the District's Representative and connection to their sewer system is made.

G. The Contractor shall furnish all sewer line plugs necessary for blocking off all lines as required by the District's Representative until final acceptance.

3.07 PROTECTION

A. Protect finished installation.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 334000
STORM DRAINAGE UTILITIES

1.00 GENERAL

1.01 SUMMARY

A. Storm drainage piping, fittings, accessories, and bedding.

B. Catch basins.

C. Manholes.

D. Inlet and outlet structures.

1.02 RELATED SECTIONS

A. Section 312000 Earthwork.

B. Section 312333 Trenching and Backfilling.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. ASTM Standards.

C. Kern County Drainage Standards

1.04 SUBMITTALS

A. Submit the following in accordance with provisions in Division 1:

1. Product Data: Provide data indicating pipe, pipe accessories and catch basin grates.

2. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

4. Layout diagram for storm drain components per plan.

1.05 PROJECT RECORD DOCUMENTS

A. Submit record drawings. Accurately record locations of pipe runs, connections, catch basins, structures, manholes and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements and elevations are as indicated on drawings.

B. Complete pothole work per plans and notify the District of any discrepancy prior to commencing construction.

1.07 COORDINATION

A. Coordinate the work with connection to existing storm drain mains, and trenching.

2.00 PRODUCTS

2.01 PIPE MATERIALS

A. 12" Dia and Under: Polyvinyl Chloride (PVC) Pipe with water tight joints, per SSPWC Section 207-17.

B. 18" Dia and Larger: High Density Polyethylene (HDPE) Pipe (N-12 WT) with water tight joints, per SSPWC Section 207-18.

2.02 PIPE ACCESSORIES

A. PVC: Elastomeric Gasket water tight joints per SSPWC Section 207-17.3.2.

B. HDPE: Water-Tight Joints per SSPWC Section 207-18.4.1.

2.03 CATCH BASINS AND MANHOLES

A. Precast concrete catch basins shall include grate, as manufactured by Brooks Precast or approved equal.

B. Plastic drain basins, where called out on plans, shall be Nyloplast or approved equal.

C. Manholes shall be per SPPWC Std Plan 321-2.

2.04 METAL

A. All exposed metal parts are to be galvanized in accordance with SSPWC, Section 210-3.

2.05 CONCRETE

A. All concrete shall be Class 560-C-3250, per SSPWC Section 201.

2.06 BEDDING MATERIALS

A. Refer to Specification Section 312333 Trenching and Backfilling for Bedding Material.

2.07 FILTER FABRIC

A. Filter fabric shall be non-woven geotextile filter fabric Mirafi 140N or approved equal.

3.00 EXECUTION

3.01 EXAMINATION

A. Verify that trench cut is ready to receive Work and excavations, dimensions, and elevations are as indicated on Drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with compacted bedding material.

B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.03 BEDDING

A. Excavate pipe trench in accordance with Specification Section 312333. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.

B. Place bedding material in trench bottom, level materials in continuous layer. Bedding shall be 4" thickness for pipe diameters less than or equal to 24” and 6” thickness for pipe diameters greater than 24” and shall be per SSPWC Section 217-1.2.

3.04 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions and per SSPWC Section 207.

B. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

C. Install backfill along sides and over top of pipe. Provide backfill over top of pipe to minimum compacted thickness of 12 inches, compacted to a minimum of 95 percent of maximum dry density.

D. Refer to Specification Section 312333 for Trenching Requirements. Do not displace or damage pipe when compacting.

E. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers or equal to protect the pipe.

3.05 INSTALLATION - CATCH BASINS, MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base with provisions for storm drainage pipe end sections.

C. Level top surface of concrete base to receive shaft sections.

D. Establish elevations and pipe inverts for inlets and outlets as indicated on drawings.

E. Compact top 12" of native materials below the bottom of catch basins and manholes to minimum 95 percent of maximum dry density.

3.06 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District's representative.

B. Request inspection prior to and immediately after placing backfill cover over pipe.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to the District.

3.07 PROTECTION

A. Protect pipe and backfill cover from damage or displacement until backfilling operation is in progress.

END OF SECTION