Yerba Buena High School

NEW STUDENT UNION ALTERATION & ADDITION

PROJECT NO.: Z-060-601

100% CD PHASE
PROJECT MANUAL

September 2, 2016

Architect: MFDB Architects, Inc.
111 Scripps Drive
Sacramento, CA 95825
(916) 972-0131

Contractor: Flint Builders
401 Derek Place
Roseville, CA 95678
(916) 757-1000

MFDB ARCHITECTS

MFDB ARCHITECTS INC.

FLINT

100% CD PHASE

PROJECT MANUAL – FLINT/MFDB

TABLE OF CONTENTS

DOCUMENT 01 10 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

A. Document includes summary of Work including:
   1. Summary
   2. Work Covered By Contract Documents
   3. Proposal Items, Allowances, and Alternates
   4. Work Under Other Contracts
   5. Future Work (N/A)
   6. Work Sequence
   7. Work Days and Hours
   8. Cooperation of Design-Build Entity and Coordination with Other Work
   9. Maintenance, Product Handling, and Protection
   10. Partial Occupancy/Utilization Requirements
   11. Design-Build Entity Use of Premises
   12. Lines and Grades
   13. Protection of Existing Structures and Utilities
   14. Damage to Existing Property
   15. Dust Control
   16. Parking
   17. Laydown/Staging Area
   18. Unfavorable Construction Conditions
   19. Construction Site Access
   20. Site Administration
   21. Products Ordered In Advance
   22. District-Furnished Products

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Furnish all services, labor, materials, furniture, fixtures and equipment, permits, temporary controls and construction facilities, all general conditions, seismic requirements, general requirements and incidentals required to complete the Work in its entirety as described in the Contract Documents.

B. Furnish all services, labor and material to perform the abatement work described in 00 21 26 Hazardous Materials: Asbestos, Lead and PCB Abatement Project Specifications and the associated Appendix A – Scope of Work for each location in its entirety. This cost is to be included as a line items of the Design-Build Entity's Proposal. Any abatement work not performed will be credited back to the District per the unit prices of 00 21 26 Hazardous Materials: Asbestos, Lead and PCB Abatement Project Specifications, Appendix B – Abatement Unit Prices, included with the Design-Build Entity's Proposal.

C. The Work of this Contract shall be the programming, design and construction of Yerba Buena Student Union and Quad Modernization
   a. Programming and Schematic Design Services: See Document 01 10 01 (Summary of Work – Programming and Design Services).
   b. Design Services: See Document 01 10 01 (Summary of Work – Programming and Design Services)
   c. FF&E
   d. Construction
   e. Operation and closeout

SUMMARY OF WORK

1.3 PROPOSAL ITEMS, ALLOWANCES, AND ALTERNATES

A. Any Proposal Item may be deleted from the Work and Contract Sum, in total or in part, prior to or after award of Contract without compensation in any form or adjustment of other Proposal Items or prices therefore.
B. Payment of all items is subject to provisions of Contract Documents, including without limitation Document 01 29 00 (Payments and Completion).
C. For all Proposal Items, furnish and install all work indicated and described in the Contract Documents.
D. Alternates: The Design-Build Entity may suggest additional best value options to the District as unsolicited alternates on Document 00 41 00 (Proposal Form).
E. Allowance:
   1. Refer to Section 01 21 00 (Allowance) for scope of Allowances.
   2. FF&E Allowance: All Group II FF&E will be owner furnished and owner installed.

1.4 WORK UNDER OTHER CONTRACTS

A. Several other projects may be underway at Yerba Buena High School during the anticipated duration of the Project, including but not limited to:
   1. Districtwide Swimming Pool Modernizations Project
   2. Districtwide Security Camera Upgrade Project
   3. Districtwide Energy Efficient Project
   4. Districtwide Mechanical and Electrical Upgrades Project

B. Design-Build Entity shall cooperate with and participate in joint scheduling with the District Representative and the District's other separate Contractors where activities of the projects are related and/or adjacent and/or need to occur in sequence or simultaneously to benefit the District.
C. Coordinate with District and any District forces, or other contractors, as required by Document 00 71 00 (General Conditions), paragraph 6.

1.5 FUTURE WORK

A. Yerba Buena High School Main Electrical Switchgear Replacement

1.6 WORK SEQUENCE

A. Construct Work in stages and at times to accommodate District operation requirements during the construction period; coordinate construction schedule and operations with District.
B. Design-Build Entity shall not have access to the Project Site before the District has had proper time to demobilize, unless otherwise agreed upon by District. Design-Build Entity shall schedule Work in this area accordingly.
C. Design-Build Entity acknowledges that shoring may be required to maintain a safe excavation and protect facilities, including both existing and recently constructed under this Contract. All expenses for shoring of excavations shall be included in the appropriate Proposal items.

1.7 WORK DAYS AND HOURS

A. The District's Regular Work Days and hours: Monday-Friday inclusive, 7:00 a.m. - 5:00 p.m. local time.
B. Work at the Site on weekends or holidays is not permitted, unless Design-Build Entity requests otherwise from District in writing at least 48 hours in advance and District approves in its sole discretion. In the case of Work by Design-Build Entity after normal working hours, Design-Build Entity shall be responsible for any additional inspection costs incurred by the District. Such costs may be withheld from any succeeding monthly progress payment.
C. Connections to Existing Facilities. Unless otherwise specified or indicated, Design-Build Entity shall make all necessary connections to existing facilities, including structures, drain lines, and utilities such

as water, sewer, gas, telephone, and electric. In each case, Design-Build Entity shall receive permission from District or the owning utility prior to undertaking connections.

D. Design-Build Entity shall protect facilities against deleterious substances and damage.

1.8 COOPERATION OF DESIGN-BUILD ENTITY AND COORDINATION WITH OTHER WORK

A. Coordinate with District and any District forces, or other contractors and forces, as required by Document 00 71 00 (General Conditions), paragraph 6.

B. Design-Build Entity shall coordinate the construction schedule with the schedule of the District for normal power service installation.

C. Noise: Construction activities are to comply with applicable local noise ordinance and applicable Cal-OSHA regulations. Special coordination is required to minimize any excessive noise operations during the scheduled Examination periods according to the Academic Calendar. The Academic Calendar for the upcoming semesters at each site is available at the District's web site, www.esuhsd.org.

D. Work on an Occupied Campus:

1. Work under this contract will be executed in part during regular sessions of the District. Design-Build Entity shall cooperate with District authorities in every way to minimize disturbance.
2. When schools are not in session, community use of facilities increases. Design-Build Entity shall cooperate with District authorities in every way to minimize disturbance.
3. In entrance and exit of all workers and in bringing in, storing and removal of equipment, Design-Build Entity shall cooperate with those in authority and prevent interference with functioning of the schools. Observe all rules and regulations in force and avoid unnecessary dust, mud or accumulated debris, or undue interference with the convenience, sanitation or routine of departmental activities.
4. In connecting new utilities, and similar operations. Design-Build Entity shall time and coordinate such operations so that there will be no or the absolute minimum interference with the schools activities.

1.9 MAINTENANCE, PRODUCT HANDLING, AND PROTECTION

A. Transport, deliver, handle, and store materials and equipment at the Site in such a manner as to prevent the breakage, damage or intrusions of foreign matter or moisture, and otherwise to prevent damage.

B. Hazardous substance compliance: Provide District with copies of the OSHA Material Safety Data Sheets (MSDS) for all products containing a hazardous substance, examples: Adhesives, paints, sealants, and the like.

C. Packaging: Provide packaged material in manufacturer's original containers with seals unbroken and labels intact until incorporated into the Work.

D. Remove all damaged or otherwise unsuitable material and equipment promptly from the Site.

E. Protection: Protect all finished surfaces.

F. Asbestos Removal. If, during the progress of the Work, suspected asbestos-containing products are identified, Design-Build Entity shall stop work in the affected area and immediately notify District, and engage an asbestos removal Subcontractor to verify the materials and, if necessary, encapsulate, enclose, or remove and dispose of all asbestos in accordance with current regulations of the Environmental Protection Agency and the U. S. Department of Labor – Occupational Safety and Health Administration, the state asbestos regulating agency, and any local government agency. Payment for such work will be made by Change Order.

G. Asbestos Removal Subcontractor's Qualifications. The Subcontractor for asbestos removal shall be regularly engaged in this type of activity and shall be familiar with the regulations that govern this work. The Subcontractor shall demonstrate to the satisfaction of District that it has successfully completed at least three asbestos removal projects that it has the necessary staff and equipment to perform the work, and that it has an approved site for disposal of the asbestos. Liability insurance covering the asbestos abatement work shall be provided as specified in the Supplementary Conditions.

H. Asbestos Removal Methods. The asbestos removal Subcontractor shall submit a work plan of its proposed removal procedure to District before beginning work and shall certify that the methods are in full compliance with the governing regulations. The work plan shall cover all aspects of the removal,

including health and safety of employees and building occupants, hygiene facilities, employee certification, clearance criteria, transportation and disposal, enclosure techniques, and other techniques appropriate for the proposed work.

I. Cost of maintenance of systems and equipment prior to either Substantial Completion or filing of a Notice of Completion will be considered as included in prices Proposal and no direct or additional payment will be made therefore.

J. Maintenance logs and all contract close-out documentation will be submitted to the District's Representative no more than 30 days after the date of Substantial Completion. A Notice of Completion will not be filed until all contract close-out documents are submitted and approved.

1.10 PARTIAL OCCUPANCY/UTILIZATION REQUIREMENTS

A. Allow District to take possession of and use any completed or partially completed portion of the Work during the progress of the Work as soon as is possible without interference to the Work.

B. Possession, use of Work, and placement and installation of equipment by District shall not in any way evidence the completion of the Work or any part of it.

C. Design-Build Entity shall not be held responsible for damage to the occupied part of the Work resulting from District occupancy.

D. Make available, in areas occupied, on a 24-hour per day and 7-day per week basis if required, any utility services, heating, and cooling in condition to be put in operation at the time of occupancy.
   1. Responsibility for operation and maintenance of said equipment shall remain with Design-Build Entity.
   2. Make, and District shall certify, an itemized list of each piece of equipment so operated with the date operation commences.
   3. Itemized list noted above shall be basis for commencement of warranty period for equipment.
   4. District shall pay for utility cost arising out of occupancy by District during construction.

E. Use and occupancy by District prior to acceptance of Work does not relieve Design-Build Entity of its responsibility to maintain insurance and bonds required under the Contract until entire Work is completed and accepted by District.

F. Prior to date of Final Acceptance of the Work by District, all necessary repairs or renewals in Work or part thereof so used, not due to ordinary wear and tear, but due to defective materials or workmanship or to operations of Design-Build Entity, shall be made at expense of Design-Build Entity, as required in Document 00 71 00 (General Conditions).

G. Use by District of Work or part thereof as contemplated by this Document 01 10 00 shall in no case be construed as constituting acceptance of Work or any part thereof. Such use shall neither relieve Design-Build Entity of any responsibilities under Contract, nor act as waiver by District of any of the conditions thereof.

H. District may specify in the Contract Documents that portions of the Work, including electrical and mechanical systems or separate structures, shall be substantially completed on dates described in paragraph 1.6 of this Document 01 10 00, if any, prior to substantial completion of all of the Work. Design-Build Entity shall notify District's Representative in writing when Design-Build Entity considers either Building of the Work ready for its intended use and substantially complete and request District to issue a Certificate of Substantial Completion for that part of the Work.

1.11 DESIGN-BUILD ENTITY USE OF PREMISES

A. Confine operations at Site to areas permitted by Contract Documents, permits, ordinances, and laws.

B. Do not unreasonably encumber Project Site with materials or equipment.

C. Assume full responsibility for protection and safekeeping of products stored on premises.

D. Move any stored products that interfere with operations of District or other contractor.

E. Parking, storage, staging, and work areas shall be coordinated with the District, and comply with all other Contract Documents requirements.

F. Coordinate use of premises with District's Representative.

1.12 LINES AND GRADES

A. All Work shall be done to the lines, grades, and elevations indicated on the Drawings.
B. All survey, layout, and measurement work shall be performed by Design-Build Entity as a part of the Work.
C. Design-Build Entity shall provide at its cost an experienced instrument person, competent assistants, and such instruments, tools, stakes and other materials required to complete the survey, layout, and measurement work. In addition, Design-Build Entity shall furnish at its cost competent persons and such tools, stakes, and other materials as District may require in establishing or designating control points, or in checking survey, layout, and measurement work performed by Design-Build Entity.
D. Design-Build Entity shall keep District informed, a reasonable time in advance, of the times and places at which it wishes to do Work, so that any checking deemed necessary by District may be done with minimum inconvenience to District and minimum delay to Design-Build Entity.
E. Design-Build Entity shall remove and reconstruct Work which is improperly located.

1.13 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The Drawings may indicate existing above- and below-grade structures, drainage lines, storm drains, sewers, water, gas, electrical, hot water, and other similar items and utilities that are known to District.
B. Design-Build Entity shall locate these known existing installations before proceeding with trenching or other operations which may cause damage, shall maintain them in service where appropriate, and shall repair any damage to them caused by the Work, at no increase in Contract Sum.
C. Additional utilities whose locations are unknown to District are suspected to exist. Design-Build Entity must be alert to their existence. If additional utilities are encountered, Design-Build Entity must immediately report to District for disposition.
D. In addition to reporting, if a utility is damaged, Design-Build Entity must take appropriate action as provided in Document 00 71 00 (General Conditions).
E. Additional compensation or extension of time on account of utilities not indicated or otherwise brought to Design-Build Entity's attention including reasonable action taken to protect or repair damage shall be determined as provided in Document 00 71 00 (General Conditions).

1.14 DAMAGE TO EXISTING PROPERTY

A. Design-Build Entity will be responsible for any damage to existing structures, Work, materials, or equipment because of its operations and shall repair or replace any damaged structures, Work, materials, or equipment to the satisfaction of, and at no additional cost to, District.
B. Design-Build Entity shall protect all existing structures and property from damage and shall provide bracing, shoring, or other work necessary for such protection.
C. Design-Build Entity shall be responsible for all damage to streets, roads, curbs, sidewalks, highways, shoulders, ditches, embankments, culverts, bridges, or other public or private property, which may be caused by transporting equipment, materials, or workers to or from the Work. Design-Build Entity shall make satisfactory and acceptable arrangements with the agency having jurisdiction over the damaged property concerning its repair or replacement.

1.15 DUST CONTROL

A. Design-Build Entity shall take reasonable measures to prevent unnecessary dust. The following items shall be specifically implemented to control dust:
   1. All construction locations with active excavation shall be watered at least twice daily.
   2. Cover all trucks hauling soil, sand, and other loose materials; or require all trucks to maintain at least two feet of freeboard.
   3. Pave, apply water daily, or apply non-toxic soil stabilizers on all un-paved access roads, parking areas, and staging areas at construction site.
   4. Sweep daily with water sweepers all paved access roads, parking areas, and staging areas at construction sites during earthwork activities.

5. Enclose, cover, water twice daily, or apply non-toxic soil binders to exposed stockpiles (dirt, sand, etc.)
6. Limit the speed of all construction vehicles to 5 miles per hour while on un-paved roads at the Site.

B. Buildings or operating facilities which may be affected adversely by dust shall be adequately protected from dust. Existing and new machinery, motors, instrument panels, or similar equipment shall be protected by suitable dust screens. Proper ventilation shall be included with dust screens.

C. Building Interiors: provide dust barriers, walk-off pads, etc. to minimize dust infiltration in buildings. If required, the Design-Build Entity will clean interior common areas (e.g., corridors, lobbies) at the end of each work day.

1.16 PARKING

Parking will be provided in designated areas at no cost to the Design-Build Entity; parking or standing is not allowed in any other staff or students lot, other than the area indicated. Parking in at the construction site shall be extremely limited.

1.17 LAYDOWN/STAGING AREA

Design-Build Entity shall propose an area on the Drawings for storage of all construction materials, subject to approval by the District Representative. This area shall be fenced and locked by Design-Build Entity for security purposes.

1.18 UNFAVORABLE CONSTRUCTION CONDITIONS

During unfavorable weather, wet ground, or other unsuitable construction conditions, Design-Build Entity shall confine its operations to Work which will not be affected adversely by such conditions. No portion of the Work shall be constructed under conditions which would affect adversely the quality or efficiency thereof, unless special means or precautions are taken by Design-Build Entity to perform the Work in a proper and satisfactory manner. The Design-Build Entity will employ BEST practices to manage the construction site during inclement weather.

1.19 CONSTRUCTION SITE ACCESS

A. Design-Build Entity shall at all times limit access to the Site to necessary personnel only. All personnel associated with construction of the Project shall enter the site through Design-Build Entity's access gate, at the location indicated on the Drawings. Access for construction personnel shall be limited to regular work hours, unless prior approval is obtained from the District. All mail and deliveries (Federal Express, equipment, etc.) shall be sent to a separate address (at Design-Build Entity's gate), specifically arranged by Design-Build Entity for the Project. Design-Build Entity is responsible for providing adequate signage (subject to District approval) to alert delivery persons to the project site. The District will not receive or forward Design-Build Entity mail or deliveries.

1.20 SITE ADMINISTRATION

Design-Build Entity shall be responsible for all areas of the Site used by it and by all Subcontractors in the performance of the Work. Design-Build Entity shall exert full control over the actions of all employees and other persons with respect to the use and preservation of property and existing facilities, except such controls as may be specifically reserved to District or others. Design-Build Entity shall have the right to exclude from the Site all persons who have no purpose related to the Work or its inspection, and may require all persons on the Site to observe the same regulations as Design-Build Entity requires of its employees.

DOCUMENT 01 10 00

SUMMARY OF WORK

PART 2 PRODUCTS

2.1 PRODUCTS ORDERED IN ADVANCE

A. Not used.

2.2 DISTRICT-FURNISHED PRODUCTS (if applicable)

A. District's Responsibilities:
   1. Arrange for and deliver District-reviewed Shop Drawings, Product Data, and Samples, to Design-Build Entity.
   2. Arrange and pay for delivery to site.
   3. On delivery, inspect products jointly with Design-Build Entity.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

B. Design-Build Entity's Responsibilities:
   1. Review District-reviewed Shop Drawings, Product Data, and Samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with District.
   3. Handle, store, install, and finish products.
   4. Repair or replace items damaged after receipt.
   5. Install into Project per Contract Documents.

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

DOCUMENT 01 10 01

SUMMARY OF WORK – PROGRAMMING AND DESIGN SERVICES

PART 1 GENERAL

1.01 SUMMARY

This document includes summary of work including:

1. Programming
2. Design Services
3. Schematic Design Phase
4. Design Development Phase
5. Construction Documents
6. Construction Phase
7. Operation/Project Close Out
8. Design-Build Entity's Responsibility for Finished Construction
9. District's Responsibilities

1.02 DESIGN SERVICES

A. Summary of Design and Technical Requirements

1. Programming and Schematic Design Services: The District will require the Design-Build Entity to work with the District Representative and stakeholders from Yerba Buena High School to review and validate the programming needs of the student union and quad modernization. The programming validation exercise will establish the Schematic Design that the Design-Build Entity will utilize to formulate the Construction Documents for final acceptance.

    a. The design build entity is to utilize the criteria documents and other volumes of information to properly design and construct the work of the project.

    b. The design build entity will, in coordination with the District Representative and stakeholders from the school, assist in the development of a Furnishings, Fixtures, and Equipment (FF&E) package that shall include, but is not limited to, furniture, equipment, specialty equipment, appliances, accessories and other miscellaneous items to support facility functions. FF&E shall be fully integrated with the facility systems and finishes. Group II FF&E shall be procured and installed by the District.

2. Design Services: Design-Build Entity shall submit designs and deliverables meeting the minimum requirements of the Reference Construction Documents and Specifications at completion of 100% Design Development, 50% Construction Documents, DSA Submittal and DSA Approved Construction Documents, or prior to release to the field or to subcontractors for construction, as required in this Document 00 10 01. Design-Build Entity may elect to create incremental packages of major components or activities it deems advantageous towards scheduling or permitting efficiencies.

3. In the event of any conflict between the Reference Construction Documents and any other provision of the Contract Documents, the more stringent requirement providing the District with the greater scope of work shall control. Unless specifically and expressly limited, Design-Build Entity's scope of work shall include all architectural, engineering, procurement and construction services necessary to complete the Project.

4. Design-Build Entity is required to participate, on District's behalf, in any PG&E incentive programs.

SUMMARY OF WORK – PROGRAMMING AND DESIGN SERVICES

B. Summary of Services

1. Unless specifically excluded in this Contract, Design-Build Entity shall provide to District all professional architectural and engineering services, including but not limited to all civil, electrical, fire protection, mechanical, structural engineering, landscape, and cost estimating services necessary to perform Design-Build Entity's obligations under the Contract Documents and to complete the Project and to perform Design-Build Entity's obligations under the Contract Documents.

2. Design-Build Entity shall perform the Services using the persons and subconsultants listed in Design-Build Entity's Proposal and may substitute personnel or subconsultants only upon District's written consent, which may be withheld or delayed in District's discretion. Design-Build Entity represents that it and its subconsultants possess all necessary training, licenses and permits to perform the Services, and that its performance of the Services will conform to the standard of practice of a professional that specializes in performing professional services of like nature and complexity of the Services. Design-Build Entity's licensed subconsultants (architectural and engineering) shall owe a duty of care to District in performing their architectural and engineering portions of the Services.

3. Design-Build Entity and its subconsultants shall make an independent assessment of the accuracy of the information provided by District concerning existing conditions (including but not limited to existing utilities and structures and tie-ins to existing or contemplated facilities) and the adequacy of available design information/technical reports. Design-Build Entity shall rely on the results of its own independent investigations and not on information provided by District. Design-Build Entity shall conduct such further investigations of existing conditions as are necessary for Design-Build Entity to perform the Services and shall advise District of any further design or other services necessary to complete the Project.

4. Design-Build Entity and its subconsultants' design shall provide that all surfaces, fixtures and equipment are readily accessible for maintenance, repair or replacement by ladders, power lifts, cat walks, and the like without exceeding the design loads of the floors, roofs, ceilings, and that such access is in conformance with Cal OSHA. All drawings, specifications, structural and electrical design calculations, site data, cost estimates and any other deliverable required by State or Federal law shall comply with State and federal standards. Design-Build Entity shall comply with any other requirements of public or private authorities with jurisdiction over the Project, the drawings and specifications, or tie-ins to the Project. Design-Build Entity shall comply with the applicable standard of care when preparing drawings and specifications to comply with applicable building codes, ordinances, statutes, laws, standards, governmental regulations and private restrictions, including necessary tie-ins, applicable to the Project and the Services, including, but not limited to, those listed in this Contract, all environmental, energy conservation, energy tie-in, and disabled access requirements, regulations and standards of the Fire Marshal or other authorities having jurisdiction over the Project.

5. Design-Build Entity shall perform all services and activities necessary to comply with all applicable governmental regulations and requirements and to obtain all applicable governmental reviews and approvals for and regarding the Work.

6. District at all times shall have the right (but not the duty) to review Design-Build Entity's design work, whether performed by Design-Build Entity or a subconsultant of any tier, and whether in a final or preliminary form, to determine progress and conformance to the requirements of the Contract Documents. In the event District should ever dispute the conformance of any design work (at any stage) with the intent of the Contract (including the Reference Construction Documents), then the

District's determination shall control and Design-Build Entity and/or its subconsultants shall perform the disputed design services and/or work to completion in accord with the District's determination. Design-Build Entity shall, however, retain its rights under the procedure in Document 00 71 00 (General Conditions) Article 12 for claims and disputes, and Design-Build Entity may under that procedure, in its name, advance any claim of any subconsultant of any tier.

C. Coordination of Architectural and Engineering Subconsultants/Other Contractors

1. Design-Build Entity shall fully coordinate all architectural and engineering disciplines and subconsultants involved in completing the Work. Design-Build Entity's subconsultants shall fully coordinate with Design-Build Entity and all architectural and engineering disciplines and subconsultants involved in completing the Work.

   a. Design-Build Entity shall require its subconsultants to agree in their subcontracts to coordinate with Design-Build Entity and other subconsultants.

   b. Design-Build Entity shall conduct at least monthly design coordination meetings with all subconsultants employed by Design-Build Entity.

   c. Design-Build Entity shall present District with monthly design coordination reports. Design coordination reports shall include written verification that all design coordination responsibilities appropriate to the stage of Services have been fulfilled. These reports shall be included with each Design-Build Entity Application for Payment and will be a condition of payment.

D. Coordination with Master Scheduling

1. Design-Build Entity shall complete or cause to be completed all services required under this Agreement in accordance with the Milestone Construction Schedule set forth in Document 01 32 16 (Progress Schedules and Reports), as well as all approved Project schedules and updates thereto.

2. As required in Document 01 32 16 (Progress Schedules and Reports), Design-Build Entity shall provide District with a design and construction schedule that outlines dates and time periods for the delivery of Design-Build Entity's services and requirements for information from the District for the performance of its services. This schedule shall be updated weekly, and shall meet the following requirements:

   a. The schedule shall fit within and coordinate with the overall Milestone Schedule, including any and all design interfaces referenced in the Master Schedule and all updates to the Master Schedule.

   b. The schedule shall be in a computer software format compatible with Microsoft Project or other format acceptable to the District.

   c. The schedule shall fit within the requirements of the District for partial utilization of construction packages, systems, equipment, and areas, as identified in information provided to Design-Build Entity.

   d. For each phase of the Services under this Document 01 10 01 (Summary of Work – Programming and Design Services), Design-Build Entity shall prepare and submit for District's acceptance a task list identifying the principal tasks (and subtasks) defining the scope of work of each phase. The main purpose of the task list shall be to promote

coordination and scheduling of the District and third parties whose actions might impact Design-Build Entity's progress.

i. The task list for each phase of Design Services shall be submitted with the deliverables at the conclusion of the previous phase of Design Services.

ii. The task list shall list all points of District and third party interface, for example, approvals, reviews, design input and supplying information. The task list shall include a listing of Design-Build Entity's anticipated specific requirements for information, decisions or documents from District necessary for Design-Build Entity's performance of its services, and required third party approvals and preliminary meetings required to obtain agreement in principle with agencies and third parties involved in the Project.

3. Design-Build Entity shall adjust and cause its retained subconsultants (and subcontractors, if any) to adjust activities, personnel levels, and the sequence, duration and relationship of services to be performed in a manner that will comply with the approved schedules.

4. Design-Build Entity shall meet with, make written recommendations to, and coordinate with District weekly regarding ongoing design and construction work, with respect to the following subject matters:

a. Conformance of design to Program Requirements, including the District's Design Standards.

b. Value engineering, if needed (including value engineering design, quantity surveys of materials, equipment or labor, or audits or inventories),

c. Constructability.

E. Deliverables Required Under This Section - Generally

1. All deliverables required under this Document shall be submitted in full compliance with the Contract Documents, shall be submitted in conformance with the requirements of Document 01 32 19 (Submittal Procedures).

2. Deficiencies in deliverables and modifications to conform to program requirements and modifications to achieve acceptability of deliverables to District, shall be promptly performed, and the cost thereof included in the Contract Price.

0.01 SCHEMATIC DESIGN PHASE

A. Period of Service

1. After acceptance by District of Design-Build Entity's Proposal, and upon written authorization from District, Design-Build Entity shall proceed with the performance of Services called for in the Schematic Design Phase.

2. Design-Build Entity shall submit the deliverables required by the Schematic Design Phase.

B. Consultation with District

1. Design-Build Entity shall consult with District to clarify and define the requirements for the work and review available data.

2. Design-Build Entity shall review District's Program for scope, coordination requirements, criteria, budget and constructability.

3. Design-Build Entity shall identify, analyze and conform to the requirements of governmental and private authorities having jurisdiction to approve the design of the Project and participate in consultations with such authorities.

C. Site Visits, Investigations and Other

1. Design-Build Entity shall investigate existing conditions through site visits and otherwise, to determine scope of work and effects on design and construction. Obtain from District all available information on hazardous materials and advise District immediately of any other hazardous materials consultant has observed. (This paragraph does not impose on Design-Build Entity any duty to locate hazardous materials.)

2. Design-Build Entity shall advise District as to the necessity of obtaining additional information related to the Site necessary for purposes of design. Such advice and statement of necessity shall be in writing and explain fully the considerations involved. Such information might include, by way of example only: description of property boundaries or as built information, rights of way, topographic, hydrographic, and utility surveys, soil mechanics, seismic and subsoil data, chemical, mechanical and other data, logs of borings, etc. If the District possesses such information, it will be made available to Design-Build Entity.

3. Design-Build Entity shall review all available information regarding existing conditions of any nature (whether supplied by District, generated under the Contract, or secured from third parties), and advise District whether such data is adequate for purposes of design.

D. Schematic Layouts, Sketches and Conceptual Design

1. Design-Build Entity shall prepare reports containing schematic layouts, sketches and conceptual design criteria with appropriate exhibits.

2. Reports and exhibits shall incorporate District's Program requirements and shall include plan views, sections, renderings and other drawings necessary to describe the Project. Schematic reports shall be developed until District and Design-Build Entity agree that the design concept achieves the Program requirements and the Project's intent. Design-Build Entity shall participate in progress meetings with representatives of District and shall coordinate with District formal design presentations at times indicated on the project schedule.

3. Design-Build Entity shall prepare and submit to District for approval:

   a. Outline specifications including architectural, structural, mechanical, electrical, plumbing, security, teledata, and instrumentation systems and materials proposed.

   b. Plans, sections and renderings at an appropriate scale necessary to convey the architectural design.

4. Reports and exhibits shall indicate clearly the considerations involved, including but not limited to applicable requirements of governmental authorities having jurisdiction or private licensing, patent, easements, or other legal restrictions. Reports and exhibits shall indicate any alternative

solutions available to District and set forth Design-Build Entity's findings and recommendations. Reports and exhibits shall clearly indicate when a proposed design solution, product or system has been in service fewer than ten (10) years, and if the design solution, product or system has never been approved by the permitting authority (ies).

5. Design-Build Entity shall provide a narrative report by each design discipline describing its proposed design philosophy with a description of, and the rationale for, the proposed structural systems, mechanical systems, electrical, geotechnical, electronics and security systems, types of equipment, materials, finishes, site development and landscaping. The rationale shall include initial costs, lifecycle costs, and life expectancy and maintenance considerations.

E. Present Schematic Documents to District

1. Design-Build Entity shall attend three (3) meetings, each of duration of four (4) hours, with representatives of District, interested parties, governmental entities, as necessary, and provide information to fully describe the project.
2. Design-Build Entity shall present Schematic Design Phase documents to District and secure its approval.

0.02 DESIGN DEVELOPMENT PHASE

A. Period of Service

1. After acceptance by District of Design-Build Entity's Schematic Design Phase deliverables, and upon written authorization from District, Design-Build Entity shall proceed with the performance of the services called for in the Design Development Phase. The intent of Design-Build Entity's Design Development Phase submittal is to obtain District approval for design revisions, refinements, and concept elaborations produced by Design-Build Entity during Design Development prior to Construction Document production.

2. Design-Build Entity shall submit the deliverables required by the Design Development Phase.

3. Design-Build Entity shall at the outset of this Phase make full written disclosure to District, and obtain District's express written approval of any proposed innovative, unique, proprietary, or sole source design features. District retains full discretion to disapprove such features, unless such features were fully disclosed and accepted by District during the Proposal or Schematic Design phases.

B. General Scope of Project and Final Design Criteria

1. After consultation with District in the programming phase and on the basis of Reference Construction Documents, Design-Build Entity shall: determine the scope, extent and character of the Project and establish final design criteria; participate in, or initiate periodic reviews or workshops as necessary with District Project Manager, District departmental stakeholders, and their consultants during the Design Development Phase; and at a minimum, participate in biweekly progress meetings with District Project Manager and consultants.

C. Design Development Documents

1. Design-Build Entity shall prepare documents consisting of final design criteria, Design Development drawings, and outline specifications (together, "Design Development Documents"). Design

SUMMARY OF WORK – PROGRAMMING AND DESIGN SERVICES

Development Documents shall include, but are not limited to:

a. Site plans, architectural, landscape, structural, mechanical and electrical plans, elevations, cross sections, finish schedules, door and window schedules, and other mutually agreed upon Drawings deemed necessary to describe the developed design.

b. Outline specifications describing the size, character and quality of the entire Project in its essentials as to kinds and locations of materials; type of structural, security, mechanical and electrical systems and equipment.

c. Design-Build Entity shall provide to District's Project Manager for District approval two copies of a color schedule, samples of types and size acceptable to the Project Manager of textures and finishes of all materials in the Work at the Project.

d. A grading and drainage plan and a site plan from architectural information showing a final development of the site. This Drawing will also include a horizontal and vertical control plan and utility connections to the infrastructure plan. The services described in this subparagraph shall be provided by a professional civil engineer who is to subcontract with Design-Build Entity.

D. Additional Data or Services. Design-Build Entity shall advise District in writing if additional data or services of the following types are necessary and obtain such data and services as directed in writing by District:

1. Borings, probings and subsurface explorations, hydrographic surveys, laboratory tests and inspections of samples, materials and equipment;

2. Appropriate professional interpretations of the foregoing; and

3. Other special data or consultations necessary or useful in completion of the Project.

E. Report on Additional Permits or Reports. Advise in writing if any of the following are required:

1. Governmental permits of any type; and

2. Reports of any type to governmental agencies;

F. Review with District. Prepare, for approval by District, written design criteria for mechanical, electrical, telephone, data, fire alarm (as required), controls and security systems.

G. Fire Marshal Coordination. Design-Build Entity shall be fully responsible for obtaining and coordinating all necessary Fire Marshal approvals. Design-Build Entity shall seek acceptance by local Fire Marshal, and shall seek approval of State Fire Marshal.

H. Health Department Coordination. Design-Build Entity shall be fully responsible for obtaining and coordinating all necessary Health Department approvals. Design-Build Entity shall seek acceptance by the Health Department.

I. Present Design Development Documents to District

1. Design-Build Entity shall attend one (1) meeting, of duration of five (5) hours, with representatives of District, interested parties, governmental entities, as necessary, and provide

information to fully describe the project.

2. Design-Build Entity shall present Design Development Phase documents to District and secure its approval.

0.03 CONSTRUCTION DOCUMENT PHASE

A. Period of Service

1. After acceptance by District of the Design Development Documents and any other required deliverables in the Design Development Phase, and upon written authorization from District, Design-Build Entity shall proceed with the performance of the services called for in the Construction Documents Phase.

2. Design-Build Entity shall submit the deliverables required by the Construction Documents Phase within the stipulated period required in the Project Schedule.

B. Construction Documents. On the basis of the District-approved Design Development Documents, Design-Build Entity shall prepare for incorporation in the Contract Documents final Drawings and Specifications (together, "Construction Documents") to show the work to be furnished and performed by Design-Build Entity. Construction Documents shall set forth in detail the requirement for construction of all work to be performed by Design-Build Entity and to obtain all required permits. Construction Documents shall set forth in detail the requirement for construction of all Work to be performed, but shall not supersede the Contract Documents where the Contract Documents contain a more stringent requirement.

C. Drawings shall be prepared in accordance with industry standards. Specifications shall be prepared in conformance with the latest MasterSpec format of the Construction Specification Institute. Design-Build Entity shall have complete responsibility to secure timely review by all authorities with jurisdiction.

D. The same architectural and engineering team (and team personnel) that prepared the Design Development Documents shall complete the Construction Documents.

E. Compliance with Codes, Regulations and Requirements. Prepare Construction Documents in full compliance with the Contract Documents (including without limitation Reference Construction Documents), applicable building codes, ordinances, standards, governmental regulations and private restrictions, applicable to the Work.

F. Make full written disclosure to District, and obtain District's express written approval of any proposed innovative, unique, proprietary, or sole source design features.

G. Warranty. Design-Build Entity warrants to District that the final design, as expressed in the Construction Documents:

1. Will be constructible, workable, watertight, and within Design-Build Entity's detailed Project schedule per Document 01 32 16 (Progress Schedules and Reports).

2. Will comply in all respects with the requirements of the Contract Documents (including without limitation Reference Construction Documents);

3. Will not call for the use of hazardous or banned materials; and

4. Will fully comply with applicable building codes, ordinances, standards, governmental regulations, and private restrictions applicable to the Work.

H. Design-Build Entity shall prepare and submit draft Construction Documents at the 50% level of completion to District for review. District shall conduct such review as necessary on the 50% Construction Documents and shall advise Design-Build Entity of any necessary modifications, amendments and additions as reasonably required by District. Following receipt of District's comments, Design-Build Entity shall develop and submit Construction Documents to the District for review at the time of DSA submission. District shall conduct such review as necessary on these Construction Documents and shall advise Design-Build Entity of any necessary modifications, amendments and additions as reasonably required by District. Following receipt of District's comments, Design-Build Entity shall complete final Construction Documents. Such complete Construction Documents shall be deemed the Construction Documents for the Project.

I. Upon completion of Construction Documents, Design-Build Entity shall submit such plans for approval to the Division of the State Architect, or such other permitting authority that is in place at the time, and obtain necessary permits for the construction and operation of the Project as specified in the Construction Documents. During the same time period, Design-Build Entity shall submit the Construction Documents to District for final approval.

J. Permits. Design-Build Entity shall secure all necessary permits and approvals, by identifying all necessary permits and approvals, securing necessary forms, and applying for such permits and approvals in Design-Build Entity's name, on the District's behalf. This duty includes, but is not limited to, providing technical criteria, written descriptions and design data for use in filing applications for permits with or obtaining approvals of such governmental authorities as have jurisdiction to approve the design of the Project, and engage in consultations with appropriate authorities.

0.04 CONSTRUCTION PHASE

B. Upon District's acceptance of Design-Build Entity's Construction Documents for all or any portions of the Work as Design-Build Entity and District may agree, and upon issuance of approval to construct Project by the Division of the State Architect or such other permitting authority that is in place at the time, District will issue a Notice to Proceed for construction, and Design-Build Entity may commence construction of the Project.

C. General Administration of Construction. Design-Build Entity's architectural, design, and engineering subconsultants shall make regular visits to the site at intervals appropriate to the various stages of construction as necessary to assure that construction conforms to the final design as approved.

D. Quality Control and Reporting. Design-Build Entity's architectural, design and engineering subconsultant shall participate fully in Design-Build Entity's required quality control program and shall have a duty to advise Design-Build Entity and District in writing of any observations of defective work, work not in conformance with Drawings and Specifications, and lack of progress consistent with the schedule of work in areas associated with their services.

0.05 OPERATION/PROJECT CLOSE-OUT PHASE

A. Operation/Close Out. During the Operation/Project Close-Out Phase, Design-Build Entity and Design-Build Entity's architectural, design, and engineering subconsultants shall, when requested by District, and working with District's commissioning agent (if applicable), provide all necessary architectural, design and engineering services, including services of its architectural, design and engineering subconsultants, for:

1. Refining, adjusting and correcting of any equipment or systems.

2. Start-up, testing and placing in operation all equipment and systems.

3. Completion of punchlist work.

4. Training District's staff to operate and maintain all equipment and systems.

5. Assist District in developing systems and procedures for control of the operation and maintenance of and record keeping for the Project.

6. Prepare (1) copy of electronic record sets (in PDF and AutoCAD format) and (1) set of record prints or plans showing those changes made during the construction process, based on the marked-up prints, plans and other data.

7. Together with District, visit the Project to observe any apparent defects in the completed construction, correct such deficiencies, and supply information as needed regarding replacement, correction, or diminished value of defective work.

0.06 DESIGN-BUILD ENTITY'S OBLIGATION FOR FINISHED CONSTRUCTION

A. District's right to review Design-Build Entity's design and deliverables, including without limitation Design Development Documents, Construction Documents, shop drawings, samples and Submittals, as specified in the Contract Documents, shall not relieve Design-Build Entity of its responsibility for a complete design and construction complying with the requirements of the Contract Documents; but rather, such review shall be in furtherance of District's monitoring and accepting the design as developed and issued by Design-Build Entity, consistent with these Contract Documents. Design-Build Entity's responsibility to design and construct the Project in conformance with the Contract Documents including, but not limited to, the applicable performance standards and any fully executed change orders, shall be absolute. Such duty may not be altered or diminished by any action other than a signed change order.

0.07 DISTRICT'S RESPONSIBILITIES

A. District shall designate a Project Manager, who is authorized to act on District's behalf with respect to Design-Build Entity's Design Services. District or such authorized representative shall facilitate the rendering of required decisions promptly, to avoid unreasonable delay in the progress of Design-Build Entity's services. District may delegate all or some of Project Manager's role and function to a separate contractor or to a construction manager. District may change the individual acting as Project Manager and/or the individual or entity acting as a separate contractor or construction manager at any time with notice to Design-Build Entity.

   a. Design-Build Entity shall anticipate that District's decision-rendering processes require various lead times. Design-Build Entity should use the following Decision Category matrix and the examples provided to anticipate and plan for District decision-rendering lead times.
      i. Category 1 Decision: This category of decision is likely to take one week from the time the issue is presented to District until the time District renders a decision. Category 1 Decisions are likely to be decisions made for similar circumstances in recent projects, and/or performance criteria or choices have been preselected in the District's Design Standards, and a small group of end-users must be consulted for the decision.
      ii. Category 2 Decision: This category of decision is likely to take two weeks from the time the issue is presented to District until the time District renders a decision. Category 2 Decisions

are likely to be decisions made for similar circumstances in recent projects, and/or performance criteria or choices have been preselected in the District's Design Standards, but a larger group of end-users must be consulted for the decision.

iii. Category 3 Decision: This category of decision is likely to take three weeks from the time the issue is presented to District until the time District renders a decision. Category 3 Decisions are likely to be concerning new circumstances that the District has not faced recently, and/or performance criteria or choices have not been preselected in the District's Design Standards, and a small group of end-users must be consulted for the decision.

iv. Category 4 Decision: This category of decision is likely to take four or more weeks from the time the issue is presented to District until the time District renders a decision. Category 4 Decisions are likely to be decisions that require large or numerous end-user group discussions, input and/or approval from the Board of Trustees, or were not listed by Design-Build Entity as a District-required decision at the beginning of the milestone phase. Examples of Category 4 Decisions include:

1. Selection of Design-Build Entity following submission of Proposals.
2. Major modifications during a subsequent design phase of design solutions presented and accepted during a previous design phase.
3. Contract modifications concerning scope or price.

B. Review and Acceptance of Design and Construction Documents: District shall perform timely reviews of progress documents submitted pursuant to the provisions of this Document 01 10 01 (Summary of Work – Programming and Design Services).

C. Permits and Approvals: District shall assist Design-Build Entity in its securing of all required approvals and permits from governmental authorities having jurisdiction over the Project.

END OF DOCUMENT

DOCUMENT 01 26 00

MODIFICATION PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Document includes:
   1. Description of general procedural requirements for alterations, modifications, and extras.
B. Reference
   1. Public Contract Code Section 7105(d)(2).

1.2 GENERAL

A. Any change in scope of Work or deviation from Contract Documents including, without limitation, extra work, or alterations or additions to or deductions from the original Work, shall not invalidate the original Contract, and shall be performed under the terms of the Contract Documents.
B. Only Design-Build Entity or District may initiate changes in scope of Work or deviation from Contract Documents.
   1. Design-Build Entity may initiate changes by submitting RFIs, Notice of Concealed or Unknown Conditions, or Notice of Hazardous Waste Conditions.
      a. RFIs shall be submitted to seek clarification of or request changes in the Contract Documents. RFIs shall not be submitted to District seeking clarification to any errors or omissions on behalf of the Design-Build Entity's preparation of the Construction Documents or any other Contract Documents prepared by Design-Build Entity.
      b. Notices of Concealed or Unknown Conditions shall be submitted in accordance with Document 00 71 00 (General Conditions).
      c. Notices of Hazardous Waste Conditions shall be submitted in accordance with Document 00 71 00 (General Conditions).
   2. Design-Build Entity shall be responsible for its costs to implement and administer RFIs throughout the Contract duration. Regardless of the number of RFIs submitted, Design-Build Entity shall not be entitled to additional compensation. Design-Build Entity shall be responsible for both District and its consultant's administrative costs for answering RFIs where the answer could reasonably be found by reviewing the Contract Documents, as determined by District; at District's discretion, such costs may be deducted from progress payments or final payment.
   3. District may initiate changes by issuing a Supplemental Instruction, which may revise, add to or subtract from the Work.
   4. District may initiate changes in the Work or Contract Time by issuing RFPs to Design-Build Entity. Such RFPs will detail all proposed changes in the Work and request a quotation of changes in Contract Sum and Contract Time from Design-Build Entity.
   5. District may also, by Construction Change Directive ("CCD"), order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly. A CCD shall be used in the absence of total agreement on the terms of a Change Order and may, upon notice, consist of a Change Order executed by District only.
   6. District and Design-Build Entity may notify the other party, in writing, of a proposed equitable adjustment to the Contract Sum, in accordance with Document 00 71 07 (Supplemental General Conditions – Equitable Price Adjustment).
   7. It is the responsibility of the Design-Build Entity to notify the District within 14 days if there is a cost change. Notifications beyond this time limit may result in future claims being time barred.

1.3 PROCEDURES

A. Cost Proposal and Procedures: Whenever Design-Build Entity is required in this Document 01 26 00 to prepare a Cost Proposal, and whenever Design-Build Entity is entitled to submit a Cost Proposal and elects to do so, Design-Build Entity shall prepare and submit to District for consideration a Cost

MODIFICATION PROCEDURES

Proposal using the form attached to this Document 01 26 00, or other similarly prepared form previously approved by the District. All Cost Proposals must contain a complete breakdown of costs of credits, deducts and extras; itemizing materials, labor, taxes, overhead and profit. All Subcontractor Work shall be so indicated. Individual entries on the Cost Proposal form shall be determined as provided in paragraphs 1.4 and 1.5 of this Document 01 26 00. After receipt of a Cost Proposal with a detailed breakdown, District will act promptly thereon.

1. If District accepts a Cost Proposal, District will prepare Change Order for District and Design-Build Entity signatures.
2. If Cost Proposal is not acceptable to District because it does not agree with cost and/or time included in Cost Proposal, District will submit in a response what it believes to be a reasonable cost and/or adjustment, if any. Except as otherwise provided in this Document 01 26 00, Design-Build Entity shall have seven Days in which to respond to District with a revised Cost Proposal.
3. When necessity to proceed with a change does not allow the District sufficient time to conduct a proper check of a Cost Proposal (or revised Cost Proposal), District may order Design-Build Entity to proceed on basis to be determined at earliest practical date. In this event, value of change, with corresponding equitable adjustment to Contract, shall not be more than increase or less than decrease proposed.

B. Request for Information: Whenever Design-Build Entity requires information regarding the Project or Contract Documents or receives a request for information from a Subcontractor, Design-Build Entity may (except as provided in paragraph 1.2.B.1.a above), prepare and deliver an RFI to District. Design-Build Entity shall not submit an RFI to the District if it pertains to a Subcontractor's request for clarification of the Construction Documents or any other Contract Documents prepared by Design-Build Entity. Design-Build Entity shall use RFI format provided by District. Design-Build Entity must submit time critical RFIs at least 30 days before scheduled start date of the affected Work activity. Design-Build Entity shall reference each RFI to an activity of Progress Schedule and shall note time criticality of the RFI, indicating time within which a response is required. Design-Build Entity's failure to reference RFI to an activity on the Progress Schedule and note time criticality on the RFI shall constitute Design-Build Entity's waiver of any claim for time delay or interruption to the Work resulting from any delay in responding to the RFI.

1. District will endeavor to respond within seven Days from receipt of RFI with a written response to Design-Build Entity, provided that the RFI complies with paragraph B. above and is time critical. Additionally, District may return RFI requesting additional information should original RFI be inadequate in describing condition. Design-Build Entity shall distribute response to all appropriate Subcontractors.
2. If Design-Build Entity is satisfied with the response and does not request change in Contract Sum or Contract Time, then the response shall be executed without a change.
3. If Design-Build Entity believes the response is incomplete, Design-Build Entity shall issue another RFI (with the same RFI number with the letter "A" indicating if it is a follow-up RFI) to District clarifying original RFI.
4. If Design-Build Entity believes that the response results in change in Contract Sum or Contract Time, Design-Build Entity shall notify District in writing within seven Days after receiving the response. If District disagrees with Design-Build Entity, then Design-Build Entity may give notice of intent to submit a Claim as described in Article 12 of Document 00 71 00 (General Conditions), and submit its Claim within 30 days of District's response. If District agrees with Design-Build Entity, then Design-Build Entity must submit a Cost Proposal within 21 Days of District's response to the RFI. Design-Build Entity's failure to deliver either the foregoing notice of Claim or Cost Proposal by the respective deadlines stated in the foregoing sentences shall result in waiver of the right to file a Cost Proposal or Claim.

C. Supplemental Instruction: District may issue Supplemental Instruction to Design-Build Entity.

1. If Design-Build Entity is satisfied with Supplemental Instruction and does not request change in Contract Sum or Contract Time, then Supplemental Instruction shall be executed without a Change Order.

2. If Design-Build Entity believes that Supplemental Instruction results in change in Contract Sum or Contract Time, then Design-Build Entity shall notify District in writing within seven Days after receiving the response. If District disagrees with Design-Build Entity, then Design-Build Entity may give notice of intent to submit a Claim as described in Article 12 of Document 00 71 00 (General Conditions), and submit its Claim within 30 days of District's response. If District agrees with Design-Build Entity, then Design-Build Entity must submit a Cost Proposal within 21 Days of District's response to the RFI. Design-Build Entity's failure to deliver either the foregoing notice of Claim or Cost Proposal by the respective deadlines stated in the foregoing sentences shall result in waiver of the right to file a Cost Proposal or Claim.

D. Construction Change Directives: If at any time District believes in good faith that a timely Change Order will not be agreed upon using the foregoing procedures, District may issue a CCD with its recommended cost and/or time adjustment. Upon receipt of CCD, Design-Build Entity shall promptly proceed with the change of Work involved and concurrently respond to District's CCD within 10 Days.
   1. Design-Build Entity's response must be any one of following:
      a. Return CCD signed, thereby accepting District's response, time and cost.
      b. Submit a (revised if applicable) Cost Proposal with supporting documentation (if applicable, reference original Cost Proposal number followed by letter A, B, etc. for each revision), if District so requests.
      c. Give notice of intent to submit a Claim as described in Article 12 of Document 00 71 00 (General Conditions), and submit its Claim with 30 days.
   2. If the CCD provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:
      a. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation.
      b. Unit prices stated in the Contract Documents or subsequently agreed upon.
      c. Force account.
      d. Cost to be determined in a manner agreed.
   3. CCD signed by Design-Build Entity indicates the agreement of Design-Build Entity therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.
   4. If Design-Build Entity does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by District on the basis of reasonable expenditures and savings of those performing the Work attributable to the change including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. If the parties still do not agree on the price for a CCD, Design-Build Entity may file a Claim per Article 12 of Document 00 71 00 (General Conditions). Design-Build Entity shall keep and present, in such form as District may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this paragraph shall be limited to those provided in paragraphs 1.4 and 1.5 of this Document 01 26 00.
   5. Pending final determination of cost to District, amounts not in dispute may be included in Applications for Payment. The amount of credit to be allowed by Design-Build Entity to District for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by District. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

E. District Requested RFP: Design-Build Entity shall furnish a Cost Proposal within 21 Days of District's RFP. Upon approval of RFP, District will issue a Change Order directing Design-Build Entity to proceed with extra Work. If the parties do not agree on the price for an RFP, District may either issue a CCD or decide the issue per Article 12 of Document 00 71 00 (General Conditions). Design-Build Entity shall perform the changed Work notwithstanding any claims or disagreements of any nature.

F. Differing Site Conditions: Design-Build Entity shall submit Notices of Differing Site Conditions to resolve problems regarding differing underground Site conditions encountered in the execution of the Work pursuant to paragraph 13.4 of Document 00 71 00 (General Conditions), which shall govern. If District determines that a change in Contract Sum or Contract Time is justified, District will issue RFP or CCD.

G. Hazardous Waste Conditions: Design-Build Entity shall submit Notices of Hazardous Waste Conditions to resolve problems regarding hazardous materials encountered in the execution of the Work pursuant to paragraph 13.5 of Document 00 71 00 (General Conditions), which shall govern. If District determines that a change in Contract Sum or Contract Time is justified, District will issue RFP or CCD.

H. All Changes:
   1. Documentation of Change in Contract Sum and Contract Time:
      a. Design-Build Entity shall maintain detailed records of Work performed on a time-and-material basis.
      b. Design-Build Entity shall document each Proposal for a change in cost or time with sufficient data to allow evaluation of the Proposal.
      c. Design-Build Entity shall, on request, provide additional data to support computations for:
         1) Quantities of products, materials, labor and equipment.
         2) Taxes, insurance, and bonds.
         3) Overhead and profit.
         4) Justification for any change in Contract Time and new Progress Schedule showing revision due, if any.
         5) Credit for deletions from Contract, similarly documented.
      d. Design-Build Entity shall support each claim for additional costs, and for Work performed on a cost-and-percentage basis, with additional information including:
         1) Credit for deletions from Contract, similarly documented.
         2) Origin and date of claim.
         3) Dates and times Work was performed and by whom.
         4) Time records and wage rates paid.
         5) Invoices and receipts for products, materials, equipment and subcontracts, similarly documented.

I. Correlation of Other Items:
   1. Design-Build Entity shall revise Schedule of Values and Application for Payment forms to record each authorized Change Order or CCD as a separate line item and adjust the Contract Sum as shown thereon prior to the next monthly pay period.
   2. Design-Build Entity shall revise the Progress Schedules prior to the next monthly pay period.
   3. Design-Build Entity shall enter changes in Project Record Documents prior to the next monthly pay period.

J. Responses: For all responses for which the Contract Documents, including without limitation this Document 01 26 00, do not provide a specific time period, recipients shall respond within a reasonable time.

K. Disputes: For all disputes arising from the procedures herein, Design-Build Entity shall follow Article 12 of Document 00 71 00 (General Conditions).

1.4 COST DETERMINATION

A. Total cost of extra Work or of Work omitted shall be the sum of construction labor costs, material costs, equipment rental costs, design professional costs and specialist costs as defined herein plus overhead and profit as allowed herein. This limit applies in all cases of claims for extra Work, whether calculating Cost Proposals, Change Orders or CCDs, or calculating claims of all types, and applies even in the event of fault, negligence, strict liability, or tort claims of all kinds, including strict liability or negligence. Design-Build Entity may recover no other costs arising out of or connected with the performance of extra Work, of any nature. No special, incidental or consequential damages may be

claimed or recovered against District, its representatives or agents, whether arising from breach of contract, negligence or strict liability, unless specifically authorized in the Contract Documents.

Design Professional costs shall be calculated by multiplying the number of hours per design professional by the hourly rate established in the Proposal Form.

B. Overhead and Profit: (Overhead shall be as defined in paragraph 1.8 of this Document 01 26 00.
   1. Overhead and profit on labor for extra Work shall not exceed 15 percent.
   2. Overhead and profit on materials for extra Work shall not exceed 15 percent.
   3. Overhead and profit on equipment rental for extra Work shall not exceed 7 percent.
   4. When extra Work is performed by a first tier Subcontractor or a Design Professional, Design-Build Entity shall receive a 5 percent markup on Subcontractors' or Design Professional's total costs of extra Work. First tier Subcontractor's markup on its Work shall not exceed 10 percent.
   5. When extra Work is performed by a lower tier Subcontractor, Design-Build Entity shall receive a total of 5 percent markup on the lower tier Subcontractors' total costs of extra Work. First tier Subcontractors and lower tier Subcontractors shall divide the 15 percent markup as mutually agreed.
   6. Notwithstanding the foregoing, in no case shall the total markup on any extra Work exceed 20 percent of the direct cost, notwithstanding the actual number of contract tiers.
   7. On Proposals covering both increases and decreases in Contract Sum, overhead, profit, and commission shall be allowed on the net increase only as determined in paragraph 1.4 above. When the net difference is a deduction, no percentage for overhead, profit and commission shall be allowed, but rather a deduction shall apply.
   8. The markup shall include profit and overhead. No markup will be allowed on permits, fees, taxes, insurance and bonds for contract changes utilizing Owners Allowance.

C. Taxes:
   1. All State sales and use taxes, Santa Clara County and applicable City sales taxes, shall be included.
   2. Federal and Excise tax shall not be included.

D. Accord and Satisfaction: Every Change Order and accepted CCD shall constitute a full accord and satisfaction, and release, of all Design-Build Entity (and if applicable, Subcontractor) claims for additional time, money or other relief arising from or relating to the subject matter of the change including, without limitation, impacts of all types, cumulative impacts, inefficiency, overtime, delay and any other type of claim. Design-Build Entity may elect to reserve its rights to disputed claims arising from or relating to the changed Work at the time it signs a Change Order or approves a CCD, but must do so expressly in a writing delivered concurrently with the executed Change Order or approved CCD, and must also submit a Claim for the reserved disputed items pursuant to Article 12 of Document 00 71 00 (General Conditions) no later than 30 days of Design-Build Entity's first written notice of its intent to reserve rights**.**

1.5 COST BREAKDOWN

A. Labor: Design-Build Entity will be paid cost of labor for workers (including forepersons when authorized by District) used in actual and direct performance of extra Work. Labor rate, whether employer is Design-Build Entity, Subcontractor or other forces, will be sum of following:
   1. Actual Wages: Actual wages paid shall include any employer payments to or on behalf of workers for health and welfare, pension, vacation, and similar purposes.
   2. Labor surcharge: Payments imposed by local, county, state, and federal laws and ordinances, and other payments made to, or on behalf of, workers, other than actual wages as defined in paragraph 1.5A.1 of this Document 01 26 00, such as taxes and worker's compensation insurance. Such labor surcharge shall not exceed that set forth in California Department of Transportation official labor surcharges schedule which is in effect on date upon which extra Work is accomplished and which schedule is incorporated herein by reference as though fully set forth herein.

MODIFICATION PROCEDURES

B. Material: Only materials furnished by Design-Build Entity and necessarily used in performance of extra Work will be paid for. Cost of such materials will be cost, including sales tax, to purchaser (Design-Build Entity, Subcontractor or other forces) from supplier thereof, except as the following are applicable:
   1. If cash or trade discount by actual supplier is offered or available to purchaser, it shall be credited to District notwithstanding fact that such discount may not have been taken.
   2. For materials salvaged upon completion of extra Work, salvage value of materials shall be deducted from cost, less discounts, of materials.
   3. If cost of a material is, in opinion of District, excessive, then cost of material shall be deemed to be lowest current wholesale price at which material is available in quantities concerned delivered to Site, less any discounts as provided in paragraph 1.5B.1 of this Document 01 26 00.

C. Equipment Rental: For Design-Build Entity- or Subcontractor-owned equipment, payment will be made at rental rates listed for equipment in California Department of Transportation official equipment rental rate schedule which is in effect on date upon which extra Work is accomplished and which schedule is incorporated herein by reference as though fully set forth herein. If there is no applicable rate for an item of equipment, then payment shall be made for Design-Build Entity- or Subcontractor-owned equipment at rental rate listed in the most recent edition of the Association of Equipment Distributors (AED) book. For rented equipment, payment will be made based on actual rental invoices. Equipment used on extra Work shall be of proper size and type. If, however, equipment of unwarranted size or type and cost is used, cost of use of equipment shall be calculated at rental rate for equipment of proper size and type, as determined by District. Rental rates paid shall be deemed to cover cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals. Unless otherwise specified, manufacturer's ratings, and manufacturer-approved modifications, shall be used to classify equipment for determination of applicable rental rates. Individual pieces of equipment or tools not listed in said publication and having a replacement value of $100 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefore as payment is included in payment for labor. Rental time will not be allowed while equipment is inoperative due to breakdowns.
   1. For equipment on Site, rental time to be paid for equipment shall be time equipment is in operation on extra Work being performed or on standby as approved by District. The following shall be used in computing rental time of equipment:
      a. When hourly rates are listed, less than 30 minutes of operation shall be considered to be ½ hour of operation.
      b. When daily rates are listed, less than four hours of operation shall be considered to be ½ Day of operation.
   2. For equipment that must be brought to Site to be used exclusively on extra Work, cost of transporting equipment to Site and its return to its original location shall be determined as follows:
      a. District will pay for costs of loading and unloading equipment.
      b. Cost of transporting equipment in low bed trailers shall not exceed hourly rates charged by established haulers.
      c. Cost of transporting equipment shall not exceed applicable minimum established rates of California Public Utilities Commission.
      d. District will not make any payment for transporting and loading and unloading equipment if equipment is used on Work in any other way than upon extra Work.
   3. Rental period may begin at time equipment is unloaded at Site of extra Work and terminate at end of the performance of the extra Work or Day on which District directs Design-Build Entity to discontinue use of equipment, whichever first occurs. Excluding Saturdays, Sundays, and District's legal holidays, unless equipment is used to perform extra Work on such Days, rental time to be paid per Day shall be four hours for zero hours of operation, six hours for four hours of operation and eight hours for eight hours of operation, time being prorated between these parameters. Hours to be paid for equipment that is operated less than eight hours due to

breakdowns, shall not exceed eight less number of hours equipment is inoperative due to breakdowns.

D. Work Performed by Special Forces or Other Special Services: When District and Design-Build Entity, by agreement, determine that special service or item of extra Work cannot be performed by forces of Design-Build Entity or those of any Subcontractors, service or extra Work item may be performed by specialist. Invoices for service or item of extra Work on basis of current market price thereof may be accepted without complete itemization of labor, material, and equipment rental costs when it is impracticable and not in accordance with established practice of special service industry to provide complete itemization. In those instances wherein Design-Build Entity is required to perform extra Work necessitating a fabrication or machining process in a fabrication or machine shop facility away from Site, charges for that portion of extra Work performed in such facility may, by agreement, be accepted as a specialist billing. District must be notified in advance of all off-Site Work. In lieu of overhead and profit provided in paragraph 1.4B of this Document 01 26 00, 5 percent will be added to specialist invoice price, after deduction of any cash or trade discount offered or available, whether or not such discount may have been taken.

1.6 FORCE-ACCOUNT WORK

A. If it is impracticable because of nature of Work, or for any other reason, to fix an increase or decrease in price definitely in advance, the Design-Build Entity may be directed to proceed at a not-to-exceed (NTE) maximum price which shall not under any circumstances be exceeded. Subject to such limitation, such extra Work shall be paid for at actual necessary cost for Force-Account Work or at the negotiated cost, as determined by District. The cost for Force-Account Work shall be determined pursuant to paragraphs 1.4 and 1.5 of this Document 01 26 00.

B. Force-Account Work shall be used when it is not possible or practical to price out the changed Work prior to the start of that Work. In these cases, Force-Account Work will be utilized during the pricing and negotiation phase of the change. Once negotiations have been concluded and a bilateral agreement has been reached, the tracking of the Work under Force-Account is no longer necessary. Force-Account Work shall also be used when negotiations between District and Design-Build Entity have broken apart and a bilateral agreement on the value of the changed Work cannot be reached. District may approve other uses of Force-Account Work.

C. Whenever any Force-Account Work is in progress, definite price for which has not been agreed on in advance, Design-Build Entity shall report to District each Business Day in writing in detail amount and cost of labor and material used, and any other expense incurred in Force-Account Work on preceding Day, by using the Cost Proposal form attached hereto. No claim for compensation for Force-Account Work will be allowed unless report shall have been made and acknowledged by District.

D. Whenever Force-Account Work is in progress, definite price for which has not been agreed on in advance, Design-Build Entity shall report to District when 75 percent of the NTE amount has been expended.

E. Force-Account Work shall be paid as extra Work under this Document 01 26 00. Methods of determining payment for Work and materials provided in this paragraph 1.6 shall not apply to performance of Work or furnishings of material that, in judgment of District, may properly be classified under items for which prices are otherwise established in Contract Documents.

1.7 DISTRICT-FURNISHED MATERIALS

A. District reserves right to furnish materials as it deems advisable, and Design-Build Entity shall have no claims for costs and overhead and profit on such materials.

1.8 OVERHEAD DEFINED

A. The following constitutes charges that are deemed included in overhead for all Contract Modifications, including Force-Account Work or CCD Work, whether incurred by Design-Build Entity, Subcontractors, or suppliers, and Design-Build Entity shall not invoice or receive payment for these costs separately:

1. Drawings: field drawings, Shop Drawings, etc., including submissions of drawings
2. Routine field inspection of Work proposed
3. General Superintendence, including Project Management or Construction Management services provided by Design-Build Entity
4. General administration and preparation of Cost Proposals, schedule analysis, change orders and other supporting documentation as necessary
5. Computer services
6. Reproduction services
7. Salaries of, superintendent, timekeeper, storekeeper and secretaries
8. Janitorial services
9. Temporary on-Site facilities, including for any extended periods of Contract Time:
   a. Offices
   b. Telephones
   c. Plumbing
   d. Electrical: Power, lighting
   e. Platforms
   f. Fencing, etc.
   g. Water
10. Home office expenses
11. Insurance and Bond premiums
12. Procurement and use of vehicles and fuel used coincidentally in Work otherwise included in the Contract Documents
13. Surveying
14. Estimating
15. Protection of Work
16. Handling and disposal fees
17. Final cleanup
18. Small tools
19. Warranty
20. Other incidental Work

1.9 RECORDS AND CERTIFICATION

A. Force-Account (cost reimbursement) charges shall be recorded daily and summarized in Cost Proposal form attached hereto. Design-Build Entity or authorized representative shall complete and sign form each Day. Design-Build Entity shall also provide with the form: the names and classifications of workers and hours worked by each; an itemization of all materials used; a list by size type and identification number of equipment and hours operated; and an indication of all Work performed by specialists.

B. No payment for Force-Account Work shall be made until Design-Build Entity submits original invoices substantiating materials and specialists charges.

C. District shall have the right to audit all records in possession of Design-Build Entity relating to activities covered by Design-Build Entity's claims for modification of Contract, including Force-Account Work and CCD Work.

D. Further, District will have right to audit, inspect, or copy all records maintained in connection with this Contract, including financial records, in possession of Design-Build Entity relating to any transaction or activity occurring or arising out of, or by virtue of, the Contract. If Design-Build Entity is a joint venture, right of District shall apply collaterally to same extent to records of joint venture sponsor, and of each individual joint venture member. This right shall be specifically enforceable, and any failure of Design-Build Entity to voluntarily comply shall be deemed an irrevocable waiver and release of all claims then pending that were or could have been subject to the Article 12 of Document 00 71 00.

DOCUMENT 01 26 00

MODIFICATION PROCEDURES

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

DOCUMENT 01 26 00

MODIFICATION PROCEDURES

SAMPLE OF COST PROPOSAL FORM

COST PROPOSAL (CP)

[__] PROJECT/Contract Number [__]

COR Number: _____
Date: _____
In Response To: (RFP#, etc.) _____

To: East Side Union High School District
Attention: [Point of Contact]
[Insert POC address] **Telephone:** (408) [_____]
[Insert POC address] **Fax:** (408) [_____]

From:

REQUESTED CHANGE IN CONTRACT TIME (DAYS) _____

Brief description of change(s): _____

	D-B Entity	First-Tier Subcontractors			Lower-Tier Subs		Totals
		Sub A	Sub B	Sub C	Sub A1	Sub B1	
LABOR							
Cost	$ -	$ 5,000	$ 10,000	$ 20,000	$ 1,000	$ 3,000	$ 39,000
Mark-up							
%	15%	15%	15%	15%	15%	15%	
$$	$ -	$ 750	$ 1,500	$ 3,000	$ 150	$ 450	$ 5,850
Taxes	$ -	$ -	$ -	$ -	$ -	$ -	$ -
						Labor Total Including Taxes	**$ 44,850**
MATERIALS							
Cost	$ -	$ 2,000	$ 4,000	$ 10,000	$ 500	$ 1,500	$ 18,000
Mark-up							
%	15%	15%	15%	15%	15%	15%	
$$	$ -	$ 300	$ 600	$ 1,500	$ 75	$ 225	$ 2,700
Taxes	$ -	$ 165	$ 330	$ 825	$ 41	$ 124	$ 1,485
						Materials Total Including Taxes	**$ 22,185**
RENTALS							
Cost	$ -	$ -	$ -	$ 2,500	$ -	$ -	$ 2,500
Mark-up							
%	7%	7%	7%	7%	7%	7%	
$$	$ -	$ -	$ -	$ 175	$ -	$ -	$ 175
Taxes	$ -	$ -	$ -	$ -	$ -	$ -	$ -
						Rentals Total Including Taxes	**$ 2,675**
DESIGN SERVICES							
Cost	$ 5,000	$ -	$ -	$ -			$ 5,000
Mark-up							
%	15%	15%	15%	15%			
$$	$ 750	$ -	$ -	$ -			$ 750
						Design Services Total	**$ 5,750**
SPECIALTY WORK							
Cost	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Discount	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mark-up							
%	5%	5%	5%	5%	5%	5%	
$$	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Taxes	$ -	$ -	$ -	$ -	$ -	$ -	$ -
						Specialty Work Total	**$ -**
Total All Costs n.i.c. Sales Tax	$ 5,000	$ 7,000	$ 14,000	$ 32,500	$ 1,500	$ 4,500	$ 64,500
D-B Entity Mark-up on Sub Costs		$ 350	$ 700	$ 1,625	$ 75	$ 225	$ 2,975
1st Tier Subcontractor Mark-up on Lower-tier Subs					$ 75	$ 225	$ 300
						Total All Contractor Mark-ups	***$ 12,750***
						Total Mark-up as a % of Costs	19.77%
						Total Sales Tax	$ 1,485
						GRAND TOTAL	**$ 78,735**
Print Name & Title:		**Signature:**			**Date:**		

Notes:

1. D-B Entity figures are to include only self-performed work. Do not include the value of work performed by first or lower-tier subs.
2. First-tier subcontractor figures are to include only self-performed work. Do not include the value of work performed by lower-tier contractors.

DOCUMENT 01 26 00

MODIFICATION PROCEDURES

END OF DOCUMENT

DOCUMENT 01 29 00

PAYMENTS AND COMPLETION

PART 1 GENERAL

1.1 SUMMARY

Document includes description of requirements and procedures for determining amount of Work performed and for obtaining payment for Work performed.

1.2 REFERENCES

A. California Public Contract Code
B. Code of Civil Procedures
C. Government Code

1.3 SCOPE OF WORK

Work under Contract Documents, or under any Proposal Item, allowance, or alternate, shall include all labor, materials, taxes, transport, handling, storage, supervision, administration, and all other items necessary for the satisfactory completion of Work, whether or not expressly specified or indicated.

1.4 DETERMINATION OF QUANTITIES

Quantity of work to be paid for under any item for which a unit price is fixed in Contract Documents shall be number, as determined by District, of units of work satisfactorily completed in accordance with Contract Documents or as directed by District. Unless otherwise provided, determination of number of units of work so completed will be based, so far as practicable, on actual measurement or count within prescribed or ordered limits, and no payment will be made for work done outside of limits. Measurements and computations will be made by methods set forth in Contract Documents, including without limitation this Document 01 29 00. If methods are not so set forth, measurements shall be made in any manner which District considers appropriate for class of Work measured (e.g., pre-assigned values, percentage completion, units completed or incremental milestones). Design-Build Entity must immediately inform District of any disputes regarding quantity measurements and shall immediately supply District with any documentation supporting the disputed measurements.

1.5 SCOPE OF PAYMENT

A. Except as otherwise expressly stated in Document 01 10 00 (Summary of Work), payment to Design-Build Entity at the unit price or other price fixed in Contract Documents for performing Work required under any item, or (if the Contract is on a single lump sum price basis) at the lump sum price fixed in the Contract Documents for performing all Work required under Contract Documents, and as either may be adjusted pursuant to any approved Change Order or Construction Change Directive, shall be full compensation for completing, in accordance with Contract Documents, all Work required under the item or under Contract Documents, and for all expense incurred by Design-Build Entity for any purpose in connection with the performance and completion of said Work, including all incidental work necessary for completion of the Work.
B. The Contract Sum, whether lump sum, unit price or otherwise, shall be deemed to include all costs necessary to complete required Work, including all Design-Build Entity overhead and profit, all costs (if any) for loss or damage arising from nature of Work or prosecution of the Work, and from action of elements. Unless Contract Documents expressly provide otherwise, the Contract Sum shall be deemed to include:
    1. Any and all costs arising from any unforeseen difficulties which may be encountered during, and all risks of any description connected with, prosecution of Work or prosecution of Proposal Item (whether lump sum or unit price) until acceptance by District;

2. All expenses incurred due to suspension, or discontinuance of Work or discontinuance of Proposal Item (whether lump sum or unit price) as provided in Contract Documents;
3. Escalation to allow for cost increases between time of Contract Award and completion of Work or completion of Proposal Item (whether lump sum or unit price).

C. Whenever it is specified herein that Design-Build Entity is to do work or furnish materials of any class for which no price is fixed in Contract Documents, it shall be understood that Design-Build Entity is to do such work or furnish such materials without extra charge or allowance or direct payment of any sort, and that cost of doing work or furnishing materials is to be included in price Proposal, unless it is expressly specified herein, in particular cases, that work or material is to be paid for as extra work.

D. Unit Prices shall apply to work covered by unit price

E. s so long as actual quantities performed on the Project are not less than 75 percent or greater than 125 percent of the estimated quantities contained in Document 00 41 00 (Proposal Form) or otherwise referenced in Document 01 10 00 (Summary of Work). If actual quantities exceed these parameters, then the unit price shall be adjusted by an amount to reflect the Design-Build Entity's incremental cost differential resulting from increased or decreased economies of scale.

F. No payment shall be made for materials or equipment not yet incorporated into the Work.

G. The District may, in its discretion, where Design-Build Entity requests payment on the basis of materials and equipment not incorporated in the Work, Design-Build Entity must satisfy the following conditions:
   1. The materials and/or equipment shall be delivered and suitably stored at the Site or at another local location agreed to in writing, for example, a mutually acceptable warehouse;
   2. Full title to the materials and/or equipment shall vest in District at the time of delivery to the Site, warehouse or other storage location;
   3. Obtain a negotiable warehouse receipt, endorsed over to District for materials and/or equipment stored in an off-site warehouse. No payment will be made until such endorsed receipts are delivered to District;
   4. Stockpiled materials and/or equipment shall be available for District inspection, but District shall have no obligation to inspect them and its inspection or failure to inspect shall not relieve Design-Build Entity of any obligations under the Contract Documents. Materials and/or equipment shall be segregated and labeled or tagged to identify these specific Contract Documents;
   5. After delivery of materials and/or equipment, if any inherent or acquired defects are discovered, defective materials and/or equipment shall be removed and replaced with suitable materials and/or equipment at Design-Build Entity's expense;
   6. At Design-Build Entity's expense, insure the materials and/or equipment against theft, fire, flood, vandalism, and malicious mischief, as well as any other coverages required under the Contract Documents;
   7. Design-Build Entity's Application for Payment shall be accompanied by a bill of sale, invoice or other documentation warranting that District has received the materials and equipment free and clear of all liens and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect District's interest therein, all of which must be satisfactory to District. This documentation shall include, but not be limited to, conditional releases of mechanics' liens and stop notices from all those providing materials and equipment as to which the Application for Payment relates, as well as unconditional releases of the same from the same as to the previous Application for Payment for which they have not already been provided.

H. Amounts previously paid for materials and equipment prior to incorporation into the Work shall be deducted from amounts otherwise due Design-Build Entity as they are incorporated.

1.6 BASIS OF PAYMENT

A. Unit Price Quantities: When estimated quantity for specific portions of Work is listed in Proposal Form, quantity of Work to be paid for shall be actual number of units satisfactorily completed, as determined by District and certified by Design-Build Entity, in accordance with Contract Documents.

B. Lump Sum: When estimated quantity for specific portion of Work is not indicated and unit is designated as lump sum, payment will be on a lump sum basis for Work satisfactorily completed in accordance with Contract Documents.

C. Allowances: Allowance items (if any – refer to Document 01 21 00 (Allowance)) will be paid for as provided in Document 01 10 00 (Summary of Work) and Document 01 10 01 (Summary of Work – Programming and Design Services). Funds authorized for Allowance work will not be released for Contract payments unless District has authorized Allowance work in writing.

D. District does not expressly, or by implication, agree, warrant, or represent in any manner, that actual amount of Work will correspond with amount shown or estimated and reserves right to increase or decrease amount of any class or portion of Work, to leave out entire Proposal Item or Items, or to add work not originally included in Proposal or Contract Documents, when in its judgment such change is in best interest of District. No change in Work shall be considered a waiver of any other condition of Contract Documents. No claim shall be made for anticipated profit, for loss of profit, for damages, or for extra payment whatever, except as otherwise expressly provided for in Contract Documents, because of any differences between amount of work actually done and estimated amount as set forth herein, or for elimination of Proposal Items.

1.7 PROGRESS PAYMENTS

A. If requested by Design-Build Entity, progress payments will be made monthly.

B. Schedule of Values:

1. Within ten Days from issuance of Notice of Award and prior to the Design-Build Entity's first Application for Payment, submit an initial breakdown of Proposal, including detailed breakdown of all design phases. Detailed construction activities need not be included in this initial submittal. Prior to commencing construction, Design-Build Entity shall submit for review and approval a more detailed breakdown of the construction activities of its Proposal by scheduled Work items and/or activities, including coordination responsibilities and Contract Closeout responsibilities, per Document 01 77 00 (Contract Closeout). Where more than one Subcontractor comprises the work of a Work item or activity, the Schedule of Values shall show a separate line item for each subcontract. Design-Build Entity shall furnish such breakdown of the total Contract Sum by assigning dollar values to each applicable Progress Schedule activity, which cumulative sum equals Contract Sum. The format and detail of the breakdown shall be as directed by District to facilitate and clarify future progress payments to Design-Build Entity for direct Work under Contract Documents. This breakdown shall be referred to as the Schedule of Values.
2. Design-Build Entity's overhead, profit, insurance, cost of bonds (except to the extent expressly identified in a Proposal Item) and/or other financing, as well as "general conditions costs," (e.g., Site cleanup and maintenance, temporary roads and access, off-Site access roads, temporary power and lighting, security, and the like), shall be prorated through all activities so that the sum of all the Schedule of Values line items equals Design-Build Entity's total Contract Sum, less any allowances designated by District.
3. District will review the breakdown in conjunction with the Progress Schedule to ensure that the dollar amounts of this Schedule of Values are, in fact, fair market cost allocations for the Work items listed. Upon favorable review by District, District will accept this Schedule of Values for use. District shall be the sole judge of fair market cost allocations.
4. District will reject any attempt to increase the cost of early activities, i.e., "front loading," resulting in a complete reallocation of moneys until such "front loading" is corrected. Repeated attempts at "front loading" may result in suspension or termination of the Work for default, or refusal to process progress payments until such time as the Schedule of Values is acceptable to District.
5. Funds shall be allocated in the Schedule of Values for Project Closeout.

C. Applications for Payment: Design-Build Entity shall establish and maintain records of cost of the Work in accordance with generally accepted accounting practices. In addition:

1. On or before the 16th of the month, Design-Build Entity shall meet with the District's Representative and the Inspector of Record, if directed by the District, with proposed "pencil

copy" of Application for Payment indicating % complete for each value. Application for Payment shall include % complete for each value as agreed in the pre-Application meeting.

2. On or before the 20th Day of each month (but after District's receipt of the updated Schedule as required by Document 01 32 16 (Progress Schedules and Reports)), Design-Build Entity shall submit to District one copy of an Application for Payment for the cost of the Work put in place during the period from the first Day of the previous month to the last Day of the current month, along with one copy of the District-approved updated Schedule. Such Applications for Payment shall be for the total value of activities completed or partially completed, including approved activity costs, based upon Schedule of Values prices (or Proposal item prices if unit price) of all labor and materials incorporated in the Work up until midnight of the last Day of that one month period, less the aggregate of previous payments. Accumulated retainage shall be shown as separate item in payment summary. Design-Build Entity shall submit in a form acceptable to District, and following the format of AIA Form G702/G703, an itemized cost breakdown of Design-Build Entity's record of Cost of the Work together with supporting data and any certification required by District. If Design-Build Entity is late submitting it's Application for Payment, that Application may be processed at any time during the succeeding one-month period, resulting in processing of Design-Build Entity's Application for Payment being delayed for more than a Day for Day basis.
3. Applications for Payment may include, but are not necessarily limited to the following:
   a. Material, equipment, and labor incorporated into the Work, less any previous payments for the same;
   b. Up to 75 percent of the cost of equipment identified in paragraph 1.5G of this Document 01 29 00 (if any), if purchased and delivered to the Site or stored off Site, as may be approved by District.
   c. Up to 75 percent of the cost of materials identified in paragraph 1.5G of this Document 01 29 00 (if any), specifically fabricated for the Project that are not yet incorporated into the Work.
4. At the time any Application for Payment is submitted, certify in writing the accuracy of the Application and that Design-Build Entity has fulfilled all scheduling requirements of Document 00 71 00 (General Conditions) and Document 01 32 16 (Progress Schedules and Reports), including updates and revisions. A responsible officer of Design-Build Entity shall execute the certification.
5. No progress payment will be processed prior to District receiving all requested, acceptable schedule update information. Failure to submit a schedule update complying with Document 01 32 16 (Progress Schedules and Reports) justifies denying the entire Application for Payment.
6. Each Application for Payment shall list each Change Order and Construction Change Directive ("CCD") executed prior to date of submission, including the Change Order/CCD Number, and a description of the work activities, consistent with the descriptions of original work activities. Submit a monthly Change Order/CCD status log to District.
7. If District requires substantiating data, submit information requested by District, with cover letter identifying Project, Application for Payment number and date, and detailed list of enclosures. Submit one copy of substantiating data and cover letter for each copy of Application for Payment submitted.
8. If Design-Build Entity fails or refuses to participate in work reconciliations or other construction progress evaluation with District, Design-Build Entity shall not receive current payment until Design-Build Entity has participated fully in providing construction progress information and schedule update information to District.

D. Progress Payments
   1. District will review Design-Build Entity's Application for Payment following receipt. If adjustments need to be made to percent of completion of each activity, District will make appropriate notations and return to Design-Build Entity. Design-Build Entity shall revise and resubmit. All parties shall update percentage of completion values in the same manner, i.e., express value of an accumulated percentage of completion to date.

2. Each Application for Payment may be reviewed by District and/or inspectors to determine whether the Application for Payment is proper, and shall be rejected, revised, or approved by District pursuant to the Schedule of Values prepared in accordance with paragraph 1.7B of this Document 01 29 00.
3. If it is determined that the Application for Payment is not proper and suitable for payment, District will return it to the Design-Build Entity as soon as practicable, but no later than seven Days after receipt, together with a document setting forth in writing the reasons why the Application for Payment is not proper. If District determines that portions of the Application for Payment are not proper or not due under the Contract Documents, then District may approve the other portions of the Application for Payment, and in the case of disputed items or defective Work not remedied, may withhold up to 150 percent of the disputed amount from the progress payment.
4. Pursuant to Public Contract Code Section 20104.50, if District fails to make any progress payment within 30 Days after receipt of an undisputed and properly submitted Application for Payment from Design-Build Entity, District shall pay interest to the Design-Build Entity equivalent to the legal rates set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure. The 30-Day period shall be reduced by the number of Days by which District exceeds the seven-Day return requirement set forth herein.
5. As soon as practicable after approval of each Application for Payment for progress payments, District will pay to Design-Build Entity in manner provided by law, an amount equal to **95** percent of the amounts otherwise due as provided in the Contract Documents, or a lesser amount if so provided in Contract Documents, provided that payments may at any time be withheld if, in judgment of District, Work is not proceeding in accordance with Contract, or Design-Build Entity is not complying with requirements of Contract, or to comply with stop notices or to offset liquidated damages accruing or expected.
6. Before any progress payment or final payment is due or made, Design-Build Entity shall submit satisfactory evidence that Design-Build Entity is not delinquent in payments to employees, Subcontractors, suppliers, or creditors for labor and materials incorporated into Work. This specifically includes, without limitation, conditional lien release forms for the current progress payment and unconditional release forms for past progress payments. If District is notified of impropriety of Design-Build Entity's payments to employees, Subcontractors, suppliers, or creditors for labor and materials incorporated into work and previously paid to Design-Build Entity, District may elect in its sole discretion to pay progress payments by joint check to Design-Build Entity and each Subcontractor having an interest in that progress payment in such amount.
7. District reserves and shall have the right to withhold payment for any equipment and/or specifically fabricated materials that, in the sole judgment of District, are not adequately and properly protected against weather and/or damage prior to or following incorporation into the Work.
8. Granting of progress payment or payments by District, or receipt thereof by Design-Build Entity, shall not be understood as constituting in any sense acceptance of Work or of any portion thereof, and shall in no way lessen liability of Design-Build Entity to replace unsatisfactory work or material, though unsatisfactory character of work or material may have been apparent or detected at time payment was made.
9. When District shall charge sum of money against Design-Build Entity under any provision of Contract Documents, amount of charge shall be deducted and retained by District from amount of next succeeding progress payment or from any other moneys due or that may become due Design-Build Entity under Contract. If, on completion or termination of Contract, such moneys due Design-Build Entity are found insufficient to cover District's charges against it, District shall have right to recover balance from Design-Build Entity or Sureties.

1.8 SUBSTITUTION OF SECURITIES IN LIEU OF RETENTION

A. In accordance with the provisions of Public Contract Code Section 22300, substitution of securities for any moneys withheld under Contract Documents to ensure performance is permitted under following conditions:

1. At request and expense of Design-Build Entity, securities listed in Section 16430 of the Government Code, bank or savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by Design-Build Entity and District which are equivalent to the amount withheld under retention provisions of Contract shall be deposited with Controller or with a state or federally chartered bank in California, as the escrow agent, who shall then pay such moneys to Design-Build Entity. Upon satisfactory completion of Contract, securities shall be returned to Design-Build Entity.
2. Alternatively, Design-Build Entity may request and District shall make payment of retentions earned directly to the escrow agent at the expense of Design-Build Entity. At the expense of Design-Build Entity, Design-Build Entity may direct the investment of the payments into securities and receive the interest earned on the investments upon the same terms provided for in this Document 01 29 00 for securities deposited by Design-Build Entity. Upon satisfactory completion of Contract Documents, Design-Build Entity shall receive from escrow agent all securities, interest, and payments received by the escrow agent from District, pursuant to the terms of this Document 01 29 00. Pay to each Subcontractor, not later than 20 Days after receipt of the payment, the respective amount of interest earned, net of costs attributed to retention withheld from each Subcontractor, on the amount of retention withheld to insure the performance of Design-Build Entity.
3. Design-Build Entity shall be beneficial owner of securities substituted for moneys withheld and shall receive any interest thereon.
4. Enter into escrow agreement with Controller according to Document 00 43 45 (Escrow Agreement for Security Deposits in Lieu of Retention), as authorized under Public Contract Code Section 22300, specifying amount of securities to be deposited, terms and conditions of conversion to cash in case of default of Design-Build Entity, and termination of escrow upon completion of Contract Documents.
5. Public Contract Code Section 22300 is hereby incorporated in full by this reference.

1.9 FINAL PAYMENT

A. As soon as practicable after all required Work is completed in accordance with Contract Documents, including punch list, testing, record documents, training, and Design-Build Entity maintenance after Final Acceptance, District will pay to Design-Build Entity, in manner provided by law, unpaid balance of Contract Sum of Work (including without limitation retentions), or whole Contract Sum of Work if no progress payment has been made, determined in accordance with terms of Contract Documents, less sums as may be lawfully retained under any provisions of Contract Documents or by law.

B. Prior progress payments shall be subject to correction in the final payment. District's determination of amount due as final payment shall be final and conclusive evidence of amount of Work performed by Design-Build Entity under Contract Documents and shall be full measure of compensation to be received by Design-Build Entity.

C. Design-Build Entity and each assignee under an assignment in effect at time of final payment shall execute and deliver at time of final payment, and as a condition precedent to District's obligation to make final payment, Document 00 65 73 (Agreement and Release of Any and All Claims) discharging District, its officers, agents, employees, and consultants of and from liabilities, obligations, and claims arising under Contract Documents.

1.10 EFFECT OF PAYMENT

A. Payment will be made by District, based on District's observations at the Site and the data comprising the Application for Payment. Payment will not be a representation that District has:
   1. Made exhaustive or continuous on-Site inspections to check the quality or quantity of Work;
   2. Reviewed construction means, methods, techniques, sequences, or procedures;
   3. Reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by District to substantiate Design-Build Entity's right to payment; or
   4. Made examination to ascertain how or for what purpose Design-Build Entity has used money previously paid on account of the Contract Sum.

DOCUMENT 01 29 00

PAYMENTS AND COMPLETION

1.11 ALLOWANCE

A. District will authorize and direct Design-Build Entity regarding provisions in this paragraph.
B. Allowance Amount: as listed in Document 00 52 00 (Agreement for Design-Build Services).
C. District shall determine in its sole discretion which, if any, costs it will authorize in writing to be paid from the Allowance.
D. Cost shall be determined as for CCD work as provided in Document 01 26 00 (Modification Procedures).
E. Prior to final payment, an appropriate Change Order will be issued to reflect actual amounts due Design-Build Entity on account of Work covered by the Allowance, and the Contract Sum will be correspondingly adjusted.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

DOCUMENT 01 31 19

PROJECT MEETINGS

PART 1 GENERAL

1.1 SUMMARY

A. Document Includes:
1. Descriptions of the required Project meetings for the Work. These meetings include:
    a. Preconstruction Conference.
    b. Schedule Review Meetings
    c. Weekly Progress Meetings.
    d. Progress Schedule and Billing Meetings.
    e. Special Meetings.
    f. Other Meetings as required by District to facilitate progress of the Project, including Design Review Meetings during Design Phases of Project.

1.2 PRECONSTRUCTION CONFERENCE

A. District will call for and administer Preconstruction Conference at time and place to be announced (usually 2-3 weeks prior to start of Work at the Site).
B. Design-Build Entity, all major Subcontractors, and major suppliers shall attend Preconstruction Conference.
C. Agenda may include, but will not be limited to, the following items:
    1. Schedules
    2. Personnel and vehicle permit procedures
    3. Use of premises
    4. Location of the Design-Build Entity's on-Site facilities
    5. Security
    6. Housekeeping
    7. Submittal and RFI procedures
    8. Inspection and testing procedures, on-Site and off-Site
    9. Utility shutdown procedures
    10. Control and reference point survey procedures
    11. Design-Build Entity's Safety Program
    12. Design-Build Entity's Initial Schedule
    13. Design-Build Entity's Schedule of Values
    14. Design-Build Entity's Schedule of Submittals
    15. Project Directory
    16. Design-Build Entity's Emergency Contact List
D. District will distribute copies of minutes to attendees. Attendees shall have 7 Days to submit comments or additions to minutes. Minutes will constitute final memorialization of results of Preconstruction Conference.

1.3 SCHEDULE REVIEW MEETINGS

A. Meet with District within 60 days from Notice to Proceed (Design) date to review draft Schedule of Values and Initial Schedule. Meet with District within 90 days from Notice to Proceed (Design) date and conduct initial review of Design-Build Entity's draft Shop Drawing and Sample Submittal Schedule.
B. Authorized representative in Design-Build Entity's organization, designated in writing, who will be responsible for working and coordinating with District relative to preparation and maintenance of Progress Schedule shall attend the initial schedule review meeting.
C. Design-Build Entity shall, within 10 Days from (if not prior to) the Notice to Proceed (Construction) date, meet with District to review the Progress Schedule and construction schedule submittals.
    1. Design-Build Entity shall have its manager, superintendent, scheduler, and key Subcontractor representatives, as required by District, in attendance.

2. District's review will be limited to submittal's conformance to Contract Documents requirements including, but not limited to, coordination requirements. District's review may also include:
   a. Clarifications of Contract Requirements.
   b. Directions to include activities and information missing from submittal.
   c. Requests to Design-Build Entity to clarify its schedule.
3. Within 14 Days of the Schedule Review Meeting, Design-Build Entity shall respond in writing to all questions and comments expressed by District at the meeting.

D. Design-Build Entity will administer Schedule Review Meetings and shall distribute minutes of Schedule Review Meetings to attendees. Attendees shall have 10 Days to submit comments or additions to minutes. Minutes will constitute final memorialization of results of Schedule Review Meetings.

1.4 WEEKLY PROGRESS MEETINGS

A. Weekly Progress Meetings will be scheduled throughout duration of Work at a time acceptable to the District. Progress meetings will be held weekly unless otherwise directed by District.
   1. Meetings shall be held at Design-Build Entity's on-Site office unless otherwise directed by District.
   2. The Design-Build Entity will prepare agenda and distribute it 2 Days in advance of meeting to Design-Build Entity. District reserves the right to direct Design-Build Entity to add additional matters to the meeting agenda, or to raise additional matters at the Weekly Progress Meeting.
   3. Design-Build Entity will record meeting notes of the Weekly Progress Meeting. Within 4 Days after the meeting, Design-Build Entity will distribute minutes to District though e-mail, and to those affected by decisions made at meeting. Attendees can either submit comments or additions to minutes prior to the next progress meeting, or may attend the next progress meeting and submit comments or additions there. Minutes will constitute final memorialization of results of meeting.

B. Progress meetings shall be attended by Design-Build Entity's job superintendent, major Subcontractors and suppliers, District, Inspector of Record, and others as appropriate to agenda topics for each meeting.

C. Agenda will contain the following items, as appropriate:
   1. Review, revise as necessary, and approve previous meeting minutes
   2. Review of Work progress since last meeting
   3. Status of Construction Work Schedule, delivery schedules, adjustments
   4. Submittal, RFI, and Change Order status
   5. Review of the Design-Build Entity's safety program activities and results, including report on all serious injury and/or damage accidents
   6. Other items affecting progress of Work

1.5 PROGRESS SCHEDULE AND BILLING MEETINGS

A. A meeting will be held on approximately the 16th of each month or as agreed to with the District (but no more than once every 30 days) to review the schedule update submittal and progress payment application.

1. At this meeting, at a minimum, the following items will be reviewed:
   a. Percent complete of each activity;
   b. Time impact evaluations for Change Orders and Time Extension Request;
   c. Actual and anticipated activity sequence changes;
   d. Actual and anticipated duration changes; and
   e. Actual and anticipated Design-Build Entity delays.
2. These meetings are considered a critical component of overall monthly schedule update submittal and Design-Build Entity shall have appropriate personnel attend. At a minimum, Design-Build Entity's General Superintendent and Scheduler shall attend these meetings.
3. Design-Build Entity shall plan on the meeting and set aside sufficient time to review the progress schedule and the monthly pay application.

PROJECT MEETINGS

1.6 SPECIAL MEETINGS

A. Any party may call special meetings by notifying all desired participants and District (5) days in advance, giving reason for meeting. Special meetings may be held without advance notice in emergency situations.
B. At any time during the progress of Work, District shall have authority to require Design-Build Entity to attend a meeting of any or all of the Subcontractors engaged in Work or in other work, and notice of such meeting shall be duly observed and complied with by Design-Build Entity.
C. Design-Build Entity shall schedule and conduct coordination meetings as necessary to discharge coordination responsibilities in Document 00 71 00 (General Conditions). Design-Build Entity shall give District (5) days written notice of coordination meetings. Design-Build Entity shall maintain and distribute minutes of coordination meetings. Attendees shall have (7) days to submit comments or additions to minutes. Minutes will constitute final memorialization of results of coordination meetings.

1.7 DESIGN REVIEW MEETINGS

A. Design Review Meetings shall be held at least twice a month or in accordance with such other schedule as the Design-Build Entity and District shall mutually agree upon during the Design Phase of the Project to review the progress of the design and to facilitate the Design Work described in Document 01 10 01 (Summary of Work – Programming and Design Services).
   1. Meetings shall be held at District Representative's on-Site office unless otherwise directed by District.
   2. Design-Build Entity shall record meeting notes of the Design Review Meeting. Within (7) days after the meeting, Design-Build Entity shall distribute minutes to District though e-mail, and to those affected by decisions made at meeting. Attendees can either submit comments or additions to minutes prior to the next progress meeting, or may attend the next progress meeting and submit comments or additions there. Minutes will constitute final memorialization of results of meeting.
   3. The agenda for the next meeting shall be ascertained no later than at the previous meeting, to ensure that appropriate District representatives for those agenda items are prepared for the decisions to be discussed.
B. Progress meetings shall be attended by representatives of the Design-Build Entity's Design Team and Construction Team, District, and others as appropriate to the agenda topics for each meeting.
C. Agenda will contain the following items, as appropriate:
   1. Review, revise as necessary, and approve previous meeting minutes
   2. Review of Design progress since last meeting
   3. Status of Design Schedule and adjustments
   4. Required responses from District pertaining to the design clarifications of the Contract Documents, material selections, proposed deviations from the Contract Documents, etc.
   5. DSA submittal strategies
   6. Other items affecting progress of Design.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

DOCUMENT 01 32 16

PROGRESS SCHEDULES AND REPORTS

PART 1 GENERAL

1.1 SUMMARY

A. Perform scheduling of Work under this Contract in accordance with requirements of this Document 01 32 16.
   1. Development of schedule, cost, and resource loading of the Progress Schedule, monthly payment requests, and project status reporting requirements of the Contract Documents shall employ scheduling as required in this Document 01 32 16.
   2. The Schedule shall be cost-loaded based on Schedule of Values as approved by District.
   3. Submit schedules and reports as specified in 00 71 00 (General Conditions).

B. Upon Award of Contract, immediately commence development of Initial Schedule to ensure compliance with schedule submittal requirements.

C. Design-Build Entity's obligations under this Document 01 32 16 are hereby deemed material obligations justifying District's remedies for default if Design-Build Entity fails to perform. Nothing in this paragraph 1.1.C of this Document 01 32 16 or the lack of an express statement that any other Contract Documents provision is or is not material shall be considered in determining whether any such other provision is material.

D. Employ competent scheduling personnel or a schedule consultant with experience performing scheduling required herein on two prior, similar projects.

1.2 GENERAL

A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.

B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in Document 00 52 00 (Agreement for Design-Build Services), unless an earlier (advanced) time of completion is requested by Design-Build Entity and agreed to by District. A Change Order shall formalize any such agreement.
   1. District is not required to accept an earlier (advanced) schedule, i.e., one that shows early completion date(s) for the Contract Time.
   2. Design-Build Entity is not entitled to extra compensation in event agreement is reached on an earlier (advanced) schedule and Design-Build Entity completes its Work, for whatever reason, beyond completion date shown in earlier (advanced) schedule but within the Contract Time.
   3. A schedule showing the Work completed in less than the Contract Time, which has been accepted by District, shall be considered to have Project Float. The Project Float is the time between the scheduled completion of the Work and Contract Substantial Completion. Project Float is a resource available to both District and Design-Build Entity.
   4. Float Ownership: Neither District nor Design-Build Entity owns float. The Project owns the float. As such, liability for delay of any Substantial Completion or Final Completion date rests with the party whose actions, last in time, actually cause delay to a Substantial Completion or Final Completion date.
      a. For example, in the event of unexcused delay by Party A and Party B, and if Party A uses some, but not all of the float and Party B later uses remainder of the float as well as additional time beyond the float, Party B shall be liable for the time that represents a delay to the Substantial Completion date.
      b. Under this scenario, Party A would not be responsible for the time since it did not consume all of the float and additional float remained; therefore, the Substantial Completion Date was unaffected.

C. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract schedule and monitoring actual progress as compared to Progress Schedule rests with Design-Build Entity.

D. Failure of Progress Schedule to include any element of the Work or any inaccuracy in Progress Schedule will not relieve Design-Build Entity from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of Schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests, and shall not, in any manner, impose a duty of care upon District, or act to relieve Design-Build Entity of its responsibility for means and methods of construction.

E. Transmit each item under form approved by District or following Document 01 32 19 (Submittal Procedures).
   1. Identify Project as **Yerba Buena HS Student Union and Quad Modernization Project**, and include name of Design-Build Entity.
   2. Provide space for Design-Build Entity's approval stamp and District's review stamps.
   3. Submittals received from sources other than Design-Build Entity will be returned to Design-Build Entity without District's review.

1.3 INITIAL AND ORIGINAL PROGRESS SCHEDULE

A. Initial Schedule submitted for review shall serve as Design-Build Entity's schedule for up to 90 Days after the Notice to Proceed (Design).

B. Initial Schedule must indicate detailed plan for the Design progress to be completed in first 90 Days of the Contract; details of any planned mobilization of plant and equipment; sequence of early operations; and procurement of materials and equipment. Show Work beyond 90 Days in summary form.

C. Design-Build Entity shall submit its Original Schedule for review within 90 days of Notice to Proceed (Design). Original Schedule and all updates shall comply with all standards herein. Original Schedule must comply with milestone and completion dates specified in Contract Documents.

D. All Schedules shall be time-scaled.

E. All Schedules shall be cost and resource-loaded. Accepted cost and resource-loaded Schedule will be used as basis for monthly progress payments. Use of Initial Schedule for progress payments shall not exceed 90 Days.

F. Except as otherwise expressly provided in this Document 01 32 16, meet with District to review and discuss each Schedule (i.e., Initial, Original and monthly updates) within seven Days after each Schedule has been submitted to District.
   1. District's review and comment on any Schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).
   2. Design-Build Entity shall make corrections to Schedule necessary to comply with Contract requirements and shall adjust Schedule to incorporate any missing information requested by District. Resubmit Initial Schedule if requested by District.

G. If Design-Build Entity is of the opinion that any of the Work included on its Schedule has been impacted, submit to District a written Time Impact Evaluation (TIE) in accordance with paragraph 1.8 of this Document 01 32 16. The TIE shall be based on the most current update of the Initial Schedule.

1.4 SCHEDULE FORMAT AND LEVEL OF DETAIL

A. Each Schedule (Initial, Original and updates) shall indicate all separate design, approval, fabrication, procurement and field construction activities required for completion of the Work, including but not limited to the following:
   1. All Design-Build Entity, Subcontractor, and assigned Design-Build Entity work shall be shown in a logical work sequence that demonstrates a coordinated plan of work for all contractors. The intent is to provide a common basis of acceptance, understanding, and communication, as well as interface with other contractors.
   2. Activities related to the delivery of Design-Build Entity and District-furnished equipment to be Design-Build Entity-installed per Contract shall be shown.
   3. All activities shall be identified through codes or other identification to indicate the building (i.e. buildings, Site work) and Design-Build Entity/Subcontractor responsibility to which they pertain.
   4. Break up the Work schedule into activities of durations of approximately 21 Days or less each, except for non-field construction activities or as otherwise deemed acceptable by District.

5. Show the critical path in red. For each activity, show early start, late start, early finish, late finish, durations measured in Days, float, resources, predecessor and successor activities, planned workday/week for the activity, man power loading, and scheduled/actual progress payments.

B. Seasonal weather conditions (which do not constitute a delay as defined herein) shall be considered in the planning and scheduling of all work influenced by high or low ambient temperatures or presence of high moisture for the completion of the Work within the allotted Contract Time.

C. Failure by Design-Build Entity to include any element of Work required for performance of the Work on the detailed construction schedule shall not excuse Design-Build Entity from completing all Work required within the Contract Time.

D. A two-week "look ahead," detailed daily bar chart schedule shall be updated and issued weekly for discussion at the Weekly Progress Meetings.

E. Utilize Primavera or Microsoft Project computer-scheduling software, or approved equivalent, for all scheduling including schedule updates.

1.5 MONTHLY SCHEDULE UPDATE SUBMITTALS

A. Following acceptance of Design-Build Entity's Initial Schedule, monitor progress of Work and adjust Schedule each month to reflect actual progress and any anticipated changes to planned activities.
   1. Each Schedule update submitted shall be complete, including all information requested for the Initial Schedule and Original Schedule submittal.
   2. Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed, and Design-Build Entity warrants the accuracy of as-built information as shown.

B. A meeting will be held on approximately the 16th of each month to review the Schedule update submittal and progress payment application.
   1. At this meeting, at a minimum, the following items will be reviewed: Percent complete of each activity; TIEs for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Design-Build Entity delays.
   2. These meetings are considered a critical component of overall monthly schedule update submittal; have appropriate personnel attend. At a minimum, Design-Build Entity's General Superintendent and Scheduler shall attend these meetings.

C. Within five Days after monthly Schedule update meeting, submit the updated Schedule.

D. Within five Days of receipt of above-noted revised submittals, District will either accept or reject monthly schedule update submittal.
   1. If accepted, percent complete shown in monthly update will be basis for Application for Payment by Design-Build Entity. The schedule update shall be submitted as part of Design-Build Entity's Application for Payment.
   2. If rejected, update shall be corrected and resubmitted by Design-Build Entity before the Application for Payment is submitted.

E. Updating, changing or revising of any report, curve, schedule or narrative submitted to District by Design-Build Entity under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall not have the effect of amending or modifying, in any way, the Contract Substantial Completion date or milestone dates or of modifying or limiting, in any way, Design-Build Entity's obligations under this Contract.

1.6 SCHEDULE REVISIONS

A. Updating the Schedule (Initial and Original) to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, however, revisions to activity durations and sequences are expected on a monthly basis.

B. To reflect revisions to the Schedule, provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of Work, provide a schedule diagram that compares the original sequence to the revised sequence of Work. Provide the

written narrative and schedule diagram for revisions three Days in advance of the monthly schedule update meeting. Clearly show and discuss any changes in the critical path.

C. Schedule revisions shall not be incorporated into any schedule update until District has reviewed the revisions. District may request further information and justification for schedule revisions and, within three Days, provide District with a complete written narrative response to District's request.

D. If District does not accept Design-Build Entity's revision, and Design-Build Entity disagrees with District's position, Design-Build Entity has seven Days from receipt of District's letter rejecting the revision, to provide a written narrative providing full justification and explanation for the revision. Design-Build Entity's failure to respond in writing within seven Days of District's written rejection of a schedule revision shall be contractually interpreted as acceptance of District's position, and Design-Build Entity waives its rights to subsequently dispute or file a claim regarding District's position. If Design-Build Entity files a timely response as provided in this paragraph, and the parties are still unable to agree, Design-Build Entity's sole right shall be to file a claim as provided in Document 00 71 00 (General Conditions), Article 12.

E. At District's discretion, Design-Build Entity can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

1.7 RECOVERY SCHEDULE

A. If a Schedule update shows a substantial completion date 21 Days beyond any Contract Substantial Completion date, or individual Milestone completion dates, submit to District within seven Days the proposed revisions to recover the lost time. As part of this submittal, provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, provide a schedule diagram comparing the original sequence to the revised sequence of Work. If District requests, show the intended critical path; secure appropriate Subcontractor and supplier consent to the recovery Schedule; submit a narrative explaining trade flow and construction flow changes, duration changes, added/deleted activities, critical path changes and identify all near critical paths and man hour loading assumptions for major Subcontractors.

B. The revisions shall not be incorporated into any Schedule update until District has reviewed the revisions.

C. If District does not accept Design-Build Entity's revisions, District and Design-Build Entity shall follow the procedures in paragraphs 1.6C, 1.6D, and 1.6E of this Document 01 32 16.

D. At District's discretion, Design-Build Entity can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

1.8 TIME IMPACT EVALUATION FOR CHANGE ORDERS AND OTHER DELAYS

A. When Design-Build Entity is directed to proceed with changed work, prepare and submit, within 14 Days from the direction to proceed, a TIE that includes both a written narrative and a schedule diagram depicting how the changed work affects other schedule activities. The schedule diagram shall show how Design-Build Entity proposes to incorporate the changed work in the schedule, and how it impacts the current Schedule update critical path or otherwise. Design-Build Entity is also responsible for requesting time extensions based on the TIE's impact on the critical path. The diagram shall be tied to the main sequence of scheduled activities to enable District to evaluate the impact of changed work to the scheduled critical path.

B. Comply with the requirements of paragraph 1.8A of this Document 01 32 16 for all types of delays such as, but not limited to, Design-Build Entity/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.

C. Design-Build Entity is responsible for all costs associated with the preparation of TIEs, and the process of incorporating TIEs into the current schedule update. Provide District with four copies of each TIE.

D. Once agreement has been reached on a TIE, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Time may be extended in an amount District allows, and Design-Build Entity may submit a claim for additional time claimed by Design-Build Entity as provided in Document 00 71 00 (General Conditions).

PROGRESS SCHEDULES AND REPORTS

1.9 TIME EXTENSIONS

A. Design-Build Entity is responsible for requesting time extensions for time impacts that, in the opinion of Design-Build Entity, impact the critical path of the current schedule update. Notice of time impacts shall be given in accordance with Document 00 71 00 (General Conditions).

B. Where an event for which District is responsible impacts the projected Substantial Completion date, provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. Also include a detailed cost breakdown of the labor, equipment, and material Design-Build Entity would expend to mitigate District-caused time impact. Submit mitigation plan to District within 18 Days from the date of discovery of said impact. Design-Build Entity is responsible for the cost to prepare the mitigation plan.

C. Failure to request time, provide TIE, or provide the required mitigation plan will result in Design-Build Entity waiving its right to a time extension and cost to mitigate the delay.

D. No time will be granted under the Contract Documents for cumulative effect of changes.

E. District will not be obligated to consider any time extension request unless requirements of Contract Documents are complied with.

F. Failure of Design-Build Entity to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.

G. Notwithstanding any other provision of this Document 01 32 16, if Design-Build Entity does not submit a TIE within the required 18 Days for any issue, Design-Build Entity hereby agrees that Design-Build Entity does not require a time extension for that issue.

1.10 PROJECT STATUS REPORTING

A. In addition to submittal requirements for scheduling identified in this Document 01 32 16, provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each Schedule as specified herein. Status reporting shall be in form specified in this paragraph 1.10 below.

B. Prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:

1. Status of major Project components (percent complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.
2. Progress made on critical activities indicated on each Schedule, including inspections.
3. Explanations for any lack of work on critical path activities planned to be performed during last month.
4. Explanations for any schedule changes, including changes to logic or to activity durations.
5. List of critical activities scheduled to be performed during the next month.
6. Status of major material and equipment procurement.
7. Any delays encountered during reporting period.
8. Provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.
   a. Actual resource shall be accumulated in field by Design-Build Entity, and shall be as noted on Design-Build Entity's daily reports. These reports will be basis for information provided in monthly and weekly printed reports.
   b. Explain all variances and mitigation measures.
9. Design-Build Entity may include any other information pertinent to status of Project. Include additional status information requested by District at no additional cost.
10. Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

C. By noon of each workday provide District with report of Design-Build Entity and its Subcontractors' work activities for the previous day, including trades, equipment, work activities worked on, staff levels, any recorded accidents and equipment deliveries. Any Force Account records from previous day shall be attached.

DOCUMENT 01 32 16

PROGRESS SCHEDULES AND REPORTS

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

DOCUMENT 01 32 19

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Document Includes:
   1. Description of general requirements for Submittals for the Work:
      a. Schedule of Shop Drawing and Sample Submittals
      b. Procedures
      c. Safety Program
      d. Progress Schedules
      e. Design Development Drawings and Specifications
      f. Construction Documents and Specifications
      g. Product Data
      h. Shop Drawings
      i. Samples
      j. Installation, Operations and Maintenance Manuals
      k. Quality Assurance Control Submittals
      l. Environmental Impact Mitigation Plan Documents
      m. Project Record Documents
      n. Delay of Submittals
      o. Optional Review Meeting

1.2 SCHEDULE OF SHOP DRAWING AND SAMPLE SUBMITTALS

A. Submit preliminary Schedule of Shop Drawing and Sample Submittals as required by Document 00 71 00 (General Conditions) and in quantities as required by paragraph 1.2A.1 of this Document 01 32 19.
B. Schedule of Submittals will be used by District to schedule its activities relating to review of Submittals. Schedule of Submittals shall indicate a spreading out of Submittals and early Submittals of long-lead-time items and of items that require extensive review.
C. Unless otherwise specified, make Submittals in groups containing all associated items to assure that information is available for checking each item when it is received. Identify on the Submittal which Submittals should be reviewed together.
D. Schedule of Submittals will be reviewed by District and shall be revised and resubmitted until accepted by District.

1.3 PROCEDURES

A. Submit at Design-Build Entity's expense, the following items ("Submittals") required by the Contract Documents:
   1. Schedule of Submittals
   2. Safety Program
   3. Progress Schedules
   4. Design Development Drawings and Specifications
   5. Construction Documents and Specifications
   6. Product Data
   7. Material Safety Data Sheets
   8. Vibration Control Drawings and Calculations
   9. Shop Drawings
   10. Samples
   11. Installation, Operation, and Maintenance Manuals

12. Quality Assurance Control Data
13. Environmental Impact Mitigation Documents
14. Computer Programs
15. Project Record Documents
16. Storm Water Pollution Prevention Plan
17. Seismic Submittal Review Forms, where specified in Divisions 2 through 60.

B. Submit these Submittals to District for review and approval in accordance with accepted Schedule of Shop Drawings and Samples Submittals. If no such schedule is agreed upon prior to, then all Shop Drawing, Samples, and product data Submittals shall be submitted within **30 Days** after receipt of Notice to Proceed with Construction from District. In all instances, District may require Design-Build Entity to submit any or all Submittals directly to Architect/Engineer for review.

C. Transmit each item with the appropriate Submittal transmittal form (attached to this Document 01 32 19 as Exhibits A and B). For project on which an electronic web-based Project Management System is used, per Document 01 31 23 Web Based Project Management System, Design-Build Entity shall use the system's similar electronic forms and formats for Submittal transmissions. Identify Project, Design-Build Entity, Subcontractor, major supplier, pertinent Drawing sheet and detail number, and Specification Section number as appropriate. Where manufacturer's standard drawings or data sheets are used, they shall be marked clearly to show those portions of the data that are applicable to this Project. Inapplicable portions shall be marked out. Submittals shall be submitted based on each Specification Section. Submittals containing information about more than one Specification Section will be returned for re-submittal. Submittals shall include all information requested by each Specification Section. **(No partial Submittals.)** Incomplete Submittals will be returned and not reviewed by District.

D. The data shown on the Submittals shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to show District the materials and equipment Design-Build Entity proposes to provide and to enable District to review the information for the limited purposes specified in this Document 01 32 19. Submittals shall be identified clearly as to material, supplier, pertinent data such as catalog numbers and the use for which it is intended and otherwise as District may require to enable District to review the Submittal. The quantity of each Submittal to be submitted will be as required by individual Specification Sections or this Document 01 32 19.

E. At the time of each submission, give District specific written notice of all variations, if any, that the submitted Submittal may have from the requirements of the Contract Documents, and the reasons therefore. This written notice shall be in a written communication attached to the Submittal transmittal form. In addition, cause a specific notation to be made on each Submittal submitted to District for review and approval of each such variation. If District accepts deviation, District will note its acceptance on the returned Submittal transmittal form and, if necessary, issue appropriate Contract Modification.

F. Submittal coordination and verification is responsibility of Design-Build Entity; this responsibility shall not be delegated in whole or in part to Subcontractors or suppliers. Before submitting each Submittal, review and coordinate each Submittal with other Submittals and with the requirements of the Work and the Contract Documents, and determine and verify:
   1. All field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto;
   2. All materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work; and
   3. All information relative to Design-Build Entity's sole responsibilities and of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

G. Design-Build Entity's submission to District of a Submittal shall constitute Design-Build Entity's representation that it has satisfied its obligations under the Contract Documents, and as set forth immediately above in this paragraph 1.2 of Document 01 32 19, with respect to Design-Build Entity's review and approval of that Submittal.

H. Designation of work "by others," if shown in Submittals, shall mean that work will be responsibility of Design-Build Entity rather than Subcontractor or supplier who has prepared Submittals.

SUBMITTAL PROCEDURES

I. After review by District or Architect/Engineer or other consultant designated by District, of each of Design-Build Entity's Submittals, one set of material will be returned to Design-Build Entity with actions defined as shown on Submittal transmittal form (attached to this Document 01 32 19 as Exhibit A):
   1. NO EXCEPTIONS TAKEN - Accepted subject to its compatibility with future Submittals and additional partial Submittals for portions of the Work not covered in this Submittal. Does not constitute approval or deletion of specified or required items not shown on the Submittal.
   2. MAKE CORRECTIONS NOTED (NO RESUBMISSIONS REQUIRED) - Same as item 1 above, except that minor corrections as noted shall be made by Design-Build Entity.
   3. MAKE CORRECTIONS NOTED AND RESUBMIT - District identified major inconsistencies or errors that shall be resolved or corrected by Design-Build Entity prior to subsequent review by District.
   4. NOT APPROVED - RESUBMIT - Submitted material does not conform to Contract Documents in major respect, e.g.,: wrong size, model, capacity, or material.
   5. DISTRICT'S REVIEW NOT REQUIRED – Submittal to be retained by District for reference purposes only.

J. Make a complete and acceptable Submittal at least by second submission. District reserves the right to deduct monies from payments due Design-Build Entity to cover District and Architect/Engineer's additional costs of review beyond the second submission. Illegible Submittals will be rejected and returned to Design-Build Entity for resubmission. Design-Build Entity shall be in breach of the Contract if Design-Build Entity's first re-submittal, following a Submittal which District determines falls within categories 3 or 4 above, does not fall within categories 1 or 2 above. Deductions will be calculated in accordance with Section 1.2.T of this specification 01 32 19.

K. Favorable review will not constitute acceptance by District of any responsibility for the accuracy, coordination and completeness of the Submittals. Accuracy, coordination, and completeness of Submittals shall be sole responsibility of Design-Build Entity, including responsibility to back-check comments, corrections, and modifications from District's review before fabrication. Design-Build Entity, Subcontractors, or suppliers may prepare Submittals, but Design-Build Entity shall ascertain that Submittals meet requirements of Contract Documents, while conforming to structural space and access conditions at point of installation. District's review will be only to assess if the items covered by the Submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as indicated by the Contract Documents. Favorable review of Submittal, method of work, or information regarding materials and equipment Design-Build Entity proposes to furnish shall not relieve Design-Build Entity of responsibility for errors therein and shall not be regarded as assumption of risks or liability by District , or any officer or employee thereof, and Design-Build Entity shall have no claim under Contract Documents on account of failure or partial failure or inefficiency or insufficiency of any plan or method of work or material and equipment so accepted. Favorable review shall be considered to mean merely that District has no objection to Design-Build Entity using, upon Design-Build Entity's own full responsibility, plan or method of work proposed, or furnishing materials and equipment proposed.

L. District's review will not extend the means, methods, techniques, sequences or procedures of construction or to safety precautions or programs incident thereto. The review and comment on a separate item as such will not indicate approval of the assembly in which the item functions.

M. Submit complete initial Submittal for those items where required by individual Specification Sections. Complete Submittal shall contain sufficient data to demonstrate that items comply with Specifications, shall meet minimum requirements for submissions cited in Specification Sections, shall include motor data and seismic anchorage certifications, where required, and shall include necessary revisions required for equipment other than first named. If Design-Build Entity submits incomplete initial Submittal when complete Submittal is required, Submittal may be returned to Design-Build Entity without review.

N. Copy, conform, and distribute reviewed Submittals in sufficient numbers for Design-Build Entity's files, Subcontractors, and vendors.

O. After District's review of Submittal, revise as noted and resubmit as required. Identify changes made since previous Submittal.
   1. Begin no fabrication or work that requires Submittals until return of Submittals not requiring re-submittal. Do not extrapolate from Submittals covering similar work.

2. Normally, Submittals will be processed and returned to Design-Build Entity within twenty-one (21) calendar days of receipt.

P. Distribute copies of reviewed Submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

Q. All Submittals shall be **number-identified** by Design-Build Entity, prior to submission to District, in accordance with the following:
   1. Sequentially number each Submittal by Specification Section (i.e., "1-2", "2-2", "3-2", etc.) as the basis for number identification of Submittals.
   2. Affix the Submittal number under which each Submittal is made on every copy of each Shop Drawing, product data, sample, certification, etc.
   3. Number Installation, Operation, and Maintenance Manuals with original root number of the approved Submittal for the item.
   4. If the Submittal is a re-submittal (including without limitation after an initial Submittal is rejected, returned without review or marked 'Revise as Noted and Resubmit'), add the suffix designation "A" (i.e., a re-submittal of Submittal 1-2 would be numbered 1A-2). Subsequent re-submittals would be identified by the Submittal number and sequential letters (i.e., "B", "C", "D", etc.).
   5. All Submittals shall include all information requested by each Specification Section. No partial Submittals will be accepted unless previously authorized by District. In the event a partial Submittal is authorized, each subsequent different Submittal (as opposed to re-submittal) is given a new number.

R. Submission Requirements:
   1. Deliver Submittals to District giving sufficient time for more than one review, but in no case less than thirty (30) Days before dates reviewed Submittals will be needed.
   2. Initial Submittal of Installation, Operation and Maintenance Manuals shall be forty-five (45) Days after the date Submittals that pertain to the applicable portion of the Installation, Operation and Maintenance Manual is satisfactorily reviewed.
   3. The following table lists the number of initial Submittals required from Design-Build Entity for each type of submission, to whom Design-Build Entity shall distribute the information, and District's distribution of reviewed submissions. If Design-Build Entity needs more copies of reviewed Submittals returned to it, then either submit additional copies or make copies from the returned transparency Submittal. Submittals requiring resubmission will require the same quantity and distribution as an initial Submittal.

Submittal	Design-Build Entity Initial Submittal		District Submittal Review Return	
	# of Electronic files	# of Hard Copies/ Prints/ Samples	# of Electronic files	# of Hard Copies/ Prints/ Samples
Schedule of Submittals	1	0	1	0
Safety Program	1	0	0	0
Progress Schedules	1	0	1	0
Schematic Design Drawings & Specifications	1	2	1	0
100% Design Development Drawings & Specifications	1	2	1	0
50% Construction Document Drawings & Specifications	1	2	1	0
DSA Submittal Drawings & Specifications	1	2	1	0
DSA Approved Drawings & Specifications	1	2	1	0
Product Data	1	0	1	0
Materials Safety Data Sheets	1	0	1	0

Vibration Control Drawings & Calculations	1	0	1	0
Shop Drawings	1	0	1	0
Samples	0	2	0	1
Installation, Operation, and Maintenance Manuals	1	2	1	0
Quality Assurance Control Submittals	1			
Computer Programs	1	0	0	0
Environmental Impact Mitigation Documents	1	0	1	0
Project Record Documents	1	2	1	0
Other Documents	1	0	1	0

S. Accompany Submittals with Submittal transmittal form, containing:
   a. Date, revision date, and Submittal log number.
   b. **Project name and District's Contract number**.
   c. Design-Build Entity's name, address, and job number.
   d. Specification Section number clearly identified.
   e. The quantity of Shop Drawings, Product Data, or Samples submitted.
   f. Notification of deviations from Contract Documents.
   g. Materials Safety Data Sheet (MSDS) for each item complying with OSHA's Hazard Communication Standard 29 CFR 1910.1200.
   h. Other pertinent data.

T. Submittal shall include:
   i. Date and revision dates.
   j. Revisions, if any, identified.
   k. Project Name and Contract number.
   l. The names of:
      1) Design-Build Entity, Subcontractor, Supplier, Manufacturer, and separate detailer, when pertinent.
   m. Identification of product material by location within the Project.
   n. Relation to adjacent structure or materials.
   o. Field dimensions, clearly identified as such.
   p. Specification Section number and applicable detail reference number on the Drawings.
   q. Applicable reference standards, such as ASTM, ANSI, FS, NEMA, SMACNA or ACI.
   r. A blank space, on each Drawing or data sheet, 5" x 4" for the District's stamp.
   s. Identification of deviations from Contract Documents.
   t. Design-Build Entity's stamp, initialed or signed, with language certifying the review of Submittals, verification of field measurements, construction criteria and technical standards in compliance with Contract Documents.

U. Resubmission requirements:
   1. Shop Drawings:
      a. Revise initial Shop Drawings as required and resubmit as specified for initial Submittals.
      b. Indicate on Shop Drawings any changes that have been made other than those requested by District.
   2. Product Data and Samples:
      a. Submit new Product Data and Samples as required for initial Submittals.
   3. Installation, Operation, and Maintenance Manuals:
      a. Revise initial Installation, Operation, and Maintenance Manual(s) as required and resubmit as specified for initial Submittals.

V. Number of resubmissions:
   1. One reexamination of Design-Build Entity's Submittals that have been returned for correction or replacement will be included in District's budget. **Any additional re-examination of Design-Build**

SUBMITTAL PROCEDURES

Entity's Submittals will be considered additional scope services to be paid by Design-Build Entity through District. Design-Build Entity shall pay District (or District may deduct from any progress or final payment), for design team personnel, on an hourly basis at 2.5 times direct payroll expenses, and for consultant personnel time at 1.25 times the amount billed District.

1.4 SAFETY PROGRAM

A. Submit Safety Program in quantities as required by paragraph 1.2.R.3 of this Document 01 32 19, in Adobe pdf, to District within the time set forth in Document 01 56 00 (Site Security and Safety), paragraph 1.4. to District This submittal is for the District's information only**.**

1.5 PROGRESS SCHEDULE

A. See Document 01 32 16 (Progress Schedules and Reports) for schedule and report requirements. Document 01 32 16 shall control in any conflict with Document 01 32 19.
B. Submit in quantities as required by paragraph 1.2.R.3 of this Document 01 32 19, at each of the following times:
   1. Initial Progress Schedule as set forth in Document 01 32 16.
   2. Original Schedule as set forth in Document 01 32 16.
   3. Adjustments to the Schedule as required.
   4. Schedule updates monthly, as required.
C. Submit one electronic copy, in Adobe .pdf, of the reports listed in Document 01 32 16 (Progress Schedules and Reports) with:
   1. Initial Schedule
   2. Original Schedule
   3. Each monthly Schedule update
D. Progress Schedules and Reports shall be submitted on CD Roms or other electronic media, **using software described in paragraph** 1.4.E **of Document 01 32 16 (**in addition to hard copies specified in this paragraph 1.2.R.3. Electronic files shall be complete copies, including all programs and electronic coding.

1.6 DESIGN DEVELOPMENT DRAWINGS AND SPECIFICATIONS

A. Submit Design Development Drawings and Specifications as required by Document 01 10 01 (Summary of Work – Design Services).
B. Submit in quantities and format as required by paragraph 1.2.R.3 of this Document 01 32 19.

1.7 CONSTRUCTION DOCUMENTS AND SPECIFICATIONS

A. Submit Construction Documents and Specifications as required by Document 01 10 01 (Summary of Work – Design Services).
B. Submit in quantities and format as required by paragraph 1.2.R.3 of this Document 01 32 19.

1.8 PRODUCT DATA

A. Submit Product Data in quantities and format as required by paragraph 1.3A.1 of this Document 01 32 19.
B. Ten Days prior to design phase system confirmation meeting(s), submit the complete list of major products proposed for use, with name of manufacturer, telephone number, trade name, and model number of each product. Tabulate product data by Specification Section.
C. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
D. Product or Catalog Data:
   1. Manufacturer's standard drawings shall be modified to delete non-applicable data or include applicable data.
   2. Manufacturer's catalog sheets, brochures, diagrams, schedules, charts, illustrations and other standard descriptive data:

a. Mark each copy to identify pertinent materials, products, or models.
b. Show dimensions and clearances required, performance characteristics and capacities, wiring diagrams and controls.
c. Include applicable MSDS.

E. Supplemental Data:
1. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to Project.

F. Provide final Project Record Data as described in Document 01 78 39 (Project Record Documents).

1.9 SHOP DRAWINGS

A. Submit Schedule of Submittals in quantities as required by paragraph 1.2.R.3 of this Document 01 32 19.
B. Minimum Sheet Size: 8½ inches by 11 inches. All others: Multiples of 8½ inches by 11 inches, 34 inches by 44 inches maximum.
C. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to Work.
D. Include manufacturers' installation instructions when required by Specification Section.
E. If Design-Build Entity submits Shop Drawings for items that Shop Drawings are not specified, District will not be obliged to review them.
F. Design-Build Entity is responsible for procuring copies of Shop Drawings for its own use as it may require for the progress of the Work.
G. Shop Drawings shall be drawn to scale and completely dimensioned, giving plan view together with such sectional views as are necessary to clearly show construction detail and methods.

1.10 SAMPLES

A. Submit Schedule of Submittals in quantities as required by paragraph 1.2.R.3 of this Document 01 32 19.
B. Submit full range of manufacturers' standard colors, textures, and patterns for District's selection.
C. Submit samples to illustrate functional and aesthetic characteristics of product, with integral parts and attachment devices. Coordinate Submittal of different categories for interfacing work.
D. Include identification on each sample, giving full information.
E. Sizes: Unless otherwise specified, provide the following:
1. Paint Chips: Manufacturers' standard
2. Flat or Sheet Products: Minimum 6 inches square, maximum 12 inches square
3. Linear Products: Minimum 6 inches, maximum 12 inches long
4. Bulk Products: Minimum 1 pint, maximum 1 gallon

F. Full size samples may be used in Work upon approval by District.
G. Field Samples and Mock-ups (if applicable):
1. Erect field samples and mock-ups at Site in accordance with requirements of Specification Sections. If testing is conducted, record and certify results and full Contract compliance.
2. Modify or make additional field samples and mock-ups as required to provide appearance and finishes approved by District.
3. Approved field samples and mock-ups may be used in Work upon approval by District.
4. Construct or prepare as many additional Samples as may be required, as directed by the District, until desired textures, finishes, and/or colors are obtained.
5. Accepted Samples and mock-up shall serve as the standard of quality for the various units of work.

H. No review of a Sample shall be taken in itself to change or modify the requirements in the Contract Documents.
I. Finishes, materials, and workmanship in the completed Work shall match accepted Samples.

1.11 INSTALLATION, OPERATIONS AND MAINTENANCE MANUALS

A. Submit Installation, Operations and Maintenance Manuals in quantities and type as required by paragraph 1.2.R.3 of this Document 01 32 19 and Document 01 78 39.
B. Submit Project Record Documents as required in Document 01 78 39 Project Record Documents.

C. Design-Build Entity shall submit initial copies of the complete IOM manuals for review by the architect/engineer and commissioning agent or other consultant designated by District within 45 calendar days after review of applicable Submittal.
D. Design-Build Entity shall submit final IOM manuals prior to substantial completion.
   1. Prior to final completion, the commissioning agent or other consultant designated by District shall review the final IOM manuals (in addition to the initial IOM manuals), and documentation, with redline as-builts, for systems that were commissioned to verify compliance with the specifications. The commissioning agent will communicate, through District, deficiencies in the manuals to the Design-Build Entity or Architect/Engineer, as requested.
   2. Upon successful review of the corrections, the commissioning agent will recommend approval and acceptance of the IOM manuals to District.
   3. The commissioning agent will also review each equipment warranty and verify that all requirements to keep the warranty valid are clearly stated. This work does not supersede the Architect/Engineer's review of the IOM manuals according to the Architect/Engineer's contract.
E. After review by District or Architect/Engineer or other consultant designated by District, of each of Design-Build Entity's Submittals, one set of material will be returned to Design-Build Entity with actions defined as shown on Submittal transmittal form (attached to this Document 01 32 19 as Exhibit B):
   1. NO EXCEPTIONS TAKEN - Accepted subject to its compatibility with future Submittals and additional partial Submittals for portions of the Work not covered in this Submittal. Does not constitute approval or deletion of specified or required items not shown on the Submittal.
   2. MAKE CORRECTIONS NOTED (NO RESUBMISSIONS REQUIRED) - Same as item 1 above, except that minor corrections as noted shall be made by Design-Build Entity.
   3. MAKE CORRECTIONS NOTED AND RESUBMIT - District identified major inconsistencies or errors that shall be resolved or corrected by Design-Build Entity prior to subsequent review by District.
   4. NOT APPROVED - RESUBMIT - Submitted material does not conform to Contract Documents in major respect, e.g.,: wrong size, model, capacity, or material.

1.12 QUALITY ASSURANCE CONTROL SUBMITTALS

A. Submit Schedule of Submittals in quantities as required by paragraph 1.2.R.3 of this Document 01 32 19.
B. Test Reports:
   1. Indicate that material or product conforms to or exceeds specified requirements.
   2. Reports may be from recent or previous tests on material or product, but shall be acceptable to District. Comply with requirements of each individual Specification Section.
C. Certificates:
   1. Indicate that material or product conforms to or exceeds specified requirements.
   2. Submit supporting reference data, affidavits, and certifications as appropriate.
   3. Certificates may be recent or from previous test results on material or product, but shall be acceptable to District.
D. Manufacturers' Instructions:
   1. Include manufacturers' printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing.
   2. Identify conflicts between manufacturers' instructions and Contract Documents.
E. Material Safety Data Sheets:
   1. In addition to Material Safety Data Sheets (MSDS) otherwise required by the Contract Documents, submit MSDS for any paints, solvents, thinners, varnish, lacquer, glues and adhesives, mastics, or other materials needed for the Project as required by the individual Specification Sections or as otherwise specified in the Contract Documents.
   2. MSDS required for a Submittal shall be submitted with product data in order for the Submittal to be reviewed.

SUBMITTAL PROCEDURES

1.13 ENVIRONMENTAL IMPACT MITIGATION PLAN DOCUMENTS

A. Submit Project Record Documents in quantities as required by paragraph 1.2.R.3 of this Document 01 32 19.
B. Submit Noise Control Plan, Spill Prevention, Control and Countermeasure Program, Site Safety Plan, Hazardous Materials Program, Dust Control Plan, Erosion Control Plan, Cultural Resources Protection Plan, Traffic Control Plan, Tree Protection Plan, and Migratory Bird Protection Plan (if applicable) as listed in Document 01 35 00 Special Procedures.

1.14 PROJECT RECORD DOCUMENTS

A. Submit Project Record Documents in quantities as required by paragraph 1.2.R.3 of this Document 01 32 19.
B. Submit Project Record Documents listed in Document 01 78 39 Project Record Documents.

1.15 DELAY OF SUBMITTALS

A. Delay of Submittals by Design-Build Entity is considered avoidable delay.

1.16 OPTIONAL REVIEW MEETING

A. At the Design-Build Entity's request, in order to facilitate the timeliness of the review process, the District may schedule a meeting to review the materials submitted. If this option is exercised, the following requirements apply:
   1. Request a meeting date with the District at least ten (10) Business Days in advance.
   2. Provide the complete package of Submittal information at least five (5) Business Days in advance of the meeting.
   3. The meeting shall take place at District's office. District will provide the authorized staff to review and respond on the Submittal information during the meeting.
   4. Make available for this meeting the job superintendent and/or foreman, Design-Build Entity's safety officer, and someone knowledgeable of all the items submitted and authorized to make substitutions or changes.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

TRANSMITTAL SHEETS AND MAINTENANCE SHEET FOLLOW THIS PAGE

SUBMITTAL PROCEDURES

Submittal Transmittal Form

EXHIBIT A

SUBMITTAL TRANSMITTAL NO. _____

Project Name:			Date Received:	
East Side Union High School District 830 North Capitol Avenue San Jose, CA 95133			Checked By:	
Design-Build Entity:	To:		Log Page:	
Address: Attention:	Address: Attention:		Specification Section Number: 1st Submittal ☐	Resubmittal ☐
Date Transmitted:	Previous Transmittal Date:			

No. Copies	Description	Manufacturer	Dwg. or Data No.	Action Taken*

Remarks:

* The action designated above is in accordance with the following legend:

A – No Exceptions Taken
B – Make Corrections Noted (No Resubmission Required)
C. – Make Corrections Noted and Resubmit
D – Not Approved
1. Not enough information for review
2. No reproducibles submitted
3. Copies illegible
4. Not enough copies submitted
5. Wrong sequence number
6. Wrong re-submittal number
7. Wrong Specification section number
8. Wrong form used
9. See comments

E – District's review not required
1. Submittal not required
2. Supplemental information. Submittal retained for informational purposed only
3. Information reviewed and approved on prior Submittal
4. See comments

Comments

Distribution:Design-Build Entity ☐ File ☐ IOR ☐ District ☐ CM ☐ Other ☐

DOCUMENT 01 32 19

SUBMITTAL PROCEDURES

EXHIBIT B

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
TRANSMITTAL NO. _____

Project Name:			Date Received:	
East Side Union High School District 830 North Capitol Avenue San Jose, CA 95133			Checked By:	
Design-Build Entity:	To:		Log Page:	
Address: Attention:	Address: Attention:		Specification Section Number: 1st Submittal ☐ / Resubmittal ☐	
Date Transmitted:	Previous Transmittal Date:			

No. Copies	Description	Manufacturer	Dwg. or Data No.	Action Taken*

Remarks:

* The action designated above is in accordance with the following legend:

A – No exceptions taken
B – Make Corrections Noted (No Resubmission Required)
C. – Make Corrections Noted and Resubmit
D – Not Approved– this manual Submittal is deficient in the following area:

1. Equipment record sheets
2. Functional description
3. Assembly, disassembly, installation, alignment, adjustment, and checkout instructions
4. Operating instructions

D – (continued)

5. Lubrication and maintenance instructions
6. Troubleshooting guide
7. Parts list and ordering instructions
8. Organization (indexing and tabbing)
9. Wiring diagrams and schematics specific to installation
10. Outline, cross section, and assembly diagrams
11. Test data and performance curves
12. Tag or equipment identification numbers
13. See comments

Comments

By _____ Date _____

Distribution:Design-Build Entity ☐ File ☐ IOR ☐ District ☐ CM ☐ Other ☐

DOCUMENT 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Document includes administrative and procedural requirements for following.

1. Preconstruction photographs.
2. Periodic construction photographs.

B. Related Documents: The following Document contains requirements that relate to construction photographs:

1. Division 01 Document 01 32 19 "Submittal Procedures - CMR" specifies general requirements for submitting digital construction photographs.

1.2 SUBMITTALS

A. Preconstruction/Construction Photographs: Provide all photographs in soft copy 14 days of taking photographs and hard copies with the monthly application for payment.

1. Soft Copy Format: Provide a CD/DVD/flash drive that includes all photographs that have been labeled with the date, project name, and vantage taken (i.e., 2013 0603 JL Bld. 500 Room 141 West Interior). Submit images that have the same aspect ratio as the sensor, not cropped.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in uncompressed TIFF format, original produced by a digital camera with minimum sensor size of 4.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

PART 3 – EXECUTION

3.1 PRECONSTRUCTION PHOTOGRAPHS

A. Before commencement of construction the Design Build Entity shall document in digital photographs the project site, surrounding properties, all exterior existing buildings to remain during construction, and all interior rooms where construction work will occur, from different points of view, ensuring all existing conditions are captured digitally. Identify locations photographs are taken from on a site plan and provide to the District for review and approval.

1. Take digital photos and videotape in sufficient number to show existing site and building conditions before starting Work.

2. Take digital photos of adjacent existing buildings either on or adjoining the property in sufficient detail to record accurately the physical conditions at the start of construction.
3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

3.2 PHOTOGRAPHIC REQUIREMENTS

A. Take digital photographs daily. Select the vantage points for each shot to best show the status of construction and progress since the last photos were taken.

B. Provide and coordinate the use of photographic software to assure that the photos are viewable by all interested parties.

END OF DOCUMENT

DOCUMENT 01 35 00

SPECIAL PROCEDURES

PART 1 GENERAL

1.1 Summary

A. Design-Build Entity shall conform with the following mitigation measures.

B. Document Includes:

1. Noise Control Plan
2. Spill Prevention, Control and Countermeasure Program
3. Site Safety Plan (Soil and Groundwater Management Plan)
4. Hazardous Materials Program
5. Dust Control Plan
6. Erosion Control Plan
7. Traffic Control Plan

1.2 Definitions

1.3 Submittals

A. See Document 01 32 19 (Submittal Procedures).
B. Name and address of the selected treatment, recycling, or disposal facilities for contaminated soil disposal.
C. Hazardous waste manifests "if applicable."
D. Non-hazardous waste manifests "if applicable."
E. Facility weight tickets "if applicable."
F. Spill Prevention, Control, and Countermeasure Program.

1.4 Noise Control Plan

A. Implement the following noise-control measures to reduce and control noise generated from construction, demolition, and renovation-related activities.

1. Restrict noise-producing construction activities to between 7:00 a.m. and 7:00 p.m. on weekdays. If construction is scheduled for Saturdays or Sundays to avoid disrupting school operations, restrict noise-producing construction activities to 9:00 a.m. and 5:00 p.m. Construction on Sundays will be avoided if possible, and there will be no construction on public holidays. When activities must occur outside the hours specified above, conform with notification requirements of Document 01 10 00 (Summary of Work), Paragraph 1.7.C, and utilize local barriers around equipment and other noise attenuating devices if necessary to limit noise to acceptable levels.
2. Construction equipment shall have appropriate mufflers, intake silencers, and noise-control features, and shall be properly maintained and equipped with exhaust mufflers that meet State standards.
3. Vehicles and other gas- or diesel-powered equipment shall be prohibited from unnecessary warming up, idling, and engine revving.
4. Post a sign at the construction site giving the name and telephone number or e-mail address of the District's Representative whom the public should contact with any noise complaints. If necessary due to complaints, provide additional noise-attenuating measures such as additional mufflers or engine shrouding.

1.5 Spill Prevention, Control and Countermeasure Program

A. Prepare and implement a Spill Prevention, Control, and Countermeasure Program (SPCCP) to minimize the potential for and effects from spills of hazardous, toxic, or petroleum substances during construction and demolition activities. Obtain approval of the SPCCP before any construction or demolition activities begin.
B. Design-Build Entity shall routinely inspect the construction area to verify that the measures specified in the SPCCP are properly implemented and maintained. Inform the District immediately if there is a noncompliance issue and take immediate measures to restore compliance.

C. The federal reportable spill quantity for petroleum products, as defined in 40 CFR 110, is any oil spill that includes any of the following.
   1. Violates applicable water quality standards.
   2. Causes a film or sheen on or discoloration of the water surface or adjoining shoreline.
   3. Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines.

D. If a spill is reportable, notify the District's Representative and take action to contact appropriate safety and clean-up crews to ensure that the SPCCP is followed.
   1. A written description of reportable releases must be submitted to the District's Representative and to the San Francisco Bay RWQCB. This submittal must contain a description of the spill, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred, and a description of the steps taken to prevent and control future releases. Document the releases on a spill report form.
   2. If a reportable spill has occurred and results determine that project activities have adversely affected surface water or groundwater quality, the District will engage a registered environmental assessor for a detailed analysis to identify the likely cause of contamination. This analysis will conform to American Society for Testing and Materials (ASTM) standards, and will include recommendations for reducing or eliminating the source or mechanisms of contamination.
   3. Based on this analysis, the Design-Build Entity shall select and implement measures to control contamination, with a performance standard that groundwater quality must be returned to baseline conditions. These measures will be subject to approval by the District.

1.6 Site Safety Plan (Soil and Groundwater Management Plan)

A. Prior to excavation, prepare and submit a Site Safety Plan (Soil and Groundwater Management Plan) to protect people from known or previously undiscovered soil and groundwater contamination during construction activities. Obtain approval of the SPCCP before any construction or demolition activities begin.

B. The Site Safety Plan (Soil and Groundwater Management Plan) shall, at a minimum, include the following:
   1. All construction activities involving work in proximity to potentially contaminated soils and/or groundwater shall be undertaken in accordance with California Occupational Safety and Health Administration (Cal-OSHA) standards, contained in Title 8 of the CCR.
   2. Establish soil and groundwater mitigation and control specifications for construction activities, including health and safety provisions for monitoring exposure to construction workers, procedures to be undertaken in the event that previously unreported contamination is discovered, and emergency procedures and responsible personnel.
   3. Procedures for managing soils and groundwater removed from the site to ensure that any excavated soils and/or dewatered groundwater with contaminants are stored, managed, and disposed in accordance with applicable regulations.

1.7 Hazardous Materials Program

A. If hazardous materials are encountered, they shall be handled in accordance with applicable local, state, and federal regulations which may include: (1) CCR Title 8, Division 4, Chapter 4, Sections 5163 through 5167 and 5192 (Hazardous Waste Operations and Emergency Response); (2) CCR, Title 22, Division 4.5, Chapters 10 through 13 and 18 (Environmental Health Standards for Management of Hazardous Waste); and (3) CCR Title 23, Division 3, Chapter 15 (Discharges of Hazardous Waste to Land).

B. Should the discovery of contaminants cause delay to Design-Build Entity's operations, extension of Contract Time will be granted by District in accordance with Section 00 71 00 (General Conditions), and Document 01 32 16 (Progress Schedules and Reports). Design-Build Entity may not be entitled to damages or additional payment due to such delay. District may, if it believes appropriate in its sole discretion, grant an extension of Contract Time. The Design-Build Entity shall take all measures to avoid and/or mitigate delays due to Hazardous Materials/Waste finds such as; avoiding the area of the find and proceeding with other work on the project; developing "work around" plans; and documenting his best efforts to avoid and/or mitigate delays. See Document 01 32 16 (Progress Schedules and Reports) regarding requirement to demonstrate Time Impacts.

SPECIAL PROCEDURES

C. Subsurface Hazardous Materials

1. If Design-Build Entity encounters subsurface contamination, the following provisions and precautionary measures shall be implemented during construction:
   a. Design-Build Entity's personnel shall be alert for and immediately report to District's Representative any detectable chemical odors, unusual debris, or discolored soil.
   b. Disposal requirements: Soils containing hazardous materials shall be disposed by Design-Build Entity at permitted treatment, recycling, or disposal facilities in accordance with CCR Title 23, Division 3, Chapter 15 (Discharges of Waste to Land). Determine to which permitted treatment, recycling, or disposal facilities the soil will be delivered.
   c. Dewatering: Construct, operate and maintain as required by applicable laws, codes and standards, and to complete the Work all necessary cofferdams, channels, pipes, flumes, drains, sumps, well points and protective works; and furnish, install, operate and maintain all necessary pumping and other equipment for dewatering the areas of Work suspected of containing hazardous materials; and control all surface flow and groundwater as may be encountered while performing the Work. Remove all water that may accumulate in the excavation while the Work progresses so that all Work can be performed in dry conditions. All contaminated water shall be removed from the excavation before it is backfilled. The excavation shall be kept free from water until backfilling has progressed to a height above the water source.
   d. Water sampling and chemical analysis: Water samples shall be collected from the holding tanks and submitted to a State-Certified chemical analysis laboratory. Chemical analyses required for the samples shall at a minimum include: TPHg following EPA Test Methods 5030/8015 (modified); benzene, toluene, ethylbenzene, and total xylenes (BTEX) following EPA Test Method 8020; and chlorinated solvents following EPA Test Method 8010. Perform additional chemical analyses that may be required for disposal or recycling of the water. Laboratory chemical analysis reports associated with the water samples shall be provided to District's Representative.
   e. Removal of dewatering equipment: After having served their purpose, all protective works, and dewatering pumps, shall be decontaminated and removed from the Site. Design-Build Entity is responsible for permanent disposal of all equipment that cannot be decontaminated or recycled in accordance with all applicable laws and regulations.
   f. Fees: Pay for any fees associated with the treatment, recycling, or disposal of these soils. Any additional soil sampling and chemical analyses required for acceptance of the soil at facilities other than those described above may be deemed to be the responsibility of Design-Build Entity.
   g. Transport: Transport the soils to the selected facilities under approved manifests and submit copies of these manifests and the facility weight tickets to District's Representative.

D. Hazardous Building Materials

1. To protect construction workers and members of the public from known or undiscovered hazardous building materials, including asbestos and lead, undertake all demolition activities in accordance with Cal-OSHA standards, contained in Title 8 of the California Code of Regulations (CCR).
2. During demolition activities, all building materials containing lead-based paint shall be removed in accordance with Cal-OSHA Lead in Construction Standard, Title 8, California Code of Regulations 1532.1.
3. All potentially friable asbestos-containing materials (ACMs) shall be removed in accordance with National Emissions Standards for Hazardous Air Pollutants (NESHAP) guidelines prior to building demolition or renovation that may disturb the materials. Applicable standards include the following.
   a. The facility shall be inspected before any renovation occurs in which 160 square feet or more of building materials or 260 linear feet or more of pipe insulation will be disturbed at a regulated facility, or any demolition occurs at a regulated facility.
   b. An asbestos notification form shall be submitted to the Bay Area Air Quality Management District (BAAQMD) for any regulated asbestos abatement project or regulated demolition 10 working days before the activity begins.

c. If ACMs are discovered during a renovation or demolition, they must be removed before the project may proceed. Also, the Cal-OSHA and California Environmental Protection Agency (Cal-EPA) hazardous waste regulations apply in most cases.

E. Naturally Occurring Asbestos

1. To protect construction workers and members of the public from exposure to known areas of naturally-occurring asbestos (NOA), all ground disturbing activities will be undertaken in accordance with all applicable Cal-OSHA standards, contained in Title 8 of the California Code of Regulations (CCR). In addition, any ground-disturbing activity in an area that meets one or more of the applicability criteria for the Asbestos Airborne Toxic Control Measure (ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations, as adopted by the California Air Resources Board (CARB), is subject to the requirements therein. Per section 93105(b) of the ATCM, these criteria are as follows:
   a. The area to be disturbed is located in a geographic ultramafic rock unit; or
   b. The area to be disturbed has naturally-occurring asbestos, serpentine, or ultramafic rock as determined by the owner / operator, or the Air Pollution Control Officer (APCO); or
   c. Naturally-occurring asbestos, serpentine, or ultramafic rock is discovered by the District, a registered geologist, or the APCO in the area to be disturbed after the start of any construction, grading, quarrying, or surface mining operation.
2. For construction projects that disturb areas of 1 acre or less, implement standard dust mitigation measures before construction begins, and maintain each measure throughout the duration of the construction project. The following additional measures will be implemented in accordance with Section 93105 (e)(1) of the ATCM and will be undertaken in concurrence with the dust control measures identified in Paragraph 1.8 Dust Control Measures and Paragraph 1.9 Erosion Control Measures.
   a. Equipment used during excavation, grading, and construction activities will be washed down before moving from the property onto a paved public road.
   b. Any visible track-out on the paved public road will be cleaned using wet sweeping or a high-efficiency particulate air (HEPA) filter equipped vacuum device within twenty-four hours.
3. For construction projects that disturb areas greater than 1acre in size, submit an asbestos dust mitigation plan to the Bay Area Air Quality Management District (BAAQMD) for review and approval, in accordance with Section 93105(2)(A) of the ATCM, before the start of any construction or grading activity. The provisions of the dust mitigation plan will be implemented before construction begins, and will be maintained throughout the duration of the construction or grading activity. The asbestos dust mitigation plan will address the following:
   a. Prevention of dust emissions offsite;
   b. Control of dust for disturbed areas and storage piles;
   c. Traffic control for on-site unpaved areas;
   d. Control for earthmoving activities;
   e. Track-out prevention;
   f. Control for off-site transport;
   g. Post-construction stabilization of disturbed areas;
   h. Air monitoring for asbestos (if required by the APCO).

1.8 Dust Control Plan

A. Implement dust control measures to protect air quality during construction. To control dust emissions generated during construction, implement the following Bay Area Air Quality Management District (BAAQMD) measures for construction emissions of particulate matter over 10 microns in size (PM10):

1. Water all active construction areas at least twice daily.
2. Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least 2 feet of freeboard.
3. Pave, apply water three times daily, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
4. Sweep streets daily (with water sweepers) if visible soil material has been carried onto adjacent public streets.

5. Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 miles per hour.
6. Limit speed of vehicles to 15 miles per hour or less at construction sites.

1.9 Erosion Control Plan

A. Implement erosion control measures to protect water quality during construction.
   1. Cover or apply nontoxic soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more) that could contribute sediment to waterways.
   2. Enclose and cover exposed stockpiles of dirt or other loose, granular construction materials that could contribute sediment to waterways.
   3. Contain soil and filter runoff from disturbed areas by berms, vegetated filters, silt fencing, straw wattle, plastic sheeting, catch basins, or other means necessary to prevent the escape of sediment from the disturbed area.
   4. Prohibit the placement of earth or organic material where it may be directly carried into a stream, marsh, slough, lagoon, or body of standing water.
   5. Prohibit the following types of materials from being rinsed or washed into streets, shoulder areas, or gutters: concrete, solvents and adhesives, fuels, dirt, gasoline, asphalt, and concrete saw slurry.
   6. Conduct dewatering activities as required the Contract Documents. Prohibit placement of dewatered materials in local water bodies or in storm drains leading to such bodies without implementation of proper construction water quality control measures.

1.10 Traffic Control Plan

A. Develop and implement a traffic control plan to minimize the effects of construction traffic on the surrounding residential areas, as appropriate. Submit the plan to the District for review and approval.

B. The construction traffic control plan will include, at a minimum, the following requirements:
   1. Provide clearly marked pedestrian detours if any sidewalk or pedestrian walkway closures are necessary.
   2. Provide clearly marked bicycle detours if heavily used bicycle routes must be closed, or if bicyclist safety would be otherwise compromised.
   3. Provide crossing guards and/or flag persons as needed to avoid traffic conflicts and ensure pedestrian and bicyclist safety.
   4. Use nonskid traffic plates over open trenches to minimize hazards.
   5. Locate all stationary equipment as far away as possible from areas used heavily by vehicles, bicyclists, and pedestrians.
   6. Notify and consult with emergency service providers and provide emergency access by whatever means necessary to expedite and facilitate the passage of emergency vehicles.
   7. Avoid routing construction traffic through residential areas to the extent feasible. Prohibit mobilization and demobilization of heavy construction equipment during AM and PM peak traffic hours.
   8. Provide access for driveways and private roads outside the immediate construction zone by using steel plates or temporary backfill, as necessary.
   9. Prohibit construction worker parking in residential areas.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF DOCUMENT

DOCUMENT 01 35 16

ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;

B. Special Conditions.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK:

A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Design-Build Entity shall match existing products, conditions, and work for patching and extending work.

B. Type and Quality of Existing Products: Design-Build Entity shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Design-Build Entity shall verify that demolition is complete and that areas are ready for installation of new Work.

B. By beginning restoration Work, Design-Build Entity acknowledges and accepts the existing conditions.

3.02 PREPARATION:

A. Design-Build Entity shall cut, move, or remove items as necessary for access to alterations and renovation Work. Design-Build Entity shall replace and restore these at completion.

B. Design-Build Entity shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Design-Build Entity shall replace materials as specified for finished Work.

C. Design-Build Entity shall remove debris and abandoned items from all areas of the Site and from concealed spaces.

D. Design-Build Entity shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.

E. Design-Build Entity shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Design-Build Entity shall insulate ductwork and piping to prevent condensation in exposed areas. Design-Build Entity shall insulate building cavities for thermal and/or acoustical protection, as detailed.

3.03 INSTALLATION:

A. Design-Build Entity shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.

B. Designated Areas and Finishes: Design-Build Entity shall complete all installations in all respects, including operational, mechanical work and electrical work.

C. Design-Build Entity shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.

D. Design-Build Entity shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.

E. Design-Build Entity shall install products as specified in the Contract Documents, including without limitation, the Specifications.

3.04 TRANSITIONS:

A. Where new Work abuts or aligns with existing surfaces, Design-Build Entity shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.

B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Design-Build Entity shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

3.05 ADJUSTMENTS:

A. Where removal of partitions or walls results in adjacent spaces becoming one, Design-Build Entity shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

B. Where a change of plane of 1/4 inch or more occurs, Design-Build Entity shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.

C. Design-Build Entity shall trim existing doors as necessary to clear new floor finish and refinish trim as required.

D. Design-Build Entity shall fit Work at penetrations of surfaces.

ALTERATION PROJECT PROCEDURES

3.06 REPAIR OF DAMAGED SURFACES:

A. Design-Build Entity shall patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.

B. Design-Build Entity shall repair substrate prior to patching finish.

3.07 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS:

A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Design-Build Entity shall be restored by Design-Build Entity to their original condition or better, where indicated.

B. Design-Build Entity shall protect and replace, if damaged, all existing guard posts, barricades, and fences.

C. Design-Build Entity shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified in the Contract Documents, including without limitation, the Drawings.

3.08 FINISHES:

A. Design-Build Entity shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.

B. Design-Build Entity shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Design-Build Entity shall refinish entire surface to nearest intersections.

3.09 CLEANING:

A. Design-Build Entity shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF DOCUMENT

DOCUMENT 01 40 00

QUALITY REQUIREMENTS

PART 1 -GENERAL

1.1 SUMMARY

A. Document 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 Design-Build Entity of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in Documents that specify those activities. Requirements of this Document relate to customized fabrication and installation procedures specified in those Documents. Requirements in those Documents may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Design-Build Entity's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Design-Build Entity to provide quality-assurance and quality-control services required by Design Consultant, District, Project Manager, or authorities having jurisdiction are not limited by provisions of this Document.
4. Specific test and inspection requirements are not specified in this Document.

1.2 RELATED SECTIONS

A. Other Division 1 Specification Sections.

B. Divisions 2 through 60 Specification Sections.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM E 548 Guide for General Criteria Used for Evaluating Laboratory Competence.
2. ASTM E 329 Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

1.4 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 Design Consultant or Project Manager.

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 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 an NRTL, an NVLAP, or 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, e.g., 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 Design-Build Entity 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(s).

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.

REGULATORY REQUIREMENTS

A. Copies of Regulations: Obtain copies of following regulations and retain at Site to be available for reference by parties who have reasonable need. Documents include, but are not limited to:

1. California Building Code, applicable version as indicated on drawings bearing DSA Approval Stamp.
2. Other regulations as indicated on drawings and specifications bearing DSA Approval Stamp.

B. Additional documents as requested by Inspector of Record, Project Manager or Design Consultant.

1.6 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 Project Manager and Design Consultant 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 Project Manager and Design Consultant for a decision before proceeding.

1.7 INFORMATIONAL SUBMITTALS

A. Design-Build Entity'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 Design Consultant.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Design Consultant.

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.

1.8 REPORTS AND DOCUMENTS

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

1. Date of issue.
2. ESUHSD Project title and number.
3. DSA Application number.
4. Name, address, and telephone number of testing agency.
5. Dates and locations of samples and tests or inspections.
6. Names of individuals making tests and inspections.
7. Description of the Work and test and inspection method.
8. Identification of product and Specification Section.
9. Complete test or inspection data.
10. Test and inspection results and an interpretation of test results.
11. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
12. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements. Name and signature of laboratory inspector. 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:

a) Name, address, and telephone number of representative making report.
b) Statement on condition of substrates and their acceptability for installation of product.
c) Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
d) Results of operational and other tests and a statement of whether observed performance complies with requirements.
e) Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For District'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.

1.9 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 in material, design, and extent to those indicated for this Project.

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 by Design-Build Entity for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
2. Requirement for specialists shall not interfere with local trade-union jurisdictional settlements and similar conventions.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or 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.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
3. Testing Agencies and Labs must be DSA-approved.

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. Design-Build Entity responsibilities include the following:
      a. Provide test specimens and assemblies representative of proposed products and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
      b. Submit specimens in a timely manner with sufficient time for testing, correction and analyzing results to prevent delaying the Work.
      c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
      d. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory 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 Design Consultant and College Project Manager, with copy to Design-Build Entity and Division of State Architect. 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 Design Consultant and Project Manager.
   2. Notify Design Consultant, Inspector of Record and Project Manager seven days in advance of dates and times when mockups will be completed.
   3. Demonstrate the proposed range of aesthetic effects and workmanship.
   4. Obtain Design Consultant's and Project Manager's approval of mockups before starting work, fabrication, or construction.
      a. Allow seven days for initial review and each re-review of each mockup.
      b. All mockups and sample construction items which do not meet the requirements of the Contract Documents shall be removed and reconstructed until acceptable at no additional cost to the District.
   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.
   7. Where allowed in specific sections and approved by Project Manager, mockups may be part of the permanent work.
   8. Design-Build Entity shall provide mock-up list and include it in submittal schedule.

K. Quality Assurance Plan Requirements: The Design-Build Entity shall provide their own Quality Control, Quality Assurance Plan to the Construction Manager for review. All trade sections shall be identified the quality plan. The Design-Build Entity shall submit his quality program for approval prior to use. The

Quality Plan shall also include but not be limited to the following:

1. Training and Indoctrination: Plan shall outline the minimum quality training requirements and shall include a comprehensive and detailed energy strategy plan to educate the District facility management personnel as to the most efficient use and maintenance of all building systems and apparatuses.
2. Construction Control: Plan shall outline the requirements for pre-installation conferences for each trade and construction interface to identify change in conditions and/or clarifications. Design-Build Entity will hold pre-installation meetings with each trade and review the project requirements and sign off on the start of installation.
3. Vendor Data Control: Plan shall outline the requirements for vendor data submittals and the review process.
4. Record Documents: Plan shall outline the quality requirements for developing and maintaining record drawings, specifications, samples and submittals.
5. Welding Activities: Plan shall identify the quality requirements of welding activities.
6. Inspections: Plan shall outline the requirement of the Design-Build Entity to coordinate inspections, verifications and tests.
7. Confined Space: Plan shall identify confined spaces which may be encountered, reporting requirements.
8. Lock-Out/Tag-Out: Plan shall outline the requirements to remove from service any existing system which requires locked out of service to perform the scope of this contract.
9. Control of Nonconforming Items: Plan shall outline the requirements to report, control and correct nonconforming items.

1.10 QUALITY CONTROL

A. District Representative shall be provided full access to all construction activities, including shop fabrication, testing and inspections.

B. District Responsibilities: Where quality-control services are indicated as District's responsibility in General and Supplementary Conditions, and in other Specification sections, District will engage a qualified testing agency to perform these services.

1. District will furnish Design-Build Entity 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. Payment for these services will be made to testing and inspecting agency by the District.
3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be paid by District and back charged to Design-Build Entity, and the Contract Sum will be adjusted by Change Order.

C. Design-Build Entity Testing Responsibilities: Tests and inspections not explicitly assigned to District are Design-Build Entity’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 Design-Build Entity's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Design-Build Entity shall not employ same entity engaged by District, unless agreed to in writing by District.
b. Testing agency retained by the Design-Build Entity shall be subject to the prior approval of the Project Manager.

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 Design-Build Entity's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Design-Build Entity and not required by the Contract Documents are Design-Build Entity's responsibility and performed at Design-Build Entity's own expense.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
6. All Mechanical, Electrical, Plumbing system components requiring testing shall be pretested by the appropriate trades. The Mechanical, Electrical, Plumbing, trades shall provide qualified personnel who are responsible for carrying out the detailed planning and implementation of the commissioning process for the specified systems and for ensuring that the commissioning process is properly completed according to the Contract requirements.
7. The Design-Build Entity shall document all testing required by the Contract Documents in a format approved by District. The Design-Build Entity shall ensure that each trade keeps a copy as part of its project record documents submission. This information shall be current, bound, and submitted to the District upon completion of the project as a Project Close-out Requirement.

D. Design-Build Entity Responsibilities:

1. The Design-Build Entity shall take field measurements and verify field conditions with the Contract Documents before commencing activities.
2. Design-Build Entity shall provide a copy of the codes, references, and industry standards applicable to their scope of Work prior to the start of their Work (i.e. Electrical Subcontractor to provide applicable NEC/CEC, Plumbing Subcontractor to provide applicable UPC/CPC, etc.).
3. The Design-Build Entity shall maintain at the jobsite, on a daily basis, Record Drawings, Specifications, Addenda, Change Orders, R.F.I.'s and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition approved Shop Drawings, Product Data, Samples and similar required submittals. These drawings shall be made available to the District at any time during the course of the Work upon request. At the completion of the Work, Design-Build Entity (and applicable trades) shall incorporate all as-built changes in electronic digital files as defined in Project Record Documents. Failure to comply with this requirement shall be sufficient cause for withholding monthly Progress Payments.
4. Design-Build Entity is required to perform a complete and thorough written punch list of their work (copy Construction Manager) and notify the Owner when the work has been corrected and is ready for inspection. These punch lists shall be done in phases and at times as determined by Construction Manager (i.e. rough in completion and completion of finishes).

E. 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.

F. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Design-Build Entity's responsibility, Design-Build Entity shall pay for quality-control services, including retesting and

re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.

G. Testing Agency Responsibilities: Cooperate with Design Consultant, Construction Manager, and Design-Build Entity in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Design Consultant, Construction Manager, and Design-Build Entity 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 to Design Consultant, Construction Manager, Design-Build Entity, Inspector of Record and Division of State Architect.
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 Design-Build Entity.

H. Additional Design-Build Entity's Responsibilities: Design-Build Entity shall 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.

I. 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, corrections, obtaining samples, and similar activities.

J. Schedule of Tests and Inspections: Prepare schedule of tests, inspections, and similar quality-control services required by Contract Documents. Submit schedule within (14) days of issuance of Notice to Proceed.

1. Distribution: Distribute schedule to Inspector of Record, Design Consultant, Construction Manager, testing agencies, and each party involved in performance of portions of Work where tests and inspections are required.

QUALITY REQUIREMENTS

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: District will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction and that under the Contract Documents are the responsibility of District.

1. Testing Agency will verify that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Testing Agency will notify Inspector of Record, Design Consultant, Construction Manager, and Design-Build Entity promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Testing Agency will submit a certified written report of each test, inspection, and similar quality-control service to Inspector of Record, Design Consultant, and Construction Manager, with copy to Design-Build Entity and to authorities having jurisdiction.
4. Testing Agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Testing Agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Testing Agency will retest and re-inspect corrected work. Costs of retesting that is necessitated due to a failure by the Work to comply with the Contract Documents shall be paid by District and back charged to Design-Build Entity through a Change Order.

PART 2 -PRODUCTS (Not Used)

PART 3 -EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Design Consultant.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Design Consultant's, Commissioning Authority's, and Construction Manager's reference during normal working hours.

3.2 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 Contract Documents.

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

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

END OF DOCUMENT

DOCUMENT 01 41 00

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Document includes: regulatory requirements applicable to Contract Documents.
B. Specific reference in the Specifications to codes and regulations or requirements of regulatory agencies shall mean the latest printed edition of each adopted by the regulatory agency in effect at the time of the opening of Proposals, except as may be otherwise specifically stated in the Contract Documents.
C. No change order shall be considered for any change in any applicable federal, state or local code or regulation if similar language existed in an alternate applicable regulation in force at the time of opening of Proposals.
D. The Design-Build Entity shall not allow design or construction of any conditions wherein the finished Work will not comply with current codes. No change order shall be considered by District for the correction of any Work not complying with code.

1.2 REFERENCES TO REGULATORY REQUIREMENTS

A. Codes, laws, ordinances, rules and regulations referred to shall have full force and effect as though printed in full in these Specifications. Code, laws, ordinances, rules and regulations are not furnished to Design-Build Entity, because Design-Build Entity is assumed to be familiar with these requirements. The listing of applicable codes, laws, and regulations for hazardous waste abatement Work in the Contract Documents is supplied to Design-Build Entity as a courtesy and shall not limit Design-Build Entity's responsibility for complying with all applicable laws, regulations or ordinances having application to the Work. Where conflict among the requirements or with these Specifications occurs, the most stringent requirements shall be used with no change in Contract Sum or Contract Time.
B. Design-Build Entity shall conform to all applicable federal, state and local codes, laws, ordinances, rules and regulations, whether or not referenced in the Contract Documents.
C. Precedence:
    1. Where specified requirements differ from the requirements of applicable codes, ordinances and standards, the more stringent requirements shall take precedence.
    2. Where Contract Documents require or describe products or execution of better quality, higher standard or greater size than required by applicable codes, ordinances and standards, Contract Documents shall take precedence so long as such increase is legal.
    3. Where no requirements are identified on Contract Documents, comply with all requirements of applicable codes, ordinances and standards of governing authorities having jurisdiction.

1.3 CODES

A. Codes that apply to Contract Documents include, but are not limited to, the following:
    1. CAC (Part 1, Title 24, CCR)
    2. CBC (Part 2, Title 24, CCR)
    3. CEC (Part 3, Title 24, CCR)
    4. CMC (Part 4, Title 24, CCR)
    5. CPC (Part 5, Title 24, CCR)

1.4 LAWS, ORDINANCES, RULES, AND REGULATIONS

A. During prosecution of Work to be done under Contract Documents, comply with applicable laws, ordinances, rules and regulations, including, but not limited to, the following:
    1. Federal
        a. Americans with Disabilities Act of 1990
        b. 29 CFR, Section 1910.1001, Asbestos
        c. 40 CFR, Subpart M, National Emission Standards for Asbestos
        d. Executive Order 11246

e. Federal Endangered Species Act
f. Clean Water Act

2. State of California
   a. California Code of Regulations, Titles 5, 8, 19, 21, 22, 24 and 25
   b. California Public Contract Code
   c. California Health and Safety Code
   d. California Government Code
   e. California Labor Code
   f. California Civil Code
   g. California Code of Civil Procedure
   h. CPUC General Order 95, Rules for Overhead Electric Line Construction
   i. CPUC General Order 128, Rules for Construction of Underground Electric Supply and Communications Systems
   j. Cal/OSHA
   k. OSHA: Hazard Communications Standards
   l. California Endangered Species Act
   m. Water Code
   n. Fish and Game Code
3. State of California Agencies
   a. State and Consumer Services Agency
   b. Office of the State Fire Marshall
   c. Office of Statewide Health Planning and Development
   d. Department of Fish and Game
   e. Bay Area Air Quality Management District
   f. San Francisco Bay Regional Water Quality Control Board
   g. Division of the State Architect
4. Local Agencies:
   a. City of San Jose
   b. County of Santa Clara
   c. San Jose Fire Department
5. Other Requirements:
   a. National Fire Protection Association (NFPA): Pamphlet 101, Life Safety.
   b. References on Drawings or in Specifications to "code" or "building code" not otherwise identified shall mean the codes specified in this Document 01 41 00, together with all additions, amendments, changes, and interpretations adopted by code authorities of the jurisdiction.

B. Have access to all of the foregoing within 24 hours.

C. Other Applicable Laws, Ordinances and Regulations:
   1. Work shall be accomplished in conformance with all applicable laws, ordinances, rules and regulations of federal, state, and local governmental agencies and jurisdictions having authority over the Project.
   2. Work shall be accomplished in conformance with all rules and regulations of public utilities and utility districts.
   3. Where such laws, ordinances rules, and regulations require more care or greater time to accomplish Work, or require better quality, higher standards or greater size of products, Work shall be accomplished in conformance to such requirements with no change to the Contract Time and Contract Sum, except where changes in laws, ordinances, rules and regulations occur subsequent to the time of opening of the Proposals.

D. Under California Government Code Section 930.2 et. seq. and Public Contract Code Section 7105(d)(2), neither the Contract Claims Procedure (Document 00 71 00, Article 12) nor the Change Order Procedure (Document 01 26 00) may be modified, waived, or otherwise not complied with, absent a written change order that explicitly and expressly makes such modifications.

DOCUMENT 01 41 00

REGULATORY REQUIREMENTS

1.5 CONFLICTS

A. Between referenced regulatory requirements: Comply with the one establishing the more stringent requirement.
B. Between referenced regulatory requirements and Contract Documents: Comply with the one establishing the more stringent requirement.

1.6 COMPLIANCE WITH AMERICANS WITH DISABILITIES ACT

A. Design-Build Entity acknowledges that, pursuant to the Americans with Disabilities Act (ADA), programs, services and other activities provided by a public entity to the public, whether directly or through a contractor, must be accessible to people with disabilities. Design-Build Entity shall provide the services specified in the Contract Documents in a manner that complies with the ADA and any and all other applicable federal, state and local disability rights legislation. Design-Build Entity agrees not to discriminate against people with disabilities in the provision of services, benefits or activities provided under this Agreement and further agrees that any violation of this prohibition on the part of Design-Build Entity, its employees, agents or assigns shall constitute a material breach of the Contract Documents.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

DOCUMENT 01 41 01

REGULATORY REQUIREMENTS – HAZARDOUS MATERIALS

PART 1 GENERAL

1.1 SUMMARY

A. Document Includes:
   1. Regulatory requirements applicable to Work in connection with hazardous waste abatement and disposal including, but not limited to, asbestos and asbestos-containing materials, lead-based paint, polychlorinated biphenyls, petroleum-contaminated soils and materials, construction and demolition debris and any other hazardous substance or hazardous waste.

B. This Section supplements Document 01 41 00 (Regulatory Requirements) and the Work-specific listings of applicable regulatory requirements elsewhere in the Specifications.

1.2 REFERENCES TO REGULATORY REQUIREMENTS

A. Codes, laws, ordinances, rules and regulations applicable to the Work shall have full force and effect as though printed in full in Contract Documents. Codes, laws, ordinances, rules and regulations are not furnished to Design-Build Entity, because Design-Build Entity is assumed to be familiar with their requirements. The listing herein of applicable codes, laws, and regulations for hazardous waste abatement work is supplied to Design-Build Entity as a courtesy and shall not limit Design-Build Entity's responsibility for complying with all applicable laws, regulations or ordinances having application to the Work. Where conflict among the requirements or with these Specifications exists, the most stringent requirements shall be used.

B. Conform to all applicable codes, laws, ordinances, rules and regulations that are in effect on date of contracting.

1.3 LAWS, ORDINANCES, RULES, AND REGULATIONS

A. During prosecution of Work under Contract Documents, Design-Build Entity shall comply with applicable laws, ordinances, rules and regulations including, but not limited to, those listed below.

B. Federal:
   1. Statutory Requirements:
      a. Resource Conservation and Recovery Act, 42 U.S.C. Sections 6901 *et seq*.
      b. Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, 42 U. S.C. Sections 9601 *et seq*.
      c. Toxic Substances Control Act of 1976, 15 U.S.C., Sections 2601 *et seq*.
      d. Hazardous Materials Transportation Act of 1975, 49 U.S.C. Sections 1801 *et seq.*
      e. Clean Water Act, 33 U.S.C. Sections 1251 *et seq.*
      f. Safe Drinking Water Act, 42 U.S.C., Sections 3001 *et seq.*
      g. Clean Air Act, Section 112, 42 U.S.C., Section 7412
      h. Occupational Safety and Health Act of 1970, 29 U.S.C., Sections 651 *et seq.*
      i. Underground Storage Tank Law, 42 U.S.C., Sections 6991 *et seq.*
      j. The Emergency Planning and Community Right to Know Act of 1986, 42 U.S.C., Sections 11011 *et seq.*
   2. Environmental Protection Agency (EPA):
      a. 40 C.F.R. Parts 260, 264, 265, 268, 270
      b. 40 C.F.R. Parts 258 *et seq.*
      c. 40 C.F.R. Part 761
      d. 40 C.F.R. Parts 122-124
   3. Occupational Safety and Health Administration (OSHA):
      a. OSHA Worker Protection Standards, Title 29 C.F.R. Part 1926.58, Construction Standards and 29 C.F.R. 1910.1001 General Industry Standard

b. OSHA, 29 C.F.R. Part 1926.1101, Construction Standards for Asbestos
c. OSHA, Lead Exposure in Construction: Interim Final Rule, 29 C.F.R. 1926.62
d. National Emission Standard for Hazardous Air Pollutants, Title 40 C.F.R. Part 61
e. Asbestos Hazardous Emergency Response Act, Title 40 C.F.R. 763

4. Department of Transportation:
   a. Title 49 C.F.R. 173.1090
   b. Title 49 C.F.R. 172
   c. Title 49 C.F.R. 173
   d. DOT, HM 181 and MH126f

C. State of California Requirements:
1. Statutory Law:
   a. The Carpenter-Presley-Tanner Hazardous Substance Account Act, Health & Safety Code, Sections 25300 *et seq.*
   b. Health and Safety Code, Section 25359.4
   c. Hazardous Waste Control Law, Health & Safety Code, Sections 25100 *et seq.*
   d. Porter-Cologne Water Quality Control Act, Water Code, Sections 13000 *et seq.*
   e. Health and Safety Code, Sections 25915-25924
   f. California Labor Code Chapter 6, including, without limitation, Sections 6382, 6501.5-6501.9, 6503.5, 9021.5, 9080
   g. Business and Professions Code, including without limitation, Sections 7058.5, 7065.01, 7118.5
   h. Underground Storage of Hazardous Substance Act, Health and Safety Code, Sections 25280 *et seq.*
   i. Petroleum Underground Storage Tank Cleanup, Health and Safety Code, Sections 25299.10 *et seq.*
   j. Safe Drinking Water and Toxic Enforcement Act of 1986, Health & Safety Code, Sections 25249.5 *et seq.* (Proposition 65)
   k. Above Ground Petroleum Storage Act, Health and Safety Code, Sections 25270 *et seq.*
   l. Hazardous Materials Release Response Plans and Inventory, Health and Safety Code, Chapter 6.95
2. Administrative Code and Regulations:
   a. Title 22 CCR Division 4.5, Environmental Health Standards for the Management of Hazardous Waste, Sections 6600 *et seq.*
   b. Cal/OSHA Worker Protection Standards, Title 8 CCR, Sections 1529, 5208
   c. Title 8 CCR, Section 1532.1, Lead in Construction
   d. Title 23 CCR, Sections 2610 *et seq.*
3. Local Agency Requirements:
   a. Bay Area Air Quality Management District, Fugitive Dust Rules
   b. Bay Area Air Quality Management District Regulation 11-2-303
   c. State Water Resource Control Board, General Construction Activity Stormwater Permit Requirements (Order 92-OS DWQ)
4. Local Agency Requirements:
   a. San Jose Fire Dept.
   b. Santa Clara County Health Department

DOCUMENT 01 41 01

REGULATORY REQUIREMENTS – HAZARDOUS MATERIALS

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

DOCUMENT 01 42 00

REFERENCES AND DEFINITIONS

PART 1 GENERAL

1.1 SUMMARY

A. Document Includes: Reference standards, abbreviations, symbols, and definitions used in Contract Documents.
B. Full titles are given in this Section for standards cited in other Sections of Specifications.
C. Material and workmanship specified by reference to number, symbol, or title of specific standard such as state standard, commercial standard, federal specifications, technical society, or trade association standard, or other similar standard, shall comply with requirements of standards except when more rigid requirements are specified or required by applicable codes.
D. Standards referred to, except as modified herein, shall have full force and effect as though printed in the Contract Documents. Standards are not furnished to Design-Build Entity because manufacturers and trades involved are assumed to be familiar with their requirements.

1.2 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES; REPORTING AND RESOLVING DISCREPANCIES

A. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code, or laws or regulations in effect at the time of opening of Proposals, except as may be otherwise specifically stated in the Contract Documents.
B. If during the performance of the Work, Design-Build Entity discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such law or regulation applicable to the performance of the Work or of any such standard, specification, manual, or code or of any instruction of any supplier, Design-Build Entity shall report it in writing at once to Inspector, with copies to District's Representative and Architect/Engineer, and Design-Build Entity shall not proceed with the Work affected thereby until consent to do so is given by District.
C. Except as otherwise specifically stated in the Contract Documents or as may be provided by Change Order, CCD, or Supplemental Instruction, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
    1. The provisions of any such standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or
    2. The provisions of any such laws or regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such law or regulation).
D. No provision of any such standard, specification, manual, code, or instruction shall be effective to change the duties and responsibilities of District, District's Representative or Design-Build Entity, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents, nor shall it be effective to assign to District, or any of their consultants, agents, representatives or employees any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.
E. Comply with the applicable portions of standards and specifications published by the technical societies, institutions, associations, and governmental agencies referred to in Specifications.
    1. Comply with referenced standards and specifications; latest revision in effect at the time of opening of Proposals, unless otherwise identified by date.
        a. Exception: Comply with issues in effect as listed in governing legal requirements.

F. Referenced Grades, Classes, and Types: Where an alternative or optional grade, class, or type of product or execution is included in a reference but is not identified in Drawings or in Specifications, provide the highest, best, and greatest of the alternatives or options for the intended use and prevailing conditions.

G. Jobsite Copies:
   1. Obtain and maintain at the Site copies of reference standards identified on Drawings and in Specifications in order to properly execute the Work.
   2. At a minimum, the following shall be readily available at the Site:
      a. Safety Codes: State of California, Division of Industrial Safety regulations.

H. Edition Date of References:
   1. When an edition or effective date of a reference is not given, it shall be understood to be the current edition or latest revision published as of the date of opening Proposals.
   2. All amendments, changes, errata and supplements as of the effective date shall be included.

I. ASTM and ANSI References: Specifications and Standards of the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI) are identified in the Drawings and Specifications by abbreviation and number only and may not be further identified by title, date, revision, or amendment. It is presumed that Design-Build Entity is familiar with and has access to these nationally- and industry-recognized specifications and standards.

1.3 ABBREVIATIONS

A. Listed hereinafter are the various organizations or references which may appear in the Contract Documents, along with their respective acronyms and/or abbreviations:

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AAP	Affirmative Action Program
AASHTO	American Association of State Highway and Transportation Officials
ABMA	American Boiler Manufacturers Association
ABPA	American Board Products Association
ACI	American Concrete Institute
AED	Association of Equipment Distributors
AGA	American Gas Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute (formerly American Standards Association)
APA	American Plywood Association
ARI	Air-Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWCI	Association of the Wall and Ceiling Industries
AWPA	American Wood- Preservers Association
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association
BAAQMD	Bay Area Air Quality Management District
BIL	Basic Insulation Level
Cal/OSHA	California Occupational Safety and Health Administration
Caltrans	State of California, Department of Transportation

REFERENCES AND DEFINITIONS

CBC	California Building Code
CCD	Construction Change Directive
CCR	California Code of Regulations
CEC	California Electric Code
CFR	Code of Federal Regulations
CISPI	Cast Iron Soil Pipe Institute
CLMFI	Chain Link Fence Manufacturers Institute
CMC	California Mechanical Code
CO	Change Order
CPC	California Plumbing Code
CPM	Critical Path Method
CPUC	California Public Utilities Commission
CRA	California Redwood Association
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards, U.S. Department of Commerce
CSA	Canadian Standards Association
CTI	Ceramic Tile Institute
DBE	Design-Build Entity
DHI	Door and Hardware Institute
DSA	Division of State Architect (formerly known as the Office of the State Architect)
EPA	Environmental Protection Agency
FF&E	Furniture, Fixtures, and Equipment; Group 1 FF&E are fixed into the building system; Group 2 FF&E are movable and have no permanent connection to the building
FGMA	Flat Glass Marketing Association
FM	Factory Mutual
FS	Federal Specifications
GA	Gypsum Association
HPMA	Hardwood Plywood Manufacturers Association
HVAC	Heating, Ventilating and Air Conditioning
I.D.	Identification
IACS	International Annealed Copper Standards
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers, Inc.
IES	Illuminating Engineering Society
ISA	Instrumentation Society of America
JATC	Joint Apprenticeship Training Committee
JV	Joint Venture
LBE	Local Business Enterprise
M.I.	Middle Initial
M/WBE	Minority and/or Woman-Owned Business Enterprise
MBE	Minority Business Enterprise
MIA	Masonry Institute of America
MIA	Marble Institute of America
MLSFA	Metal Lath/Steel Framing Association
MS	Military Specifications
MSDS	Material Safety Data Sheet
MSS	Manufacturers Standardization Society of the Valve & Fitting Industry
NAAMM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NEC	National Electric Code

REFERENCES AND DEFINITIONS

NEMA	National Electric Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Science and Technology (formerly the National Bureau of Standards)
NOFMA	National Oak Flooring Manufacturers Association
NSF	National Sanitation Foundation
NTMA	National Terrazzo & Mosaic Association
NWWDA	National Wood Windows and Doors Association
OSHA	Occupational Safety and Health Administration
OSHPD	Office of Statewide Health Planning and Department
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
PG&E	Pacific Gas and Electric Company
PM	Preventive Maintenance
PR	Proposal Request
PS	Product Standard, U. S. Department of Commerce
RFI	Request for Information
RFP	Request for Proposals
RFS	Request for Substitution
RIS	Redwood Inspection Service
SDI	Steel Deck Institute
SFM	State of California, Office of State Fire Marshal
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joint Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPIB	Southern Pine Inspection Bureau
SSPC	Steel Structures Painting Council
SWI	Steel Window Institute
SWPPP	Storm Water Pollution Prevention Plan
TCA	Tile Council of America
TIE	Time Impact Evaluation
UBC	Uniform Building Code
UFC	Uniform Fire Code
UL	Underwriters' Laboratories, Inc.
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
USA	Underground Service Alert
USC	United States Code
WCLIB	West Coast Lumber Inspection Bureau
WHI	Warnock Hersey International a testing lab
WIC	Woodwork Institute of California
WWPA	Western Wood Products Association

B. Abbreviations in Specifications:

AWG	American Wire Gauge
accord	Accordance
Co.	Company
Corp.	Corporation
cm.	centimeter (centimeters)

cu.	Cubic
Div.	Division
dia.	diameter
ft.	foot (feet)
g./gr.	gram (grams)
gal.	gallon (gallons)
gpd	gallons per day
gpm	gallons per minute
hr.	hour
kg.	kilogram (kilograms)
in.	inch (inches)
Inc.	Incorporated
km.	kilometer (kilometers)
Kw	Kilowatt
l.	liter (liters)
lbs.	pounds
m	meter (meters)
Mfg.	manufacturing
Mg.	milligram (milligrams)
ml./mls.	milliliter (milliliters)
mm.	millimeter (millimeters)
No.	number
o.c.	on centers
O.D.	outside diameter
psi	pounds per square inch
psf	pounds per square foot
sq.	square
T & G	tongue and groove
U.S.	United States
yd.	yard (yards)

C. Abbreviations on Drawings:

Additional abbreviations, used only on drawings, are indicated thereon.

1.4 SYMBOLS

A. Symbols in Specifications:

:	“shall be” or “shall” - where used within sentences or paragraphs
#1	Number
1#	Pound
&	And
%	Percent
C	Centigrade
F	Fahrenheit
°	Degree
/	per, except where used to combine words; example: power/fuel, and in that case it means and
“	inch (inches)
‘	foot (feet)
@	At

B. Symbols on Drawings:

Symbols, used only on Drawings, are indicated thereon.

1.5 DEFINITIONS

A. Wherever any of the words or phrases defined below, or a pronoun used in place thereof, is used in any part of the Contract Documents, it shall have the meaning here set forth. In the Contract Documents, the neuter gender includes the feminine and masculine, and the singular number includes the plural. While District has made an effort to identify all defined terms with initial caps, the following definitions shall apply regardless of case unless the context otherwise requires:

1. Addenda: Written or graphic instruments issued prior to the opening of Proposals, which clarify, correct, or change the Proposal requirements or the Contract Documents. Addenda shall not include the minutes of the Pre-Proposal Conference and/or Site Visit.
2. Agreement for Design-Build Services (Document 00 52 00): Agreement for Design-Build Services is the basic contract document that binds the parties to design & construction Work. Agreement for Design-Build Services defines relationships and obligations between District and Design-Build Entity and by reference incorporates Conditions of Contract and contains Addenda and all Modifications subsequent to execution of Contract Documents.
3. Alternate: Work added to or deducted from the Base Proposal, if accepted by District.
4. Application for Payment: Written application for monthly or periodic progress or final payment made by Design-Build Entity complying with the Contract Documents.
5. Approved Equal: Approved in writing by District as being of equivalent quality, utility and appearance.
6. Architect/Engineer: Unless otherwise obviously intended, "Architect/Engineer" shall mean a person holding a valid California State Architect's or Engineer's license representing District in the preparation of the Construction Documents. A Consultant Architect/Engineer may also be connected with the Project. The Consulting Architect/Engineer (if used) may be an employee of or an independent consultant to District. When a Consultant Architect/Engineer is referred to within the Contract Documents and no Consultant Architect/Engineer has in fact been designated, then the matter shall be referred to District. The term Architect/Engineer shall be construed to include employees of Architect/Engineer and/or employees that Architect/Engineer supervises. When the designated Consultant Architect/Engineer is an employee of District, his or her authorized representatives on the Project will be included under the term Consultant Architect/Engineer. If Consultant Architect/Engineer is an employee of District, then Consultant Architect/Engineer is the beneficiary of all Design-Build Entity obligations to District, including without limitation, all releases and indemnities. Refer to Section 341, Part 1, Title 24, California Code of Regulations.
7. Asbestos: Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by OSHA or Cal/OSHA.
8. Bid: The offer or proposal of the Bidder submitted on the prescribed form(s) setting forth the prices for the Work to be performed. Also referred to in the Contract Documents as the Proposal. The terms Bid and Proposal in the Contract Documents both refer to the Proposal.
9. Bidder: One who submits a Bid. Also referred to in the Contract Documents as a Proposer. The terms Bidder and Proposer in the Contract Documents both refer to the Proposer
10. Bidding Documents: All documents comprising the Project Manual (including all documents and specification sections listed on Document 00 01 10 (Table of Contents), including documents supplied for bidding purposes only and Contract Documents.

REFERENCES AND DEFINITIONS

11. Board: The District's Board of Trustees.
12. Bridging Documents: Drawings, Specifications, Adjacency Diagrams, Room Data Sheets, and other materials provided by District and included or referenced in the Project Manual to define the design intent, quality level, materials and products to be used in the Project. See Document 01 10 00 (Summary of Work), paragraph 1.2.
13. Business Day: Any Day other than Saturday, Sunday, and the following days that have been designated as holidays by District. If a holiday falls on a Saturday, the preceding Friday will be the holiday. If a holiday falls on a Sunday, the following Monday will be the holiday. Refer to the District's web site for a list of District observed holidays.
14. By District: Work that will be performed by District or its agents at the District's expense.
15. By Others: Work that is outside scope of Work to be performed by Design-Build Entity under this Contract, which will be performed by District, other contractors, or other means.
16. Change Order: A written instrument prepared by District and signed by District and Design-Build Entity, stating their agreement upon all of the following:
    a. a change in the Work;
    b. the amount of the adjustment in the Contract Sum, if any; and
    c. the amount of the adjustment in the Contract Time, if any.
17. Code Inspector: A local or state agency responsible for the enforcement of applicable codes and regulations.
18. Compliance Officer: Is defined in Document 001 35 28 (Labor Compliance Program).
19. Concealed: Work not exposed to view in the finished Work, including within or behind various construction elements.
20. Construction Change Directive: A written order prepared and signed by District, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both.
21. Construction Documents: Is defined in Document 01 10 01 (Summary of Work – Design Services).
22. Consultant: See Document 00 7305 (Supplemental General Conditions – Hazardous Materials).
23. Consulting Architect/Engineer: See Document 00 52 00 (Agreement for Design-Build Services).
24. Construction Manager: See Document 00 52 00 (Agreement for Design-Build Services).
25. Contract Conditions: Consists of two parts: General Conditions and Supplemental Conditions.
    a. General Conditions are general clauses that are common to the District Contracts, including Document 00 71 00.
    b. Supplemental conditions modify or supplement General Conditions to meet specific requirements for this Contract, including Document 00 73 00, Document 00 73 01 (if included) and Document 00 73 05.
26. Contract Documents and Contract: Contract Documents and Contract shall consist of the documents identified as the Contract Documents in Document 00 52 00 (Agreement for Design-Build Services), plus all changes, addenda, and modifications thereto.
27. Contract Modification: Either:
    a. a written amendment to Contract signed by Design-Build Entity and District; or
    b. a Change Order; or
    c. a Construction Change Directive; or
    d. a written directive for a minor change in the Work issued by District.
28. Contract Sum: The sum stated in the Agreement and, including authorized adjustments, the total amount payable by District to Design-Build Entity for performance of the Work and the Contract

Documents. The Contract Sum is also sometimes referred to as the Contract Price or the Contract Amount.

29. Contract Time: The number or numbers of Days or the dates stated in the Agreement:
    a. to achieve Substantial Completion of the Work or designated Milestones; and/or
    b. to complete the Work so that it is ready for final payment and is accepted.
30. DBE: Design-Build Entity.
31. Day: One calendar day of 24 hours measured from midnight to the next midnight, unless the word "day" is specifically modified to the contrary.
32. Design-Build Entity: The person or entity identified as such in the Agreement and referred to throughout the Contract Documents as if singular in number and neutral in gender. The term "Design-Build Entity" means the Design-Build Entity or its authorized representative.
33. Design-Build Entity's Employees: Persons engaged in execution of Work under Contract as direct employees of Design-Build Entity, as Subcontractors, or as employees of Subcontractors.
34. Defective: An adjective which, when modifying the word "Work," refers to Work that is unsatisfactory or unsuited for the use intended, faulty, or deficient, that does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents (including but not limited to approval of samples and "or equal" items), or has been damaged prior to final payment (unless responsibility for the protection thereof has been assumed by District). District is the judge of whether Work is defective.
35. Design Development Documents: Is defined in Document 01 10 01 (Summary of Work – Design Services).
36. District: The East Side Union High School District.
37. District-Furnished, Design-Build Entity-Installed: Items furnished by District at its cost for installation by Design-Build Entity at its cost under Contract Documents.
38. District's Representative(s): See Document 00 52 00 (Agreement for Design-Build Services).
39. Drawings: The graphic and pictorial portions of Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.
40. Equal: Equal in opinion of District. Burden of proof of equality is responsibility of Design-Build Entity.
41. Exposed: Work exposed to view in the finished Work, including behind louvers, grilles, registers and various other construction elements.
42. Final Acceptance or Final Completion: District's acceptance of the Work as satisfactorily completed in accordance with Contract Documents. Requirements for Final Acceptance/Final Completion include, but are not limited to:
    a. All systems having been tested and accepted as having met requirements of Contract Documents.
    b. All required instructions and training sessions having been given by Design-Build Entity.
    c. All Project Record Documents having been submitted by Design-Build Entity, reviewed by District and accepted by District.
    d. All punch list work, as directed by District, having been completed by Design-Build Entity.
    e. Generally all Work, except Design-Build Entity maintenance after Final Acceptance, having been completed to satisfaction of District.
43. Force Account: Work directed to be performed without prior agreement as to lump sum or unit price cost thereof, and which is to be billed at cost for labor, materials, equipment, taxes, and other costs, plus a specified percentage for overhead and profit.

REFERENCES AND DEFINITIONS

44. Furnish: Supply only, do not install.
45. Holiday: District's recognized holidays are published on the District's web site at http://www.esuhsd.org/Community/Calendar/index.html
46. Indicated: Shown or noted on the Drawings.
47. Inspector. The person engaged by District to inspect the workmanship, materials, or manner of construction of buildings or portions of buildings, to determine if such construction complies with the Contract Documents and applicable codes. The Inspector is subject to approval by the District and, as appropriate, Division of the State Architect, and he will report to District. Refer to section 4-333 and section 4-342, Part 1, Title 24, California Code of Regulations.
48. Install: Install or apply only, do not furnish.
49. Latent: Not apparent by reasonable inspection, including but not limited to, the inspections and research required as a condition to bidding under the General Conditions.
50. Law: Unless otherwise limited, all applicable laws including without limitation all federal, state, and local laws, statutes, standards, rules, regulations, ordinances, and judicial and administrative decisions
51. Material: This word shall be construed to embrace machinery, manufactured articles, materials of construction (fabricated or otherwise), and any other classes of material to be furnished in connection with Contract, except where a more limited meaning is indicated by context.
52. Milestone: A principal event specified in Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all Work.
53. Modification: Same as Contract Modification.
54. Not in Contract: Work that is outside the scope of Work to be performed by Design-Build Entity under Contract Documents.
55. Notice of Completion: Shall have the meaning provided in California Civil Code Section 3093, and any successor statute.
56. Off Site: Outside geographical location of the Project.
57. Partial Utilization: Use by District of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all of the Work.
58. PCBs: Polyclorinated byphenyls.
59. Phase: A specified portion of the Work (if any) specifically identified as a Phase in Document 00 52 00 (Agreement for Design-Build Services) or Document 01 10 00 (Summary of Work).
60. Product Data: That information (including brochures, catalogue cuts, MSDS, etc.) supplied by the vendor describing the technical and commercial characteristics of the supplier equipment or materials, and accompanying commercial terms such as warranties, instructions and manuals.
61. Progress Report: A periodic report submitted by Design-Build Entity to District with progress payment invoices accompanying actual work accomplished to the Progress Schedule. See Document 01 32 16 (Progress Schedules and Reports) and Document 00 71 00 (General Conditions).
62. Project: Refers to totality of Work, including design and construction, performed under Contract Documents.
63. Project Float: As defined in Document 01 32 16 (Progress Schedules and Reports), paragraph 1.2.B.3.
64. Project Manual: Project Manual consists of Proposal Requirements, Agreement, Bonds, Certificates, Contract Conditions, and Bridging Documents.
65. Project Record Documents: All Project deliverables required under Documents 01 78 39 (Project Record Documents), including without limitation, as-built drawings, operations and maintenance manuals Installation, Operation, and Maintenance Manuals, and Machine Inventory Sheets.

REFERENCES AND DEFINITIONS

66. Proposal: The offer of the Design-Build Entity submitted on the prescribed form(s) setting forth the prices for the Work to be performed
67. Provide: Furnish and install.
68. Request for Information ("RFI"): A document prepared by Design-Build Entity requesting information regarding the Project or Contract Documents as provided in Document 01 26 00 (Modification Procedures). The RFI system is also a means for District to submit Contract Document clarifications or supplements to Design-Build Entity.
69. Request for Proposals ("RFP"): A document issued by District to Design-Build Entity whereby District may initiate changes in the Work or Contract Time as provided in Contract Documents. See Document 01 26 00 (Modification Procedures).
70. Request for Substitution ("RFS"): A document prepared by Design-Build Entity requesting substitution of materials as permitted and to the extent permitted in Contract Documents. See Document 01 60 00 (Product Requirements).
71. RFI-Reply: A document consisting of supplementary details, instructions, or information issued by District that clarifies or supplements Contract Documents, and with which Design-Build Entity shall comply. RFI-Replies do not constitute changes in Contract Sum or Contract Time except as otherwise agreed in writing by District. RFI-Replies will be issued through the RFI administrative system.
72. Samples: Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
73. Services. As defined in Document 01 10 01 (Summary of Work – Design Services).
74. Shop Drawings: All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for Design-Build Entity and submitted by Design-Build Entity to illustrate some portion of the Work.
75. Shown: As indicated on Drawings.
76. Site: The particular geographical location of Work performed pursuant to Contract Documents.
77. Specifications: The written portion of the Bridging Documents consisting of requirements for materials, equipment, construction systems, standards, and workmanship for the Work; performance of related services; and are contained in Divisions 1 through 60.
78. Specified: As written in Specifications.
79. Subcontractor: A person or entity that has a direct contract with Design-Build Entity either to perform a portion of the Work at the Site, or to perform some or all of the Services. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and neutral in gender and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.
80. Substantial Completion: The Work (or a specified part thereof) has progressed to the point where, in the opinion of District as evidenced by a Certificate of Substantial Completion, the Work is sufficiently complete, in accordance with Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work (or specified part) is complete and ready for final payment as evidenced by written recommendation of District for final payment. The terms "Substantially Complete" and "Substantially Completed" as applied to all or part of the Work refer to Substantial Completion thereof.
81. Supplemental Instruction: A written directive from District to Design-Build Entity ordering alterations or modifications that do not result in change in Contract Sum or Contract Time, and do not substantially change Drawings or Specifications. See Document 01 26 00 (Modification Procedures).

REFERENCES AND DEFINITIONS

82. Teacher in service: Refer to Calendar dates in Number 45
83. Technical Specifications: Specification Divisions 2 through 60 of the Contract Documents.
84. Title 24: Title 24, California Code of Regulations.
85. Testing and Special Inspection Agency: An independent entity engaged by District to inspect and/or test the workmanship, materials, or manner of construction of buildings or portions of buildings, to determine if such construction complies with the Contract Documents and applicable codes.
86. Underground Facilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities that have been installed underground to furnish any of the following services or materials: Electricity, gases, chemicals, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.
87. Unit Price Work: Shall be the portions of the Work for which a unit price is provided in Document 00 52 00 (Agreement for Design-Build Services) or Document 01 10 00 (Summary of Work).
88. Verified Report: A periodic report submitted to District. Refer to Sections 4-336, 4-337 and 4-343, Part 1, Title 24, California Code of Regulations.
89. Work: The entire completed construction, or the various separately identifiable parts thereof, required to be furnished under the Contract Documents within the Contract Time. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents including everything shown in the Bridging Documents. Work may also include the design requirements set forth in the Contract Documents. Wherever the word “work” is used, rather than the word “Work,” it shall be understood to have its ordinary and customary meaning.

B. Wherever words “as directed,” “as required,” “as permitted,” or words of like effect are used, it shall be understood that direction, requirements, or permission of District is intended. Words “sufficient,” “necessary,” “proper,” and the like shall mean sufficient, necessary, or proper in judgment of District. Words “approved,” “acceptable,” “satisfactory,” “favorably reviewed,” or words of like import, shall mean approved by, or acceptable to, or satisfactory to, or favorably reviewed by District.
C. Wherever the word “may” or “ought” is used, the action to which it refers is discretionary. Wherever the word “shall” or “will” is used, the action to which it refers is mandatory.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

DOCUMENT 01 45 23

TESTING AND INSPECTION

PART 1 GENERAL

1.1 DOCUMENT INCLUDES

A. Design-Build Entity's Quality Control
B. Quality of the Work
C. Inspections and Tests by Division of State Architect
D. Inspections and Tests by Serving Utilities
E. Inspections and Tests by Health DepartmentINSPECTIONS AND TESTS BY HEALTH DEPARTMENT
F. Cause all tests and inspections required by the Santa Clara County Environmental Health Department to be made for Work under this Contract. Scheduling and conducting such inspections shall be solely the Design-Build Entity's responsibility.
G. Inspections and Tests by Manufacturer's Representatives
H. Inspections by Independent Testing and Inspection Agency
I. Additional Testing and Inspection

1.2 DESIGN-BUILD ENTITY'S QUALITY CONTROL

A. Design-Build Entity's Quality Control: Ensure that products, services, workmanship and Site conditions comply with requirements of Drawings and Specifications by coordinating, supervising, testing, and inspecting the Work and by utilizing only suitably qualified and appropriately audited, licensed or trained, personnel.
B. Quality Requirements: Work shall be accomplished in accordance with quality requirements of Drawings and Specifications, including, by reference, all codes, laws, rules, regulations, and standards. When no quality basis is prescribed, the quality and testing procedures shall be in accordance with the best-accepted practices of the construction industry for the locale of the Project, for projects of this type, or standards set by engineering or technical societies (e.g., ASTM or ASHRAE), whichever is more stringent.
C. Quality Control Personnel: Employ and assign knowledgeable and skilled personnel as necessary to perform quality control functions to ensure that the Work is provided as required.

1.3 QUALITY OF THE WORK

A. Quality of Products: Unless otherwise indicated or specified, all products shall be new, free of defects, and fit for the intended use.
B. Quality of Installation: All Work shall be produced plumb, level, square and true, or true to indicated angle, and with proper alignment and relationship between the various elements, as shown on or required by Contract Documents.
C. Protection of Completed Work: Take all measures necessary to preserve completed Work free from damage, deterioration, soiling, and staining, until acceptance by District.
D. Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Unless more stringent requirements are indicated or specified, comply with manufacturer's instructions and recommendations, reference standards and building code research report requirements in preparing, fabricating, erecting, installing, applying, connecting, and finishing Work.
E. Deviations from Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Secure District's advanced written consent. Document and explain all deviations from reference standards and building code research report requirements and manufacturer's product installation instructions and recommendations, including acknowledgement by the manufacturer that such deviations are acceptable and appropriate for the Project.
F. Verification of Quality: Work shall be subject to verification of quality by District in accordance with provisions of the Contract Documents.

1. Cooperate by making Work available for inspection by Division of State Architect Inspector and independent testing and inspection agencies.
2. Such verification may include mill, plant, shop, or field inspection as required.
3. Provide access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated.
4. Provide all information and assistance as required, including that by and from subcontractors, fabricators, materials suppliers and manufacturers, for verification of quality by District.
5. Applicable provisions of the Contract Documents shall govern Contract Modifications, if any, resulting from such verification activities.

G. Observations by District's Consultants: Periodic and occasional observations of Work in progress will be made by District and District's consultants as deemed necessary to review progress of Work and general conformance with design intent.

H. Limitations on Inspection, Testing and Observation: Neither employment of independent testing and inspection agency nor observations or tests by District and District's consultants shall in any manner relieve Design-Build Entity of obligation to perform Work in full conformance to all requirements of Contract Documents.

I. District's Acceptance and Rejection of Work: District reserves the right to reject all Work not in conformance to the requirements of the Drawings and Specifications, or otherwise defective.

J. Correction of Defective Work: Defective Work shall be modified, replaced, repaired or redone by the Design-Build Entity at no change in Contract Sum or Contract Time.

K. Contract Adjustment for Defective Work: Should District determine that it is not feasible or in District's interest to require defective Work to be repaired or replaced, an equitable reduction in Contract Sum shall be made by agreement between District and Design-Build Entity, and documented in the form of a contract change order. If equitable amount cannot be agreed upon, a Construction Change Directive will be issued and the amount in dispute resolved in accordance with applicable provisions of Document 00 71 00 (General Conditions).

L. Non-Responsibility for Defective Work: District and District's consultants disclaim any and all responsibility for Work produced not in conformance with the Drawings and Specifications.

M. Responsibility for Defective Work: Design-Build Entity shall have full responsibility for all consequences resulting from defective work, including without limitation all delays, disruptions, extra inspection and correction costs by Design-Build Entity and District and re-Work, and extra time and costs of all types. Design-Build Entity waives excuses for defective work relating to District's prior review of Submittals and/or prior failure to notice defective work in place on inspection.

1.4 INSPECTIONS BY DIVISION OF THE STATE ARCHITECT INSPECTOR OF RECORD

A. District will select and pay for a Division of the State Architect (DSA) certified inspector(s) for this project. The Design-Build Entity will coordinate their work with required inspections.

B. Regulatory Requirements for Testing and Inspection: Design-Build Entity shall comply with Part 1, Title 24, Section 4-335, California Code of Regulations and shall cooperate with the Inspector and District in all testing required by the Office of Regulation Services, Division of State Architect. Design-Build Entity shall comply with Part 2, Title 24, California Code of Regulations and shall cooperate with Inspector in all inspections, testing and approvals required by the Office of Regulation Services, Division of State Architect. Design-Build Entity shall also comply with 2013 CBC requirements and all other requirements of governing authorities having jurisdiction.
   1. Inspections and Tests by Governing Authorities: Design-Build Entity shall cause all tests and inspections required by governing authorities having jurisdiction to be made for Work under this Contract.
   2. Such authorities may include, but are not limited to, the Division of State Architect, Fire Department, and similar agencies.
   3. Except as specifically noted, scheduling, conducting and paying for such inspections shall be solely the Design-Build Entity's responsibility.

TESTING AND INSPECTION

1.5 INSPECTIONS AND TESTS BY SERVING UTILITIES

A. Cause all tests and inspections required by serving utilities to be made for Work under this Contract. Scheduling, conducting and paying for such inspections shall be solely the Design-Build Entity's responsibility.

1.6 INSPECTIONS AND TESTS BY HEALTH DEPARTMENT

A. Cause all tests and inspections required by the Santa Clara County Environmental Health Department to be made for Work under this Contract. Scheduling and conducting such inspections shall be solely the Design-Build Entity's responsibility.

1.7 INSPECTIONS AND TESTS BY MANUFACTURER'S REPRESENTATIVES

A. Cause all tests and inspections specified to be conducted by materials or systems manufacturers to be made. Additionally, all tests and inspections required by materials or systems manufacturers as conditions of warranty or certification of Work shall be made, the cost of which shall be included in the Contract Sum.

1.8 INSPECTIONS BY INDEPENDENT TESTING AND INSPECTION AGENCY

A. District will select an independent testing and inspection agency or agencies approved by the Division of State Architect to conduct tests and inspections in accordance with Part 1, Title 24, Section 4-335, California Code of Regulations and as indicated on Drawings, in Specifications and as required by governing authorities having jurisdiction.

B. Responsibility for time and costs shall be as indicated in schedule below. All time for Design-Build Entity's service related to such tests and inspections shall be included in Contract Time. All costs for testing and inspections shall be procured and paid for by the District.

C. Notify District and Inspector in writing (and, if provided, on inspection request form provided by District) and, if directed by District, testing and inspection agency, when Work is ready for specified tests and inspections. Deliver this written notification at least 48 hours before the requested inspection date.

D. The Design-Build Entity will pay or reimburse District for all additional charges by testing and inspection agencies and governing authorities having jurisdiction due to the following:
   1. Design-Build Entity's failure to properly schedule or notify testing and inspection agency or authorities having jurisdiction.
   2. Changes in sources, lots, or suppliers of products after original tests or inspections.
   3. Changes in means, methods, techniques, sequences, and procedures of construction that necessitate additional testing, inspection, and related services.
   4. Changes in mix designs for concrete and mortar after review and acceptance of submitted mix design.
   5. Design-Build Entity submitted requests to change materials or products, which are accepted, but require testing and/or reinspection beyond original design.

E. Tests and special inspections to be paid by District may, where required, include the following:

SECTION	MATERIAL TESTS
TBD	Reinforcing steel for concrete and concrete masonry
TBD	Concrete slump and strength
TBD	Masonry block strength, shrinkage and moisture content
TBD	Masonry grout strength
TBD	High strength grout strength
TBD	Masonry mortar strength
TBD	Structural steel bolting and welding
TBD	Pile concrete and reinforcing
TBD	Trench backfill

TBD	Building pad sub-grade and imported fill
TBD	Load test pile dowels

SECTION	SPECIAL INSPECTION
TBD	Placement of reinforcing steel for concrete and concrete masonry
TBD	Placement of cast-in-place concrete
TBD	Placement of concrete block and grout
TBD	Structural steel fabrication, erection, bolting and welding
TBD	Installation of roof membrane
TBD	Installation of anchor bolts, dowels embedded in concrete and masonry
TBD	Installation of adhesive (epoxy) connections
TBD	Placement of pile concrete and reinforcement
TBD	Pile driving
TBD	Site grading, road and parking phase
TBD	Trench backfill

SECTION	GEOTECHNICAL TESTING/INSPECTION
TBD	Soils testing

SECTION	ENVIRONMENTAL TESTS
TBD	Construction noise monitoring
TBD	Storm water runoff sampling
TBD	Air quality monitoring within occupied spaces

F. Test and Inspection Reports: After each inspection and test, one copy of report shall be promptly submitted to Division of State Architect, District's Representative, the Design-Build Entity and/or any other consultant District designates and any agency having jurisdiction (if required by Code).
   1. Reports shall clearly identify the following:
      a. Date issued.
      b. Project name and number.
      c. Identification of product and Specifications Section in which Work is specified.
      d. Name of inspector.
      e. Date and time of sampling or inspection.
      f. Location in Project where sampling or inspection was conducted.
      g. Type of inspection or test.
      h. Date of test.
      i. Results of tests.
      j. Comments concerning conformance with Contract Documents and other requirements.
   2. Test reports shall indicate specified or required values and shall include statement whether test results indicate satisfactory performance of products.
   3. Samples taken but not tested shall be reported.
   4. Test reports shall confirm that methods used for sampling and testing conform to specified test procedures.
   5. When requested, testing and inspection agency shall provide interpretations of test results.

G. Design-Build Entity Responsibilities in Inspections and Tests:
   1. Unless specified otherwise, notify Inspector, District's Representative, or any other consultant District designates and independent testing and inspection agencies 48 hours in advance of expected time of each test and inspection, and for all other operations requiring inspection and

testing services, by submitting Design-Build Entity's inspection request in writing (or, if District provides a specific form, on that form).

a. When tests or inspections cannot be performed after such notice, reimburse District for testing and inspection agency personnel and travel expenses incurred due to Design-Build Entity's negligence.

2. Deliver to laboratory or designated location, adequate samples of materials proposed to be used that require advance testing, together with proposed mix designs.
3. Cooperate with Inspector, District's Representative, or any other consultant District designates, and District's consultants. Provide access to Work areas and off-Site fabrication and assembly locations, including during weekends and after normal Work hours.
4. Provide incidental labor and facilities to provide safe access to Work to be tested and inspected, to obtain and handle samples at the Site or at source of products to be tested, and to store and cure test samples.
5. Provide, at least 15 Days in advance of first test or inspection of each type, a schedule of tests or inspections indicating types of tests or inspections and their projected scheduled dates.

1.9 ADDITIONAL TESTING AND INSPECTION

A. If initial tests or inspections made by the Inspector or District's Representative, or any other consultant District designates reveal that materials do not comply with Title 24, California Code of Regulations or with the Contract Documents, or if District has reasonable doubt that materials do not comply with Title 24, California Code of Regulations or with Contract Documents, additional tests and inspections shall be made as directed.
   1. If additional tests and inspections establish that materials comply with Contract Documents, District shall pay all costs for such tests and inspections.
   2. If additional tests and inspections establish that materials do not comply with Contract Documents, all costs of such tests and inspections shall be deducted from Contract Sum.
   3. If Work requiring inspection is covered by follow-on or follow-up Work before it is inspected, uncover Work so proper inspections can be performed. All costs of such tests and inspections shall be deducted from Contract Sum.

1.10 PROJECT INSPECTION CARDS

A. The Inspector of Record shall post the DSA 152 Project Inspection Cards electronically to the DSA box. The information in the forms shall always be current. In addition, the Inspector of Record shall:
   1. Immediately, upon request, make the form available for review by any parties involved in the construction.
   2. Include a current copy of the forms any time he/she submits a Verified Report (form DSA 6- PI). Upon request, provide a current copy of the forms to the DSA, the District/State agency, or the design professional in general responsible charge.

B. Duties of the Design-Build Entity related to the use of form DSA 152 are as follows:
   1. The Design-Build Entity shall carefully study the DSA approved documents and shall plan a schedule of operations well ahead of time.
   2. If at any time it is discovered that work is being done which is not in accordance with the DSA approved construction documents, the Design-Build Entity shall correct the work immediately
   3. Verify that forms DSA 152 are issued for the project prior to the commencement of construction.
   4. Meet with the design team, the Laboratory of Record and the Inspector of Record to mutually communicate and understand the testing and inspection program and the methods of communication appropriate for the project.
   5. Notify the Inspector of Record, in writing, of the commencement of construction of each and every aspect of the work at least 48 hours in advance by submitting form DSA 156 (or other agreed upon written documents) to the Inspector of Record.
   6. Notify the Inspector of Record of the completion of construction of each and every aspect of the work by submitting form DSA 156 (or other agreed upon written documents) to the Inspector of Record.

7. Consider the relationship of the signed off blocks and sections of the form DSA 152 and the commencement of subsequent work. Until the Inspector of Record has signed off applicable blocks and sections of the form DSA 152, the Design-Build Entity may be prohibited from proceeding with subsequent construction activities that cover up the unapproved work. Any subsequent construction activities, that cover up the unapproved work, will be subject to a "Stop Work Order" from the DSA or the district and are subject to removal and remediation if found to be in non-compliance with the DSA approved construction documents.

END OF DOCUMENT

DOCUMENT 01 51 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Document Includes:
1. Temporary Electricity
2. Temporary Communications
3. Temporary Water
4. Fences
5. Protection of Public and Private Property
6. Temporary Sanitary Facilities
7. Temporary Barriers and Enclosures
8. Water Control
9. Pollution Control
10. Construction Aids
11. Erosion Control
12. Noise Control
13. Traffic Control
14. Removal of Temporary Facilities and Controls

1.2 TEMPORARY ELECTRICITY

Design-Build Entity shall provide and maintain electrical power at the Site for construction purposes and for Design-Build Entity's and trailers and any other site offices or trailers required by the District in the Contract Documents to be provided by Design-Build Entity. Power may be obtained from District, but Design-Build Entity must provide all necessary wiring and appurtenances for connection to District's system.

1.3 TEMPORARY COMMUNICATIONS

Provide, maintain, and pay for all applicable communications and data services (including without limitation telephone, facsimile, e-mail and internet) to field office commencing at time of Project mobilization, including all installation and connection charges. In addition, the Design-Build Entity shall provide, maintain and pay for a high speed internet service (such as DSL) at the Site.

1.4 TEMPORARY WATER

A. Provide and maintain- suitable quality water service required for construction operations.
B. All water required for and in connection with the Work, including without limitation for dust control, shall be furnished by and at the expense of Design-Build Entity. Design-Build Entity shall be allowed to utilize water from the District for domestic uses. Water shall not be provided for dust control or street cleaning. However, District does not guarantee availability of this water. There will be no charge to Design-Build Entity for water used. Design-Build Entity shall furnish necessary pipe, hose, nozzles and tools and perform all necessary labor. Unnecessary waste of water will not be permitted. Special hydrant wrenches shall be used for opening and closing fire hydrants; in no case shall pipe wrenches be used for this purpose.

1.5 FENCES

A. All existing fences affected by the Work shall be maintained by Design-Build Entity until Final Completion. Fences which interfere with construction operations shall not be relocated or dismantled until District gives written permission to do so, and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

B. On completion of the Work across any tract of land, Design-Build Entity shall restore all fences to their original or to a better condition and to their original locations.

1.6 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

A. Design-Build Entity shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by its construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, together with all sod and shrubs in yards, parkways, and medians, shall be restored to their original condition, whether within or outside the easement. All replacements shall be made with new materials.

B. Design-Build Entity shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or workers to or from the Work, Site or any part thereof, whether by Design-Build Entity or Subcontractors. Design-Build Entity shall make satisfactory and acceptable arrangements with the District, or the agency or authority having jurisdiction over the damaged property, concerning its repair or replacement or payment of costs incurred in connection with the damage.

C. All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

1.7 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required temporary buildings with sanitary toilets and hand wash stations for use of all workers. At a minimum, sanitary facilities shall be located at trailer site, staging area, and adjacent to work area.

B. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 persons. Design-Build Entity shall enforce the use of such sanitary facilities by all personnel at the Site.

C. Comply with all minimum requirements of the Health Department or other public agency having jurisdiction; maintain in a sanitary condition at all times.

D. Design-Build Entity shall keep sanitary facilities free from graffiti.

1.8 TEMPORARY BARRIERS AND ENCLOSURES

A. Provide barriers to prevent unauthorized entry to construction areas to allow for District's use of Site, and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide barricades required by governing authorities for public access to existing buildings.

C. Protect vehicular traffic, stored materials, Site, and structures from damage.

1.9 WATER CONTROL

A. Grade Site to drain.

B. Maintain excavations free of water.

C. Protect Site from puddling or running water.

D. Provide water barriers as required to protect Site from soil erosion.

E. Provide for drainage of storm water and such water as may be applied or discharged on the Site in performance of the Work. Drainage facilities shall be adequate to prevent damage to the Work, the Site, and adjacent property.

F. Clean, enlarge and/or supplement existing drainage channels and conduit as necessary to carry all increased runoff attributable to Design-Build Entity's operations. Provide sediment tanks and other features to avoid increased runoff, to protect District's facilities and the Work, and to direct water to drainage channels or conduits. Provide ponding as necessary to prevent downstream flooding.

DOCUMENT 01 51 00

TEMPORARY FACILITIES AND CONTROLS

1.10 POLLUTION CONTROL

A. Design-Build Entity shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. No sanitary wastes shall be permitted to enter any drain or watercourse other than sanitary sewers. No sediment, debris, or other substance shall be permitted to enter sanitary sewers without authorization of the receiving sanitary sewer service, and all possible Best Management Practices (BMPs) shall be taken to prevent such materials from entering any drain to watercourse. Rate of discharge for storm water may not be increased by the Project during or following construction.

B. The Design-Build Entity shall implement BMPs during construction activities as specified in the California Storm Water Best Management Practices Handbook (Stormwater Quality Task Force, 1993) and/or the Manual of Standards for Erosion and Sediment Control Measures (ABAG, 1995). Erosion and sedimentation control practices shall include installation of silt fences, straw wattle, soil stabilization, revegetation, and runoff control to limit increases in sediment in stormwater runoff, including but not limited to, detention basins, straw bales, silt fences, check dams, geofabrics, drainage swales, and sand bag dikes.

C. In the event that dewatering of excavations is required, Design-Build Entity shall obtain the necessary approval and permits for discharge of the dewatering effluent from the local jurisdiction. Design-Build Entity shall be responsible for assuring that water quality of such discharge meets the appropriate permit requirements prior to any discharge.

1.11 CONSTRUCTION AIDS

A. Design-Build Entity shall furnish, install, maintain, and operate all construction aids required by it and its Subcontractors in the performance of the Work, except as otherwise provided herein. Such construction aids shall include elevators and hoists, cranes, temporary enclosures, swing staging, scaffolding and temporary stairs.

1.12 EROSION CONTROL

A. Design-Build Entity shall prevent soil erosion on the Site and adjacent property resulting from its construction activities to the maximum extent practical, including implementation of Best Management practices. Effective measures shall be initiated prior to the commencement of clearing, grading, excavation, or other operations that will disturb the natural protection.

B. Work shall be scheduled to expose areas subject to erosion for the shortest possible time, and natural vegetation shall be preserved to the greatest extent practicable. Temporary storage and construction buildings shall be located, and construction traffic routed, to minimize erosion. Temporary fast-growing vegetation or other suitable ground cover shall be provided as necessary to control runoff.

1.13 NOISE CONTROL

A. When required by OSHA Standards, construction workers shall be provided with ear protection to operate equipment.

B. Design-Build Entity shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work. During construction activities on or adjacent to occupied buildings, and when appropriate, Design-Build Entity shall erect screens or barriers effective in reducing noise in the building and shall conduct its operations to avoid unnecessary noise which might interfere with the activities of building occupants.

C. Ensure and provide certification to District that all construction equipment and vehicles used for the Work are:
   1. Maintained in good mechanical condition
   2. Equipped with properly installed engine mufflers

DOCUMENT 01 51 00

TEMPORARY FACILITIES AND CONTROLS

1.14 TRAFFIC CONTROL

The high school campus is an active site, with vehicular and pedestrian traffic occurring at all times of the day and all days of the week. Design-Build Entity shall coordinate with District's Representative all traffic associated with the construction, including without limitation delivery and mail trucks, in order to minimize disruption to school operations. Delivery trucks and large equipment shall enter the Design-Build Entity's access gate and shall use the route mutually agreed upon between District and Design-Build Entity at the beginning of each phase of work. Design-Build Entity shall provide signs directing construction and delivery traffic to this gate. Sign types and locations shall be reviewed by the District's Representative.

Traffic control plan to be submitted for District approval. Provide appropriate personnel to control traffic.

1.15 REMOVAL OF TEMPORARY FACILITIES AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials prior to final inspection.
B. Remove underground installations.
C. Clean and repair damage caused by installation or use of temporary work.
D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

DOCUMENT 01 58 00

PROJECT IDENTIFICATION AND SIGNS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project identification signs
2. Bronze plaque
3. Maintenance
4. Removal

B. Related Sections

1. Section 01 10 00: Summary of Work
2. Section 01 32 19: Submittal Procedures

1.2 QUALITY ASSURANCE

A. Design project identification signage and structure(s) to withstand 50 miles/hr wind.

B. Sign Manufacturer/Maker: Experienced as a professional signage company for a minimum of five years.

C. Project identification signs shall be constructed of new materials.

D. Finishes: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.3 SUBMITTALS

A. Submit shop drawings under provisions of Section 01 32 19 - Submittal Procedures.

B. Show content, layout, lettering style, lettering size, and colors. Make sign and lettering to scale, clearly indicating condensed lettering, if used.

C. Show proposed location(s) for signage.

PART 2 PRODUCTS

2.1 DESIGN-BUILD ENTITY-PROVIDED PLYWOOD PROJECT IDENTIFICATION SIGNAGE

A. Provide two painted signs, 48 sq. feet, bottom of signage no less than 4 feet above ground.

B. Content and composition:

1. “BUILDING TODAY FOR EDUCATION TOMORROW” across the top of each sign.
2. “Facilities Excellence” across the bottom of each sign.
3. CM’s name and number for more information or emergency response.
4. URL and telephone number of the Facilities Department.
5. Name of Project.
6. Name of District and name of School, including logos.
7. Names and roles of Architect and any consultants specified by District.
8. Name of Prime Contractor.

9. New construction projects shall include Architect's artistic rendering of the building(s).
10. Graphic Design, Colors, Style of Lettering: to be determined in coordination with District's Representative.

C. Sign Materials
1. Structure and Framing: New, wood, structurally adequate.
   a) Sign Posts: Use 4-inch by 4-inch pressure treated wood posts, 9 feet long for skid mounting and 12 feet long minimum for in-ground mounting.
   b) Skid Bracing: 2-inch by 4-inch wood framing material.
   c) Skid Members: 2-inch by 6-inch wood framing material.
2. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum ¾ - inch thick, no joints. Use full-size 4-foot by 8-foot sheet
3. Rough Hardware: Galvanized steel fasteners
   a) Use 1/2-inch by 5-1/2-inch button head carriage bolts to attach sign to posts.
   b) Secure with nuts and flat head washers.
   c) Cover button heads with white reflective film or paint to match sign background.
4. Paint and Primers: Exterior quality, two coats.
   a) White paint used to prime surfaces and to resist weathering shall be an industrial grade, fast-drying, oil-based paint with gloss finish.
   b) Paint all sign surfaces with this weather-protective paint prior to adding any adhesive applications.
   c) Sign background of color as selected.
   d) Lettering of contrasting colors as selected.

2.2 DESIGN-BUILD ENTITY-PROVIDED LAMINATED PROJECT IDENTIFICATION SIGNAGE

A. Design-Build Entity will provide and install additional poster-sized, laminated signs, approximately 12 sq. feet,. as needed on construction site fencing to supplement the plywood signs.

B. Content and composition of signage to match plywood signs.

C. Sign Materials
1. Poster paper, laminated. Metal grommets at each corner, for mounting.
2. Mounting Hardware:
   a) Use plastic tie wraps to secure the signage to the construction site perimeter chain link fence, at location(s) to be identified by Owner's construction manager.
   b) Use clear tape to secure the signage to surfaces where tie wraps will not work.

2.3 BRONZE PLAQUE

PROJECT IDENTIFICATION AND SIGNS

A. Provide one bronze plaque, installed on building exterior, exact location to be determined by District when shop drawing is submitted for review. Anchor studs shall be concealed on back of plaque. Size: ¾" thick x 24" x 20" with ½" radius corners. Raised letters.

B. Content and composition:
   a. An inspirational quote, not to exceed 250 characters.
   b. Name of Project.
   c. Date.
   d. Name of School and/or District.
   e. Names of members of the Board of Trustees.
   f. Name and title of one School Principal.
   g. Name and title of one District Superintendent.
   h. Name and roles of Architect and Contractor, or Design-Builder.
   i. Graphic Design, Style of Lettering: to be determined in coordination with District's Representative.

C. Sign Materials: Plaque shall be solid bronze.

PART 3 EXECUTION

3.1 INSTALLATION

A. Plywood Project Identification Signage
   a. Install project identification signage within twenty-one (21) days after date of Notice to Proceed.
   b. Place signs at locations as directed by the District representative. The District representative will provide sign placement instructions at the preconstruction meeting.
      i. Position the sign in such a manner as to be fully visible and readable to the general public.
      ii. Erect sign level and plumb.
   c. Post-mounted signs are preferred, but skid-mounted signs are allowed, especially for projects with noncontiguous locations where work progresses from one location to another. The skid structure shall be designed so that the sign will withstand a 60-mile-per-hour wind load directly to the face or back of the sign. Use stakes, straps, or ballast. Approval of the use of skid-mounted signs shall not release the Contractor from responsibility of maintaining project identification signage on the project site and shall not make the District responsible for security of such signs.

B. Laminated Project Identification Signage
   a. Install project identification signage within twenty-one (21) days after date of Notice to Proceed.
   b. Place signs at locations as directed by the District representative. The District representative will provide sign placement instructions at the preconstruction meeting.

i. Position the sign in such a manner as to be fully visible and readable to the general public.
ii. Erect sign level and plumb.

C. Bronze Plaque
   a. Install backing to support bronze plaque on building exterior wall.
   b. Use decorative finish hardware or fully concealed hardware, as directed by Architect.

3.2 MAINTENANCE AND REMOVAL OF PROJECT IDENTIFICATION SIGNAGE

A. Project identification signs shall be maintained to present a clean and neat look throughout the project duration. Maintain signs and supports, keep clean, repair deterioration and damage.

B. Remove signs, framing, supports and foundations at completion of Project and restore the area to a condition equal to or better than before construction.

END OF DOCUMENT

DOCUMENT 01 60 00

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 DOCUMENT INCLUDES

A. Products
B. Product Options and Substitutions
C. Product Delivery Requirements
D. Shipping Requirements
E. Product Storage and Handling Requirements

1.2 PRODUCTS

A. Products: New material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
C. For similar components, provide interchangeable components of the same manufacturer.

1.3 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Summary: This paragraph 1.3 describes procedures for selecting products and requesting substitutions of unlisted materials in lieu of materials named in the Specifications or approved for use in Addenda that were not already the subject of a Document 00 43 25 (Substitution Request Form) submittal as provided in Document 00 11 19 (Request for Proposals). For "or equal" items, it is the Design-Build Entity's responsibility to demonstrate that the items meet all of the requirements by following the Request for Substitution process.
B. Design-Build Entity's Options:
   1. For products specified only by reference standard: Select any product meeting that standard.
   2. For products specified by naming one or more products or manufacturers:
      a. Select products of any named manufacturer meeting specifications.
      b. If product becomes unavailable due to no fault of Design-Build Entity, submit Request for Substitution (RFS), including all information contained in this Document 01 60 00 and a fully executed Document 00 43 25 (Substitution Request Form), but using the term "Design-Build Entity" each place the term "Bidder" appears in that form.
C. Substitutions:
   1. Except as provided in Document 00 11 19 (Request for Proposal) with respect to "or equal" items, District will consider Design-Build Entity's substitution requests only when product becomes unavailable due to no fault of Design-Build Entity. Requests for review of proposed substitute items will not be accepted from anyone other than Design-Build Entity. The RFS shall state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice Design-Build Entity's achievement of Substantial Completion on time, and whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with District for work on the Project).
   2. Submit separate RFS (and nine copies) for each product and support each request with:
      a. Product identification.
      b. Manufacturer's literature.
      c. Samples, as applicable.
      d. Name and address of similar projects on which product has been used, and dates of installation.
      e. Name, address, and telephone number of manufacturer's representative or sales engineer.
      f. For construction methods: Detailed description of proposed method; drawings illustrating methods.

3. Where required, itemize a comparison of the proposed substitution with product specified and list significant variations including, but not limited to dimensions, weights, service requirements, and functional differences. If variation from product specified is not pointed out in submittal, variation will be rejected even though submittal was favorably reviewed. Identify all variations of the proposed substitute from that specified in the RFS and indicate available maintenance, repair, and replacement service.
4. State whether the substitute will require a change in any of the Contract Documents (or provisions of any other direct contract with District for work on the Project) to adapt the design of the proposed substitute, and whether or not incorporation or use of the substitute in connection with Work is subject to payment of any license fee or royalty. Submit data relating to changes in construction schedule.
5. Include accurate cost data comparing proposed substitution with product and amount of net change in Contract Sum including, but not limited to, an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by District in evaluating the proposed substitute. District may require Design-Build Entity to furnish additional data about the proposed substitute.
6. District will not consider substitutions for acceptance (or, in District's sole discretion, District may make Design-Build Entity solely responsible for all resulting costs, expenses and other consequences) when a substitution:
    a. Results in delay meeting construction Milestones or completion dates.
    b. Is indicated or implied on submittals without formal request from Design-Build Entity.
    c. Is requested directly by Subcontractor or supplier.
    d. Acceptance will require substantial revision of Contract Documents.
    e. Disrupts Design-Build Entity's job rhythm or ability to perform efficiently.
7. Substitute products shall not be ordered without written acceptance of District.
8. District will determine acceptability of proposed substitutions and reserve right to reject Proposals due to insufficient information.
9. Accepted substitutions will be evidenced by a Change Order. All Contract Documents requirements apply to Work involving substitutions.

D. Design-Build Entity's Representation and Warranty:
    1. Design-Build Entity's RFS constitute a representation and warranty that Design-Build Entity:
        a. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
        b. Will provide the same warranty for substitution as for specified product.
        c. Will coordinate installation and make other changes that may be required for Work to be complete in all respects.
        d. Waives claims for additional costs which may subsequently become apparent.
        e. Will compensate District for additional redesign costs associated with substitution.
        f. Will be responsible for Construction Schedule slippage due to substitution.
        g. Will be responsible for Construction Schedule delay due to late ordering of available specified products caused by requests for substitution that are subsequently rejected by District.

E. Will compensate District for all costs; including extra costs of performing Work under Contract Documents, extra cost to other contractors, and any claims brought against District, caused by late requests for substitutions or late ordering of products Liability of Substitutions
    a. Performance of substitution must be equal to item specified. If the substituted item fails to perform according to the specifications, replace with the originally specified item without extra compensation on request of the Architect any time within the guarantee period.
    b. The Design-Build Entity is responsible for the cost of any changes to other trades and additional Architectural and Consulting fees resulting from approved substitutions in mechanical equipment.
    c. The Design-Build Entity assumes full responsibility that alternate items and procedures will meet the project requirements and is responsible for cost of redesign and of

modifications to this and other parts of work caused by alternate items furnished under work in this Document. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contract has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the project will not be approved. No more than one proposed alternate will be considered for each item.

d. Alternate items installed without Engineer's approval will be replaced with specified items at Design Build Entity's expense.

F. District's Duties:
   1. Review Design-Build Entity's RFS with reasonable promptness.
   2. Notify Design-Build Entity in writing of decision to accept or reject requested substitution.

G. Administrative Requirements:
   1. Specified products, materials, or systems for Project may include engineering or on-file standards required by the regulatory agency. Design-Build Entity's substitution of products, materials or systems may require additional engineering, testing, reviews, approvals, assurances, or other information for compliance with regulatory agency requirements or both. Provide all agency approvals or other additional information required and pay additional costs for required District services made necessary by the substitution at no increase in Contract Sum or Contract Time, and as a part of substitution Proposal.

1.4 PRODUCT DELIVERY REQUIREMENTS

A. Deliver products in accordance with manufacturer's instructions.
B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.5 SHIPPING REQUIREMENTS

A. Preparation for Shipment. All equipment shall be suitably packaged to facilitate handling and to protect against damage during transit and storage. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. All equipment shall be protected from exposure to the elements and shall be kept dry at all times.
   1. Painted and coated surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted and coated surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of District.
   2. Grease and lubricating oil shall be applied to all bearings and similar items.

B. Shipping. Before shipping each item of equipment shall be tagged or marked as identified in the delivery schedule or on the Shop Drawings. Complete packing lists and bills of material shall be included with each shipment.

1.6 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store products only in staging area per provisions of Document 01 10 00 (Summary of Work).
B. Handle, store, and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate-controlled enclosures.
C. For exterior storage of fabricated products, place on appropriate supports, above ground.
D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
E. Store loose granular materials on solid flat surfaces in a well-drained area.
F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.
H. Without limiting the foregoing:

PRODUCT REQUIREMENTS

1. Design-Build Entity shall bear the responsibility for delivery of equipment, spare parts, special tools, and materials to the Site and shall comply with the requirements specified herein and provide required information concerning the shipment and delivery of the materials specified in Contract Documents. These requirements also apply to any subsuppliers making direct shipments to the Site. Acceptance of the equipment shall be made only after it is installed, tested, placed in operation and found to comply with all the specified requirements.
2. All items shall be checked against packing lists immediately on delivery to the Site for damage and for shortages. Damage and shortages shall be remedied with the minimum of delay.
3. No metalwork (miscellaneous steel shapes and reinforcing steel) shall be stored directly on the ground. Masonry products shall be handled and stored in a manner to hold breakage, chipping, cracking, and spalling to a minimum. Cement, lime, and similar products shall be stored off the ground on pallets and shall be covered and kept completely dry at all times. Pipe fittings and valves may be stored out of doors, but must be placed on wooden blocking. PVC pipe, geomembranes, plastic liner, and other plastic materials shall be stored off the ground on pallets and protected from direct sunlight.
4. Electrical equipment, and all equipment with antifriction or sleeve bearings shall be stored in weathertight structures maintained at a temperature above 60°F. Electrical equipment, controls, and insulation shall be protected against moisture and water damage. All space heaters furnished in equipment shall be connected and operated continuously.
5. Equipment having moving parts such as gears, bearings, and seals, shall be stored fully lubricated with oil, grease, etc., unless otherwise instructed by the manufacturer. Manufacturer's storage instructions shall be carefully followed by Design-Build Entity.
6. When required by the equipment manufacturer, moving parts shall be rotated a minimum of twice a month to ensure proper lubrication and to avoid metal to metal "welding". Upon installation of the equipment, Design-Build Entity shall, at the discretion of District, start the equipment at one-half load for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.
7. When required by the equipment manufacturer, lubricant shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment by Design-Build Entity at the time of acceptance.
8. Equipment and materials shall not show any pitting, rust, decay, or other deleterious effects of storage when installed in the Work.
9. In addition to the protection specified for prolonged storage, the packaging of spare units and spare parts shall be for export packing and shall be suitable for long-term storage in a damp location. Each spare item shall be packed separately and shall be completely identified on the outside of the container.
10. Handling. Stored items shall be laid out to facilitate their retrieval for use in the Work. Care shall be taken when removing the equipment for use to ensure the precise piece of equipment is removed and that it is handled in a manner than does not damage the equipment.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF DOCUMENT

DOCUMENT 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;

B. Special Conditions;

C. Site-Visit Certification.

1.02 REQUIREMENTS INCLUDED:

A. Design-Build Entity shall provide and pay for field engineering services required for the Project, including, without limitations:

(1) Survey work required in execution of the Project.

(2) Civil or other professional engineering services specified, or required to execute Design-Build Entity's construction methods.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:

A. Design-Build Entity shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

1.04 SURVEY REFERENCE POINTS:

A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.

B. Design-Build Entity shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Design-Build Entity shall:

(1) Make no changes or relocation without prior written notice to District and Architect.

(2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

(3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

1.05 RECORDS:

A. Design-Build Entity shall maintain a complete, accurate log of all control and survey work as it progresses.

1.06 SUBMITTALS:

A. Design-Build Entity shall submit name and address of Surveyor and Professional Engineer to District prior to its/their work on the Project.

B. On request of District, Design-Build Entity shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.

C. Design-Build Entity shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

PART 2 – PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 Design-Build Entity is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

3.02 Design-Build Entity is responsible for any re-surveying required by correction of nonconforming work.

END OF DOCUMENT

DOCUMENT 01 73 29

CUTTING AND PATCHING

1. PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;

B. Special Conditions;

C. Hazardous Materials Procedures and Requirements;

D. Hazardous Materials Certification;

E. Lead-Based Paint Certification;

F. Imported Materials Certification.

1.02 CUTTING AND PATCHING:

A. Design Build Entity shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:

(1) Make several parts fit together properly.

(2) Uncover portions of Work to provide for installation of ill-timed Work.

(3) Remove and replace defective Work.

(4) Remove and replace Work not conforming to requirements of Contract Documents.

(5) Remove Samples of installed Work as specified for testing.

(6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

(7) Attaching new materials to existing remodeling areas - including painting (or other finishes) to match existing conditions.

B. In addition to Contract requirements, upon written instructions from the District, Design Build Entity shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.

C. Design Build Entity shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

1.03 SUBMITTALS:

A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Design Build Entity shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:

(1) The Work of the District or other trades.

(2) Structural value or integrity of any element of Project.

(3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.

(4) Efficiency, operational life, maintenance or safety of operational elements.

(5) Visual qualities of sight-exposed elements.

B. Design Build Entity's Request shall also include:

(1) Identification of Project.

(2) Description of affected Work.

(3) Necessity for cutting, alteration, or excavations.

(4) Affects of Work on District, other trades, or structural or weatherproof integrity of Project.

(5) Description of proposed Work:

(a) Scope of cutting, patching, alteration, or excavation.

(b) Trades that will execute Work.

(c) Products proposed to be used.

(d) Extent of refinishing to be done.

(6) Alternates to cutting and patching.

(7) Cost Proposal, when applicable.

(8) The scheduled date the Design Build Entity intends to perform the Work and the duration of time to complete the Work.

(9) Written permission of other trades whose Work will be affected.

1.04 QUALITY ASSURANCE:

A. Design Build Entity shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.

B. Design Build Entity shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

1.05 PAYMENT FOR COSTS:

A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Design Build Entity and/or deducted from the Contract by the District.

B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval

of written Change Order. Design Build Entity shall provide written Cost Proposals prior to proceeding with cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Design Build Entity shall provide for replacement and restoration of Work removed. Design Build Entity shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Design Build Entity shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.

B. Materials to be cut and patched include those damaged by the performance of the Work.

PART 3 – EXECUTION

3.01 INSPECTION:

A. Design Build Entity shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Design Build Entity shall inspect conditions affecting installation of new products.

B. Design Build Entity shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

3.02 PREPARATION:

A. Design Build Entity shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.

B. Design Build Entity shall provide devices and methods to protect other portions of Project from damage.

C. Design Build Entity shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that may be exposed by cutting and patching Work. Design Build Entity shall keep excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION:

A. With respect to performance, Design Build Entity shall:

(1) Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.

(2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.

(3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage to settlement.

B. Design Build Entity shall employ original installer or fabricator to perform cutting and patching for:

(1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.

(2) Sight-exposed finished surfaces.

C. Design Build Entity shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.

D. Design Build Entity shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Design Build Entity shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Design Build Entity shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.

E. Design Build Entity shall restore Work which has been cut or removed. Design Build Entity shall install new products to provide completed Work in accordance with requirements
of the Contract Documents and as required to match surrounding areas and surfaces.

F. Design Build Entity shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

DOCUMENT 01 73 29

CUTTING AND PATCHING

END OF DOCUMENT

DOCUMENT 01 74 00

CLEANING

MPART 1 GENERAL

1.1 DOCUMENT INCLUDES

A. Progress Cleaning
B. Final Cleaning

1.2 PROGRESS CLEANING

A. Design-Build Entity shall perform periodic cleaning to ensure that any streets and other District and public properties are maintained free from accumulation of waste materials, dust, mud, and debris.
B. Where required, Design-Build Entity shall wet down surfaces to lay dust and prevent the blowing of dust to nearby residences or public properties.
C. Design-Build Entity shall keep all streets clean and free of dust, mud, and debris resulting from Design-Build Entity's operations. Daily cleanup throughout the job will be necessary as Design-Build Entity progresses with its Work, but extra attention to cleanup shall be made prior to weekends and holidays. Without limiting the foregoing, Design-Build Entity shall remove trench spoil along traveled ways daily; grade and vacuum broom surfaces initially where applicable and later water flush with high-pressure sprays, being careful to avoid downstream contamination.
D. All dust, mud, spoils, and construction debris shall be removed daily from all roadways, ditches, shoulders, and private property (fills or spoils placed on private property at private property owner's written request excepted).
E. Disposal of Materials:
    1. As part of the scope of Work included within the Contract Sum, Design-Build Entity shall be fully responsible for disposing of all construction debris, dirt and spoils resulting from the Work.
    2. All waste materials, debris, dirt and rubbish shall be disposed of at sites to be chosen by Design-Build Entity in accordance with applicable local, state, and federal regulations.
    3. Design-Build Entity is cautioned that the County of Santa Clara and cities within the county have regulations governing the disposal of rubble, broken pavement, and similar materials.
    4. Design-Build Entity shall become familiarized with the requirements of the agency having jurisdiction over any contemplated disposal site and shall comply with all such requirements.
    5. The Design-Build Entity shall estimate, log and submit regular reports to the District, an estimate of quantities (e.g. tonnage) of waste materials disposed of for compliance with AB75. Documentation requirements including the nature of materials, destination, volume and tonnage, shall be submitted as follows:
        a. Up-to-date copies of the Waste Reporting Log (Exhibit A of this Document 01 74 00) shall be submitted with each payment application per Document 01 29 00 (Payments and Completion) paragraph 1.7.C.8.
        b. The Design-Build Entity shall submit a cumulative report summarizing the nature of materials, destination, volume and tonnage of materials disposed for the preceding calendar year to the District's Representative by January 31st of each year or at the end of the project as part of the contract closeout.
F. All excess soil from performance of Work shall be disposed at sites to be chosen by Design-Build Entity in accordance with applicable local, state, and federal regulations. If Design-Build Entity elects to dispose of soil on any private property, prior to any dumping, a letter allowing such dumping shall be obtained from the property owner and presented to District. Design-Build Entity is advised that the property owner is required to obtain a fill permit from the applicable government agency (ies). In addition, placement of fill in wetland areas is subject to permit procedures of the US Army Corps of Engineers. At the completion of Work, a letter from each affected property owner will be required releasing Design-Build Entity, Santa Clara County, District and any District consultant from future liability.
G. If Design-Build Entity does not properly clean the Site, in the opinion of District, then District shall have the option of using outside equipment to perform the cleanup and such cost will be withheld from the Contract Sum.

H. Design-Build Entity will take care to mitigate dust during interior renovation activities through proper use of dust controls. Dust controls will include, but not be limited to: dust barricades, walk-off mats, negative air machines and daily custodial clean-up employed by the Contract and at not additional cost to the District

1.3 FINAL CLEANING

A. Design-Build Entity shall execute final cleaning prior to final inspection, using only properly skilled workers.
B. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from exposed interior and exterior finished surfaces.
C. Repair, patch, and touch up marred surfaces to match adjacent finishes.
D. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
E. Clean equipment and fixtures to a sanitary condition, clean or replace filters of mechanical equipment operated during construction, clean ducts, blowers and coils of units operated without filters during construction.
F. Clean Site; mechanically sweep paved areas.
G. Remove waste and surplus materials, rubbish, and construction facilities from Site.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

WASTE REPORTING LOG FOLLOWS ON NEXT PAGE

DOCUMENT 01 74 00

CLEANING

EXHIBIT A

WASTE REPORTING LOG

Yerba Buena High School New Student Union & Quad Modernization Project
Z-060-601

To: The East Side Union High School District
Attention: **Mike Hiddleson**
830 North Capitol Ave, San Jose, CA 95133
Telephone: (408) 869-8369 **Fax:** (408) 244-2220

From: _____
_____
_____

DISPOSAL DATE	NATURE OF MATERIALS DISPOSED	DESTINATION	VOLUME	TONNAGE	% RECYCLED

DOCUMENT 01 74 00

CLEANING

- Per Section 01 29 00 (Payments and Completion) paragraph 1.7.C.8. a current and up-to-date copy of this log is to be submitted with each Application for Payment.

- Per Section 01 74 00 (Cleaning) paragraph 1.2.E.5 a summary report for each calendar year shall be submitted to the District's Representative by January 31st of each year or at the end of the project as part of the contract closeout. The data shall be summarized by 'Nature of Materials Disposed' and 'Destination' for the entire calendar year.

DOCUMENT 01 77 00

CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Description of contract closeout procedures including:
      a. Removal of Temporary Construction Facilities
      b. Substantial Completion
      c. Final Completion
      d. Final Cleaning
      e. Project record documents
      f. Design-Build Entity shall comply with all applicable requirements in Section 01 78 39 (Project Record Documents).
      g. Project Guarantee
      h. Warranties
      i. DEMONSTRATION AND TRAINING

Design-Build Entity shall comply with all applicable requirements in Section 01 79 00 (Demonstration and Training).

      j. Turn-In
      k. Release of Claims
      l. Fire Inspection Coordination
      m. Building Inspection Coordination
      n. Health Inspection Coordination

1.2 REMOVAL OF TEMPORARY CONSTRUCTION FACILITIES

A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.
B. Clean and repair damage caused by installation or use of temporary facilities.
C. Restore permanent facilities used during construction to specified condition.
D. Comply with paragraph 1.12 of Section 01 51 00 (Temporary Facilities and Controls).

1.3 SUBSTANTIAL COMPLETION

A. When Design-Build Entity considers Work or designated portion of the Work as Substantially Complete, submit written notice to District's Representative, with list of items remaining to be completed or corrected.
B. Within reasonable time, District's Representative will inspect to determine status of completion.
C. Should District's Representative determine that Work is not Substantially Complete, District will promptly notify Design-Build Entity in writing, listing all defects and omissions.
D. Remedy deficiencies and send a second written notice of Substantial Completion. District will reinspect the Work. If deficiencies previously noted are not corrected on reinspection, then Design-Build Entity shall pay District's cost of the reinspection.
E. When District's Representative determines that Work is Substantially Complete, District will issue a Certificate of Substantial Completion, accompanied by Design-Build Entity's list of items to be completed or corrected as verified by District.
F. Manufactured units, equipment and systems that require startup must have been started up and run for periods prescribed by District before a Certificate of Substantial Completion will be issued.
G. A punch list examination will be performed upon Substantial Completion. One follow-up review of punch list items for each discipline will be provided. If further Site visits are required to review punch

list items due to incompleteness of the Work by Design-Build Entity, Design-Build Entity will reimburse District for costs associated with these visits.

H. District may enlist Consultants to assist with the above activities.

1.4 FINAL COMPLETION

A. Final Completion occurs when Work meets requirements for District's Final Acceptance. When Design-Build Entity considers Work is Finally Complete, submit written certification that:
   1. Design-Build Entity has inspected Work for compliance with Contract Documents, and all requirements for Final Acceptance have been met.
   2. Except for Design-Build Entity maintenance after Final Acceptance, Work has been completed in accordance with Contract Documents and deficiencies listed with Certificate of Substantial Completion have been corrected. Equipment and systems have been tested in the presence of District, and are operative.
   3. Work is complete and ready for final inspection.

B. In addition to submittals required by Contract Documents, provide submittals required by governing authorities and submit final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.

C. When District's Representative find Work is acceptable and final closeout submittals are complete, District's Representative will issue final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Order. Should District determine that Work is incomplete or defective:
   1. District promptly will so notify Design-Build Entity, in writing, listing the incomplete or defective items.
   2. Promptly remedy the deficiencies and notify the District when it is ready for reinspection.
   3. When District determines that the Work is acceptable under the Contract Documents, District will request Design-Build Entity to make closeout submittals.

D. Final adjustments of accounts:
   1. Submit a final statement of accounting to District, showing all adjustments to the Contract Sum and complete and execute Document 00 65 73 (Agreement and Release of Any and All Claims).
   2. If so required, District shall prepare a final Change Order for submittal to Design-Build Entity, showing adjustments to the Contract Sum that were not previously made into a Contract Modification.

E. District may enlist Consultants to assist with the above activities.

1.5 FINAL CLEANING

Design-Build Entity shall comply with all applicable requirements in Section 01 74 00 (Cleaning).

1.6 PROJECT RECORD DOCUMENTS

Design-Build Entity shall comply with all applicable requirements in Section 01 78 39 (Project Record Documents).

1.7 PROJECT GUARANTEE

A. Requirements for Design-Build Entity's guarantee of completed Work are included in Article 9 of Document 00 71 00 (General Conditions). Guarantee Work done under Contract against failures, leaks, or breaks or other unsatisfactory conditions due to defective equipment, materials, or workmanship, and perform repair work or replacement required, at Design-Build Entity's sole expense, for period of one year from date of Final Acceptance.

B. Neither recordation of Final Acceptance nor final certificate for neither payment nor provision of the Contract or partial or entire use or occupancy of premises by District shall constitute acceptance of Work not done in accordance with Contract Documents nor relieve Design-Build Entity of liability in respect to express warranties or responsibility for faulty materials or workmanship.
C. District may make repairs to defective Work as set forth in Document 00 71 00 (General Conditions), paragraph 9.3.

D. If, after installation, operation, or use of materials or equipment to be provided under Contract proves to be unsatisfactory to District, District shall have right to operate and use materials or equipment until said materials and equipment can, without damage to District, be taken out of service for correction or replacement. Period of use of defective materials or equipment pending correction or replacement shall in no way decrease guarantee period required for acceptable corrected or replaced items of materials or equipment.
E. Nothing in this Section shall be construed to limit, relieve, or release Design-Build Entity's, Subcontractors', and equipment suppliers' liability to District for damages sustained as result of latent defects in equipment caused by negligence of suppliers' agents, employees, or Subcontractors. Stated in another manner, warranty contained in the Contract Documents shall not amount to, nor shall it be deemed to be, waiver by District of any rights or remedies (or time limits in which to enforce such rights or remedies) it may have for defective workmanship or defective materials under laws of this State pertaining to acts of negligence.

1.8 WARRANTIES

A. Execute Design-Build Entity's submittals and assemble warranty documents, and installation, operations and maintenance manuals described in Section 01 32 19 (Submittal Procedures), executed or supplied by Subcontractors, suppliers, and manufacturers.
   1. Provide table of contents and assemble in 8½ inches by 11 inches three-ring binder with durable plastic cover, appropriately separated and organized.
   2. Include contact names and phone numbers for District personnel to call during warranty period.
   3. Assemble in Specification Section order.
B. Submit material prior to final application for payment.
   1. For equipment put into use with District's permission during construction, submit within 14 Days after first operation.
   2. For items of Work delayed materially beyond Date of Substantial Completion, provide updated submittal within 14 Days after acceptance, listing date of acceptance as start of warranty period.
C. Warranties are intended to protect District against failure of Work and against deficient, defective and faulty materials and workmanship, regardless of sources.
D. Limitations: Warranties are not intended to cover failures that result from the following:
   1. Unusual or abnormal phenomena of the elements
   2. Vandalism after Substantial Completion
   3. Insurrection or acts of aggression including war
E. Related Damages and Losses: Remove and replace Work which is damaged as result of defective Work, or which must be removed and replaced to provide access for correction of warranted Work.
F. Warranty Reinstatement: After correction of warranted Work, reinstate warranty for corrected Work to date of original warranty expiration or to a date not less than one year after corrected Work was done, whichever is later.
G. Replacement Cost: Replace or restore failing warranted items without regard to anticipated useful service lives.
H. Warranty Forms: Submit drafts to District for approval prior to execution. Forms shall not detract from or confuse requirements or interpretations of Contract Documents.
   1. Warranty shall be countersigned by manufacturers.
   2. Where specified, warranty shall be countersigned by Subcontractors and installers.

CONTRACT CLOSEOUT

I. Rejection of Warranties: District reserves right to reject unsolicited and coincidental product warranties that detract from or confuse requirements or interpretations of Contract Documents.

J. Term of Warranties: For materials, equipment, systems, and workmanship, warranty period shall be one year minimum from date of Final Completion of entire Work except where:

1. Detailed specifications for certain materials, equipment or systems require longer warranty periods.

2. Materials, equipment or systems are put into beneficial use of District prior to Final Completion as agreed to in writing by District.

K. Warranty of Title: No material, supplies, or equipment for Work under Contract shall be purchased subject to any chattel mortgage, security agreement, or under a conditional sale or other agreement by which an interest therein or any part thereof is retained by seller or supplier. Design-Build Entity warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver premises, together with improvements and appurtenances constructed or placed thereon by Design-Build Entity, to District free from any claim, liens, security interest, or charges, and further agrees that neither Design-Build Entity nor any person, firm, or corporation furnishing any materials or labor for any Work covered by Contract shall have right to lien upon premises or improvement or appurtenances thereon. Nothing contained in this paragraph, however, shall defeat or impair right of persons furnishing materials or labor under bond given by Design-Build Entity for their protection or any rights under law permitting persons to look to funds due Design-Build Entity in hands of District.

1.9 DEMONSTRATION AND TRAINING

Design-Build Entity shall comply with all applicable requirements in Section 01 79 00 (Demonstration and Training).

1.10 TURN-IN

Contract Documents will not be closed out and final payment will not be made until all personnel Identification Media, vehicle permits, keys issued to Design-Build Entity during prosecution of Work, and letters from property owners pursuant to paragraph 1.2.F of Document 01 74 00 (Cleaning) are turned in to District.

1.11 RELEASE OF CLAIMS

Contract Documents will not be closed out and final payment will not be made until Document 00 65 73 (Agreement and Release of Any and All Claims) is completed and executed by Design-Build Entity and District.

1.12 FIRE INSPECTION COORDINATION

Coordinate fire inspection and secure sufficient notice to District to permit convenient scheduling (if applicable).

1.13 BUILDING INSPECTION COORDINATION

Coordinate with District a final inspection for the purpose of obtaining an occupancy certificate (if applicable).

1.14 HEALTH INSPECTION COORDINATION

Coordinate health inspections with Santa Clara County Department of Environmental Health for the purpose of obtaining an occupancy certificate (if applicable).

DOCUMENT 01 77 00

CONTRACT CLOSEOUT

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF DOCUMENT

DOCUMENT 01 78 36

WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Warranty/Guarantee/Indemnity Information;

B. Special Conditions.

1.02 WARRANTIES

A. Execute Design-Build Entity's submittals and assemble warranty documents, and installation, operations and maintenance manuals described in Document 01 32 19 (Submittal Procedures), executed or supplied by Subcontractors, suppliers, and manufacturers.
   1. Provide table of contents and assemble in 8½ inches by 11 inches three-ring binder with durable plastic cover, appropriately separated and organized.
   2. Include contact names and phone numbers for District personnel to call during warranty period.
   3. Assemble in Specification Section order.

B. Provide all submittals, warranties, and operations and maintenance manuals referenced in paragraph 1.02.A of this Document 01 78 36 in an electronic format acceptable to the District.

C. Submit material prior to final application for payment.
   1. For equipment put into use with District's permission during construction, submit within 14 Days after first operation.
   2. For items of Work delayed materially beyond Date of Substantial Completion, provide updated submittal within 14 Days after acceptance, listing date of acceptance as start of warranty period.

D. Warranties are intended to protect District against failure of Work and against deficient, defective and faulty materials and workmanship, regardless of sources.

WARRANTIES

E. Limitations: Warranties are not intended to cover failures that result from the following:
   1. Unusual or abnormal phenomena of the elements
   2. Vandalism after Substantial Completion
   3. Insurrection or acts of aggression including war.

F. Related Damages and Losses: Remove and replace Work which is damaged as result of defective Work, or which must be removed and replaced to provide access for correction of warranted Work.

G. Warranty Reinstatement: After correction of warranted Work, reinstate warranty for corrected Work to date of original warranty expiration or to a date not less than one year after corrected Work was done, whichever is later.

H. Replacement Cost: Replace or restore failing warranted items without regard to anticipated useful service lives.

I. Warranty Forms: Submit drafts to District for approval prior to execution. Forms shall not detract from or confuse requirements or interpretations of Contract Documents.
   1. Warranty shall be countersigned by manufacturers.
   2. Where specified, warranty shall be countersigned by Subcontractors and installers

J. Rejection of Warranties: District reserves right to reject unsolicited and coincidental product warranties that detract from or confuse requirements or interpretations of Contract Documents.

K. Term of Warranties: For materials, equipment, systems, and workmanship, warranty period shall be one year minimum from date of phased Completion of Work except where:
   1. Detailed specifications for certain materials, equipment or systems require longer warranty periods.
   2. Materials, equipment or systems are put into beneficial use of District prior to Final Completion as agreed to in writing by District.

L. Warranty of Title: No material, supplies, or equipment for Work under Contract shall be purchased subject to any chattel mortgage, security agreement, or under a conditional sale or other agreement by which an interest therein or any part thereof is retained by seller or supplier. Design-Build Entity warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver premises, together with improvements and appurtenances constructed or placed thereon by Design-Build Entity, to District free from any claim, liens, security interest, or charges, and further agrees that neither Design-Build Entity nor any person, firm, or corporation furnishing any materials or labor for any Work covered by Contract shall have right to lien upon premises or improvement or appurtenances thereon. Nothing contained in this paragraph, however, shall defeat or impair right of

persons furnishing materials or labor under bond given by Design-Build Entity for their protection or any rights under law permitting persons to look to funds due Design-Build Entity in hands of District.

PART 2 - PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Document Includes: Administrative and procedural requirements for Project Record Documents.
B. Project Record Documents required include:
   1. Marked-up copies of Drawings
   2. Marked-up copies of Shop Drawings
   3. Newly prepared Drawings
   4. Marked-up Product Data submittals
   5. Field records, such as photographs, for variable and concealed conditions
   6. Record information on Work that is recorded only schematically
   7. Maintenance forms for major equipment
C. Specific Project Record Documents requirements that expand requirements of this Document are included in the individual Documents of Divisions 2 through 60.
D. General Project closeout requirements are included in Document 01 77 00 (Contract Closeout).
E. Maintenance of Documents and Samples:
   1. Store Project Record Documents and Samples in the field office apart from Contract Documents used for construction.
   2. Do not permit Project Record Documents to be used for construction purposes.
   3. Maintain Project Record Documents in good order and in a clean, dry, legible condition.
   4. Make Documents and Samples available at all times for inspection by District.
F. Dedicate one full size set of the Drawings and one Project Manual for use for recording as-built conditions.

1.2 PROJECT RECORD DRAWINGS

A. Mark-up Procedure: During the construction period, maintain a set of black line prints of Contract Drawings and Shop Drawings for Project Record Documents purposes. Label each document (on first sheet or format page) "PROJECT RECORD" in 2-inch high printed letters. Keep record documents current. Note: A reference by number to a Change Order, CCD, RFI, RFQ, RFP, Field Order or other such document is not acceptable as sufficient record information on any record document. Do not permanently conceal any Work until required information has been recorded.
   1. Mark these Drawings to indicate the actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:
      a. Dimensional changes to the Drawings
      b. Revisions to details shown on the Drawings
      c. Depths of various elements of foundation in relation to main floor level or survey datum
      d. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements
      e. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure
      f. Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stub outs, invert elevations, and similar items
      g. Actual numbering of each electrical circuit
      h. Field changes of dimension and detail
      i. Revisions to routing of piping and conduits
      j. Revisions to electrical circuitry
      k. Actual equipment locations
      l. Duct size and routing
      m. Changes made by Change Order or CCD

n. Details not on original Contract Drawings

2. Mark completely and accurately Project Record Drawing prints of Contract Drawings or Shop Drawings, whichever is the most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
3. Mark Project Record Drawing sets with red, erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.
4. Mark important additional information that was either shown schematically or omitted from original Drawings.
5. Note CCD numbers; alternate numbers, Change Order numbers, and similar identification.
6. Responsibility for Mark-up: Where feasible, the individual or entity who obtained Project Record Drawing data, whether the individual or entity is the installer, Subcontractor, or similar entity, is required to prepare the mark-up on Project Record Drawings.
   a. Accurately record information in an understandable and legible drawing technique.
   b. Record data as soon as possible after it has been obtained. In the case of concealed installations, record and check the mark-up prior to concealment.

B. Preparation of Record Drawings: Immediately prior to inspection for Certification of Substantial Completion, review completed marked-up Project Record Drawings with District, Inspector of Record and Architect of Record to consolidate and ensure accuracy of information. Once accuracy of information is confirmed, prepare and submit a full electronic set, in PDF format, of as-built Contract Drawings and Shop Drawings.
   1. Incorporate changes and additional information previously marked on print sets. Delete, redraw, and add details and notations where applicable. Identify and date each Drawing; include the printed designation "PROJECT RECORD DRAWING" and the date prepared in a prominent location on each Drawing.
   2. Distribution: Whether or not changes and additional information were recorded, organize and bind original marked-up set of prints that were maintained during the construction period into manageable sets. Bind the set with durable paper cover sheets, with appropriate identification, including titles, dates, and other information on cover sheets, and submit to District.
C. In addition to requirements of this Document, comply with supplemental requirements of other Divisions 2 through 60.
   1. The Specifications may require the preparation of large scale, detailed layout drawings of the Work of certain Divisions. These layout drawings are not Shop Drawings as defined by Document 00 71 00 (General Conditions), but together with Shop Drawings or layout drawings of all other affected Documents are used to check, coordinate, and integrate the work of the various Documents.
   2. Include these layout drawings as part of the Project Record Documents.

1.3 PROJECT RECORD SPECIFICATIONS

A. During the construction period, maintain one copy of the Project Specifications, including addenda and modifications issued, for Project Record Documents purposes.
B. Mark the Project Record Specifications to indicate the actual installation where the installation varies substantially from that indicated in Specifications and Modifications issued. Note related Project Record Drawing information, where applicable. Give particular attention to substitutions, selection of product options, Change Order and Construction Change Directive work, and information on concealed installation that would be difficult to identify or measure and record later.
   1. In each Specification Section where products, materials or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.
   2. Record the name of the manufacturer, catalog number, supplier and installer, and other information necessary to provide a record of selections made and to document coordination with Project Record Product Data submittals and maintenance manuals.
   3. Note related Project Record Product Data, where applicable, for each principal product specified, indicate whether Project Record Product Data has been submitted in maintenance manual instead of submitted as Project Record Product Data.

4. Upon completion of mark-up, submit Project Record Specifications to District for District's records.

1.4 PROJECT RECORD PRODUCT DATA

A. During the construction period, maintain one copy of each Project Record Product Data submittal for Project Record Document purposes.
   1. Mark Project Record Product Data to indicate the actual product installation where the installation varies substantially from that indicated in Project Record Product Data submitted. Include significant changes in the product delivered to the Site, and changes in manufacturer's instructions and recommendations for installation.
   2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   3. Note related Change Orders and mark-up of Project Record Drawings, where applicable.
   4. Upon completion of mark-up, submit a complete set of Project Record Product Data to District for District's records.
   5. Where Project Record Product Data is required as part of maintenance manuals, submit marked-up Project Record Product Data as an insert in the manual, instead of submittal as Project Record Product Data.
   6. Design-Build Entity is responsible for mark-up and submittal of Project Record Product Data for its own Work.

B. Material, Equipment, and Finish Data:
   1. Provide data for primary materials, equipment and finishes as required under each Specification Section.

Submit three (3) hard copy sets and one (1) digital copy on USB prior to final inspection, bound in 8-1/2 inches by 11 inches three-ring binders with durable plastic covers; provide typewritten table of contents for each volume. Provide project identification information on binder covers and spines.

C. Arrange by Specification Section number and give names, addresses, and telephone numbers of Subcontractors and suppliers. List:
   a. Trade names.
   b. Model or type numbers.
   c. Assembly diagrams.
   d. Operating instructions.
   e. Cleaning instructions.
   f. Maintenance instructions.
   g. Recommended spare parts.
   h. Product data.

1.5 MISCELLANEOUS PROJECT RECORD SUBMITTALS

A. Refer to other Specification Sections for miscellaneous record keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified, ready for use and reference. Submit to the District for District's electronic records, in Adobe PDF format. Categories of requirements resulting in miscellaneous records include, but are not limited to, the following:
   1. Field records on excavations and foundations
   2. Field records on underground construction and similar work
   3. Survey showing locations and elevations of underground lines
   4. Invert elevations of drainage piping
   5. Surveys establishing building lines and levels
   6. Authorized measurements utilizing unit prices or allowances
   7. Records of plant treatment
   8. Ambient and substrate condition tests
   9. Certifications received in lieu of labels on bulk products
   10. Batch mixing and bulk delivery records
   11. Testing and qualification of tradespersons

12. Documented qualification of installation firms
13. Load and performance testing
14. Inspections and certifications by governing authorities
15. Leakage and water-penetration tests
16. Fire resistance and flame spread test results
17. Final inspection and correction procedures
18. Final As-Built Construction Schedule

1.6 INSTALLATION, OPERATIONS AND MAINTENANCE MANUALS

A. The Design-Build Entity shall compile O&M manuals for every piece of equipment and building operating or electrical system, commissioned or not, with the following formats:

1. Quantity: as specified in Document 01 32 19 (Submittal Procedures), Paragraph 1.2.R.3 (unless more are required by the technical specifications).

2. Hard Media Format:
   (a) Size: $8^1/_2$ x 11 inch, 3 ring loose-leaf binders. Use as many binders as required for each element as listed below. Do not overload binders.
   (b) Binding: Bind in stiff, metal-hinged, three-ring binder(s) with standard three-hole punching. Binders shall be 3-inch maximum. Use white or black colored binders with integrated clear plastic covers to enable insertion of binder titles.
   (c) Sheet lifters: Provide plastic sheet lifters prior to first page and following last page.
   (d) Binder titles: Include the following title on front and spine of binder:
   YERBA BUENA HIGH SCHOOL STUDENT UNION & QUAD MODERNIZATION (2015)
   (e) Sheet Size: 8½ x 11 inch
   (f) Drawing Size: Reduce drawings or diagrams to an 8½ x 11 inch or 11 x 17 inch size. However, where reduction is not practical to ensure readability, fold larger drawings separately and place in vinyl envelopes bound into the binder. Identify vinyl envelopes with drawing numbers.
   (g) Dividers: Use dividers with permanently marked tabs of card stock to separate each section and sub section. Tab labels shall not be handwritten. Use a main tab for each specification section. Behind the section number tab there shall be the equipment ID tag sub-tab for each piece of major equipment (or group, if small or numerous). These sub-tabs shall be similar to the specification number tabs but of a different color.
   (h) Contents
      (1) Title page, which shall be a duplicate of front binder title
      (2) Table of Contents
      (3) Equipment Sections and Sub sections
         (i) Contractor. The first page behind the equipment tab shall be the contractor's name, address and telephone number of the manufacturer and installing contractor and the 24-hour number for emergency service for all equipment in this section, identified by equipment.
         (ii) Submittal and Product Data. This section shall include all approved submittal data, cut sheets, data base sheets and appropriate shop drawings. If submittal was not required for approval, descriptive product data shall be included.
         (iii) Operation and Maintenance Instructions. These shall be the written manufacturer's data with the model and features of this installation clearly marked and edited to omit reference to products or data not applicable to this installation. This section shall include data on the following:

PROJECT RECORD DOCUMENTS

1. Model number, serial number and nameplate data for each piece of equipment and any subcomponent.
2. Installation, startup and break-in instructions.
3. All starting, normal shutdown, emergency shutdown, manual operation and normal and emergency operating procedures and data, including any special limitations.
    i. Step-by-step procedure for system startup, including a pre-start checklist. Refer to controls and indicators by nomenclature consistent with that used on panels and in control diagrams.
    ii. Sequence of operation, with detailed instruction in proper sequence, for each mode of operation (i.e., day-night; staging of equipment).
    iii. Emergency operation: If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under these conditions. Include here only those alternate methods of operations (from normal) which the operator can follow when there is a partial failure or malfunctioning of components, or other unusual condition.
    iv. Shutdown procedure: Include instructions for stopping and securing the equipment after operation. If a particular sequence is required, give step-by-step instructions in that order.
4. O&M and installation instructions that were shipped with the unit.
5. Preventative and corrective maintenance, with service procedures and schedules:
    i. Provide a schedule for preventive maintenance in a printed format and an electronic format compatible with District's system. State, preferably in tabular form, the recommended frequency of performance for each preventive maintenance task, cleaning, inspection and scheduled overhauls.
    ii. Cleaning: Provide instructions and schedules for all routine cleaning and inspection with recommended lubricants.
    iii. Inspection: If periodic inspection of equipment is required for operation, cleaning or other reasons, indicate the items to be inspected and give the inspection criteria for: motors; controls; filters and any other maintenance items.
    iv. Provide instructions for minor repairs or adjustments required for preventive maintenance routines. Identify test points and give values for each. Include sensor calibration requirements and methods by sensor type.
    v. Corrective maintenance instructions shall be predicated upon a logical effect-to-cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime.
    vi. Troubleshooting: Troubleshooting tables, charts, or diagrams shall be used to present specified procedures. A guide to this type shall be a three-column chart. The columns shall be titled: malfunction, probable cause and recommended action.
    vii. Repair and Replacement: Indicate repair and replacement procedures most likely to be required in the maintenance of the equipment.
    viii. A list of recommended spare parts with a price list and a list of spare parts provided under this Contract.

ix. Outline, cross-section, and assembly drawings; engineering data; and electrical diagrams, including elementary diagrams, labeled wiring diagrams, connection diagrams, word description of wiring diagrams and interconnection diagram

6. Safety Precautions: This subsection shall comprise a listing of safety precautions and instructions to be followed before, during and after making repairs, adjustments or routine maintenance.
7. Manufacturers' brochures (including controls): Manufacturers' descriptive literature covering devices and equipment used in the system, together with illustrations, exploded views and renewal parts lists. Manufacturers' standard brochures and parts list shall be corrected so that information applying to the actual installed equipment is clearly defined.
8. Supply any special tools required to service or maintain the equipment.
9. Performance data, ratings and curves.
10. Warranty and guarantee, which clearly lists conditions to be maintained to keep warranty in effect and conditions that would affect the validity of the warranty.
11. Any service contracts issued.

(4) Supplemental Data. Prepare written text and/or special drawings to provide necessary information, where manufacturer's standard printed data is not available and information is necessary for a proper understanding and operation and maintenance of equipment or systems, or where it is necessary to provide additional information to supplement data included in the manual or project documents.

(5) Control Diagrams/Drawings. Include the as-built control diagrams/drawings for the piece of equipment and its components, including full points list, full print out of all schedules and set points after testing and acceptance of the system, and copies of all checkout tests and calibrations performed by the Design-Build Entity (not commissioning tests).

(6) Specifications. This section is comprised of the component or system specification section copied and inserted complete with all addenda.

(7) System Description. This section shall include the individual equipment portion of the overall system Design Basis Narrative.

3. Electronic Media Format: Electronic media format shall be Adobe pdf, with chapter markers and/or bookmarks inserted in place of the equivalent hard copy section tabs. Electronic copy shall include all tables, charts, drawings, codes and all other matters reflected in hard copies. Electronic media files shall be delivered on a unique DVD.

4. A separate manual or chapter shall be provided for each applicable system as follows where applicable:
   (a) Chillers
   (b) Cooling Towers
   (c) Boilers
   (d) Pumps
   (e) Air Handling Units (include sequence of operation, one line diagram and area served in a plastic pouch for mounting on equipment or in equipment room)
   (f) Exhaust Fans
   (g) Supply Air Fans (excluding Air Handling Units)
   (h) Plumbing and Drainage Systems/Equipment
   (i) Emergency Generator Systems
   (j) UPS

(k) Fire Protection Systems
(l) Fire Alarm System
(m) Valves and Pipe Specialties (include valve identification chart)
(n) Variable Frequency Drives (VFD)
(o) Smoke Control Systems
(p) Water Treatment System
(q) Elevator Systems
(r) Lighting Systems and Controls (interior, exterior and airfield)
(s) Switchgear, Transformers, Panel boards, Motor Control Centers and Motor Starters
(t) Lightning Protection and Surge Suppression Systems
(u) Public Address, Closed Circuit TV, Communication and Telephone Systems
(v) Security System
(w) Building Management/Temperature Control System (BMS)
(x) Fuel System
(y) Doors and Hardware.
(z) Power monitoring systems
(aa) HVAC, Testing Adjusting, and Balancing

1.7 COMPUTER PROGRAMS

A. When any equipment requires operation by computer programs, submit copy of program on appropriate CD or USB, plus a hard-copy and an electronic copy (Adobe .PDF format) of all user manuals and guides for operating the programs and making changes in the programs for upgrading and expanding the databases. Program shall be Windows 7 compatible. Provide required licenses to District at no additional cost.

1.8 DISTRICT'S RECOURSE

A. If Design-Build Entity is not able to provide project record documents in specified formats, District and Design-Build Entity shall negotiate a credit back to the District for this work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 RECORDING

Post changes and modifications to the Contract Documents as they occur. Do not wait until the end of the Project. District may periodically review Project Record Documents to assure compliance with this requirement. Construction Manager and IOR will review these as a condition of monthly payment.

3.2 SUBMITTAL

A. At completion of Project, deliver Project Record Documents to District, per Document 01 32 19 Submittal Procedures.
B. Accompany submittal with transmittal letter containing:
   1. Date
   2. Project title and number
   3. Design-Build Entity's name and address
   4. Number and title of each Project Record Document
   5. Certification that each document as submitted is complete and accurate, and signature of Design-Build Entity or Design-Build Entity's authorized representative.

DOCUMENT 01 78 39

PROJECT RECORD DOCUMENTS

END OF DOCUMENT

DOCUMENT 01 79 00

DEMONSTRATION AND TRAINING

PART 1 -GENERAL

1.1 SUMMARY

A. Document includes administrative and procedural requirements for instructing District's facilities personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

1.2 RELATED SECTIONS

A. Other Division 1 Specification Sections.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Prior to Startup and Testing submit electronic copy of outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
2. Obtain approval of Architect/Engineers of Record prior to submission to District Representative.

1.4 CLOSEOUT SUBMITTALS

A. Attendance Record: For each training module, submit list of participants and length of instruction time.

B. At completion of training, submit complete training manual(s) for District's use PDF electronic file format on compact disc.

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that

indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Document 01 40 00 (Quality Requirements), experienced in operation and maintenance procedures and training.

1.6 COORDINATION

A. Coordinate instruction schedule with District Representative. Adjust schedule as required to reasonably accommodate the schedules of participants, minimize disrupting operations and to ensure availability of District's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect/Engineers of Record and District Representative.

PART 2 -PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instructional program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections, and as specified in Part 3 of this Document "DEMONSTRATION AND TRAINING."

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basic descriptive information for each piece of equipment.
2. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Design-Builder is delegated design responsibility.

c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.
i. Additional data, as required by Design-Builder's proposed system.

3. Documentation: Review, without limitation, the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.
   h. Additional data, as required by Design-Builder's proposed system.
4. Emergencies: Review, without limitation, the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
   g. Additional instruction, as required by Design-Builder's proposed system.
5. Operations: Review, without limitation, the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.

m. Special operating instructions and procedures.
n. Additional instruction, as required by Design-Builder's proposed system.

6. Adjustments: Review, without limitation, the following, as applicable:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
   e. Additional instruction, as required by Design-Builder's proposed system.
7. Troubleshooting: Review, without limitation, the following, as applicable:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
   c. Additional instruction, as required by Design-Builder's proposed system.
8. Maintenance: Review, without limitation, the following, as applicable:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
   h. Additional instruction, as required by Design-Builder's proposed system.
9. Repairs: Review, without limitation, the following, as applicable:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.
   f. Additional instruction, as required by Design-Builder's proposed system.

PART 3 -EXECUTION

3.1 PREPARATION

DEMONSTRATION AND TRAINING

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Document 01 78 23 "Operation and Maintenance Data."

B. Set up instructional equipment at instructional location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instructional program and training modules, to coordinate instructors, and to coordinate between Design-Builder and District for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct District's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. District will furnish Design-Builder with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times.

1. Schedule training with District, through District Representative, with at least fourteen days' advance notice.
2. Schedule training to conform to personnel availability at Site and to conclude prior to starting of system.
3. Base duration of training on complexity of system, subsystem or piece of equipment.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess each participant's mastery of module by use of an oral performance-based test.

F. In addition to technical training, attendees shall be trained on how to provide future training for new employees.

G. Cleanup: Collect excess copies of used and leftover educational materials and remove them from Site. Remove extraneous instructional equipment. Restore systems and equipment to condition existing just before commencing training.

DEMONSTRATION AND TRAINING

3.4 DEMONSTRATION AND TRAINING TOPICS

A. Design-Builder will provide training for District personnel for equipment and systems including, but not limited to, those shown below:

1. Foundation Systems
2. Building Envelope
3. Walls/Floors/Ceilings
4. Finishes
5. Utility Systems
6. HVAC
7. Plumbing
8. Electrical
9. Illumination
10. Fire Suppression
11. Fire Alarm
12. Security
13. Tele/Data Communications
14. Bell Paging
15. Audio Visual
16. Landscape
17. Hardscape
18. Additional equipment and systems that are part of Design-Build Entity's proposed design and not listed above.

END OF DOCUMENT

DOCUMENT 01 89 00

SITE STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;

B. Special Conditions;

C. Drug-Free Workplace Certifications;

D. Criminal Background Investigation/Fingerprinting Certification

E. Construction Facilities And Temporary Controls

1.02 REQUIREMENTS OF EAST SIDE UNION HIGH SCHOOL DISTRICT:

A. **Drug-Free Schools:**
All school sites and other District Facilities have been declared "Drug-Free Zones".

No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or Design-Build Entity are to use drugs on these sites.

Design-Build Entity shall ensure that no alcohol, tobacco or tobacco products, firearms, weapons, or controlled substances enter or are used at the Site. Design-Build Entity shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.

The Design-Build Entity may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.

The Site shall be posted: "Non-Smoking Area" in a highly visible location.

B. **Language:**
Unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students, staff or the public will not be allowed.

C. Disturbing the Peace (Noise and Lighting):

Design-Build Entity shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.

The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use.

Adequate lighting shall be provided by the Design-Build Entity should any project related activity or activities reduce lighting levels from pre-construction levels.

If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

D. Traffic:

Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on-the Premises shall be five (5) miles per hour (maximum) or less if conditions require.

All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Design-Build Entity.

The District shall designate a construction entry to the Site. If Design-Build Entity requests, the District determines it is required, and to the extent possible, the District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with the District and at Design-Build Entity's expense.

Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in areas that could otherwise be damaged.

E. Conclusion:

All of the above shall be observed and complied with by the Design-Build Entity and all workers on the Job Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District.

The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

END OF DOCUMENT

SECTION 02 41 00

SELECTIVE SITE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Work required to demolish, modify, salvage, relocate, and dispose existing structures, pavements, utilities, fencing, and miscellaneous items as required for the construction of the improvements as shown on the Drawings and as specified.

2. Protect all on-site personnel and the public at all areas of demolition.

3. Complete erosion and dust control measures as specified in Section 31 25 13.

4. Protect, support, and maintain adjoining structure, utilities, site work facilities, and miscellaneous items surrounding the demolition work from damage or harmful effects.

5. In accordance with all applicable state and local laws, properly dispose of all hazardous materials as required, obtain EPA generator number from the OWNER, and prepare safety plans.

B. Related Sections. See Related Sections for additional requirements applicable to this Section (typical).

1. Section 01 10 00 – Summary of Work.

2. Section 01 51 00 – Temporary Facilities and Controls.

1.2 SELECTIVE SITE DEMOLITION WORK

A. Selective demolition work includes, but is not limited to:

1. General site work: Asphalt and concrete paving and slabs, fencing, storm drainage structures, sidewalks, curbs, gutters, concrete walls and slabs, signs, bollards, utilities, irrigation systems, and landscaping. Demolition of existing site work structures that conflict with the new Work shown on the Drawings.

2. Partial demolition of pavements to allow new work to connect, for conduit penetrations, or otherwise modify existing structures.

1.3 PROTECTION

A. Maintain free and safe passage for all on-site personnel at all times.

B. Prevent movement or settlement of structures or surrounding areas to demolition work. Provide bracing, shoring, and debris barriers as required and assume responsibility for the safety and support of affected structures.

C. Protect existing finishes, equipment, and adjacent work which remains from damage. Cut finish surfaces such as masonry, tile, plaster, wood, gypsum wallboard, concrete, or metals by methods which will terminate or join work in a straight line at an appropriate point of division.

D. Protect existing vegetation, landscaping and irrigation systems to remain.

E. Cease operations and notify the ENGINEER immediately if the safety of any structure or utility appears to be endangered. Take additional precautions to properly support such structure(s) and do not resume demolition operations until safety is restored.

F. Utility locations shown on the Drawings are approximate and may vary from where they are shown. The CONTRACTOR shall contact Underground Service Alert (800-642-2444) and obtain field marking to determine the exact locations of utilities owned by agencies. Record, preserve and protect the field markings.

G. Blasting and the use of explosives shall not be permitted for any demolition work.

H. Promptly repair any damage caused to facilities or landscaping by demolition operations as directed by the ENGINEER and at no additional cost to the OWNER. The minimum quality of repair shall be equal to that which existed prior to the start of the CONTRACTOR's work.

1.4 SCHEDULING

A. Schedule all demolition work to meet the requirements of Section 01 32 16 and minimize disruption to the work of OWNER staff and the public. Exercise due concern and procedures for maintaining plant operation and diligently direct all activities towards maintaining continuous operation of the existing plant and minimizing operation inconvenience.

1.5 CONDITION OF STRUCTURES

A. Conditions existing at the structures and areas to be demolished at the time of the bid period shall be maintained by the OWNER insofar as practical. Minor variations in small piping, electrical equipment, and miscellaneous materials shall be expected by the CONTRACTOR and this work shall be completed at no additional cost to the OWNER.

1.6 DISPOSAL OF MATERIAL REMOVED BY DEMOLITION WORK

A. All materials removed by demolition work shall become the property of the CONTRACTOR as soon as actual demolition is initiated. The CONTRACTOR shall remove demolition materials as soon as possible but in no case shall store materials removed by demolition on the project site longer than 5 working days. Demolition materials other than concrete and soil shall be properly contained in covered waste disposal bins. Concrete and soil shall be tightly stockpiled until removal.

1.7 SUBMITTALS

A. All submittals shall be in accordance with Section 01 32 19.

B. Submit letters to the ENGINEER showing proposed start and finish dates, times, and detailed descriptions of demolition work a minimum of 14 days in advance of such work. See also Section 01 32 16.

PART 2 PRODUCTS

2.1 PATCHING MATERIALS

A. See Sections 32 12 16 and 32 13 13 for patching materials.

PART 3 EXECUTION

3.1 SEQUENCE OF WORK

A. The sequence of demolition and the modifications of existing facilities shall be in accordance with Section 01 32 16.

B. The CONTRACTOR shall mark all facility components to be demolished in advance of demolition to permit ENGINEER review. The purpose of this requirement is to provide an opportunity to avoid unnecessary or erroneous demolition. The CONTRACTOR remains responsible for demolition as shown and specified in the Contract Documents.

C. The CONTRACTOR shall schedule a meeting and meet with the ENGINEER at the site of the proposed demolition in advance of the start of demolition. CONTRACTOR shall ensure that subcontractors are present if necessary or requested by the ENGINEER.

3.2 REMOVAL OF STRUCTURES

A. CONTRACTOR shall remove all components of structures shown or required to be removed.

3.3 REMOVAL AND ABANDONMENT OF BURIED PIPING

A. Unless specifically noted on the Drawings to be abandoned-in-place, all abandoned buried piping shall be excavated and removed from the site.

B. Piping specifically noted to be abandoned-in-place shall have each open end filled with concrete grout to a minimum distance of 5 feet or 5 pipe diameters, whichever is greater, unless otherwise specified or shown.

3.4 DEMOLITION OF AND ADJOINING TO ARCHITECTURAL FINISHES

A. Demolition of finishes where adjoining finishes are to remain shall be carefully completed. Such special finishes include terrazzo, tile, stone, concrete, plaster, wood paneling, metal paneling, and drywall. Cuts shall be even, straight, and parallel to surrounding building lines. Over cuts shall not be permitted unless approved by the ENGINEER.

3.5 CLEAN-UP

A. The CONTRACTOR shall remove from the site all debris resulting from the demolition operations as it accumulates and at least 2 times a week. Upon completion of the immediate demolition work, the CONTRACTOR shall thoroughly clean each area, including dusting, vacuuming, sweeping, and window cleaning.

END OF SECTION

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Selective demolition as designated or required to provide for new Work. Refer to Drawings for additional demolition notes. Work includes, but is not necessarily limited to, the following:
   1. Selective demolition of designated construction.
   2. Removal of designated materials and finishes.
   3. Disconnecting and capping identified utilities.
   4. Selective demolition of parts of existing utilities as required to connect to and construct the new facility.
   5. Protection of items to remain as indicated on Drawings.
   6. Removal of demolished materials from site.

B. Related Sections:
   1. Section 01 51 00 - Temporary Facilities and Controls. Temporary enclosures.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or recycled.

B. Remove and Salvage: Detach items from existing construction and deliver them to District.

C. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or recycled.

1.3 REFERENCE STANDARDS

A. American National Standards Institute
   1. ANSI A10.6 - American National Standard Safety Requirements for Demolition.

1.4 PERFORMANCE REQUIREMENTS

A. Salvage and recycle demolition waste in accordance with requirements of Specifications and the City of San Jose. Project is attempting LEED MRPr1 & MRCr2 in full. All material shall be recycled if possible.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate utility and building services interruptions with District.
   2. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

B. Pre-Demolition Meeting: Conduct pre-demolition meeting in accordance with Section 01 31 19 - Project Meetings requirements for a pre-installation meeting. Convene pre-demolition meeting one week prior to commencing work of this Section

C. Sequencing:

1. Sequence operations to maintain safe working conditions and preserve existing work that is to remain.
2. Sequence demolition so as not to undermine or compromise vertical and lateral load carrying capacity of structures that are to remain.

D. Scheduling:
1. Schedule work at District's convenience to cause minimal interference with District's normal operations.
2. Schedule utility and building services interruptions with District.
   a. Do not disable or disrupt building fire or life safety systems without 7 days prior written notice to District.
   b. Schedule tie-ins to existing systems to minimize disruption.
3. Cooperate with District in scheduling noisy, dirty, or wet work.
4. Cooperate with District in scheduling waste removal that may impact District's operations.
5. Obtain District's approval of times scheduled for jack hammering.

1.6 SUBMITTALS

A. Program of methods and time schedule for accomplishing this Work.

B. Existing Building Documentation: Submit the following for existing buildings indicated to remain.
1. Report of inspections conducted with District both before and after performing work.
2. Survey indicating position and elevation of exterior building features.
3. Photographic survey indicating conditions before, during, and after demolition work.

C. Provide copies of all waste manifests. Include all dump tickets and reports from recyclers on waste diversion weights. These must be submitted monthly with monthly application for payment. Payment will be withheld until received.

1.7 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
1. Perform Work in accordance with rules and regulations of state and local agencies having jurisdiction for demolition of structures, safety of adjacent structures, dust control, runoff control, and disposal of debris.
2. Conform to rules and regulations of state and local agencies having jurisdiction when hazardous or contaminated materials are discovered.

1.8 SITE CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. District assumes no responsibility for actual condition of buildings to be demolished.

C. Conduct demolition and debris removal operations to minimize interference with adjacent roads, streets, walks, and other adjacent occupied and used facilities.

D. Conduct demolition and debris removal operations with minimum interference to public or private access. Maintain egress and access from adjacent structures at all times.

E. Cease demolition immediately if structures appear to be in danger. Notify District's Representative. Do not resume operations until directed.

F. Where existing conditions conflict with representations of the Contract Documents, notify District's Representative and obtain clarification. See also inspection requirements under Existing Building Documentation Article. Do not perform work affecting the conflicting conditions until clarification of the conflict is received.

G. Hazardous Materials:
   1. Known hazardous materials will be removed before start of Work.
   2. Hazardous materials are excluded from work of this Section. Immediately inform District's Representative if hazardous materials are encountered or suspected and stop work in suspect area. Do not proceed with work in suspected area until approved by District's Representative.

PART 2 - EXECUTION

2.1 EXISTING BUILDING DOCUMENTATION

A. Before performance of work, make inspection and report defects and structural weaknesses of structures to be partially demolished, cut, or removed, of adjacent structures, and of improvements remaining. Photograph and video tape all adjacent flatwork, structures, fences, etc. prior to the start of demolition.

B. After performance of work, make inspection and document conditions including defects and structural weaknesses of:
   1. Adjacent structures indicated to remain.
   2. Structures partially demolished, cut, or removed.
   3. Improvements indicated to remain.

C. District will accompany Contractor before and after performance of Work to confirm physical condition of existing structures or improvements indicated to remain.

2.2 EXAMINATION

A. Review Project Record Documents of existing construction provided by District's Representative does not guarantee that existing conditions are same as those indicated in Project Record Documents.

B. Determine where removals may result in structural deficiency or unplanned building collapse during demolition. Coordinate demolition sequence and procedures to prevent structures from becoming unstable.

C. Determine where demolition may affect structural integrity or weather resistance of adjacent buildings indicated to remain.
   1. Identify measures required to protect buildings from damage.
   2. Identify remedial work including patching, repairing, bracing, and other work required to leave buildings indicated to remain in structurally sound and weathertight and watertight condition.

D. Verify hazardous material abatement is complete before beginning demolition.

E. Examine areas affected by work of this Section and verify following:
   1. Disconnection of utilities as required.
   2. Those utilities serving occupied portions of buildings will not be disturbed.
   3. Removal by District of District's personal property, movable furniture, and equipment items not designated for relocation.

F. Inventory and record the condition of items to be removed and salvaged to be done by the District / District's Representative.

G. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to District.

2.3 PREPARATION

A. Consult with District prior to commencing demolition work and determine which existing items are to be salvaged and retained or can be reused in the work. These items shall be carefully removed to avoid damage and shall be delivered to District or stored as directed.

B. Lay out work to be demolished at job site and coordinate with related work for which cutting is required.

C. Review proposed layout with District's Representative prior to performing demolition.

D. Erection and maintenance temporary enclosures is specified Section 01 51 00 - Temporary Facilities and Controls.

E. Erect and maintain weatherproof closures for exterior openings

F. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued District occupancy.

G. Erect and maintain temporary enclosures depicted on construction documents necessary to protect public and District's employees, finishes, and existing improvements to remain and adjoining property from damage, all in accordance with applicable regulations.

H. Existing Utilities:
   1. Notify affected utility companies before starting work and comply with their requirements.
   2. Mark location and termination of utilities.
   3. Refer to Divisions 21, 22, 23, 25, 26, 27, and 28 Sections for shutting off, disconnecting, removing, and sealing or capping mechanical or electrical utilities.
   4. Do not start demolition work until utility disconnection and sealing have been completed and verified in writing.
   5. Take care to ensure that utilities to remain and portions thereof which are not required to be demolished or removed.
   6. Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be demolished.
   7. Locate, identify, and protect known utilities indicated to remain from damage. Should damage occur, notify District's Representative and repair at no additional cost to the Contract.
   8. Verify that those utilities serving occupied portions of buildings will not be disturbed.

I. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.

J. Protect existing improvements indicated to remain from damage during demolition.

K. Locate, identify, and protect known utilities indicated to remain from damage. Should damage occur, notify District's Representative and repair at no additional cost to the Contract.

2.4 SALVAGE REQUIREMENTS

A. Coordinate with District to identify building components and equipment required to be removed and delivered to District.

B. Tag components and equipment District designates for salvage.

C. Protect designated salvage items from demolition operations until items can be removed.

D. Carefully remove building components and equipment indicated to be salvaged or reinstalled. Remove materials to be reinstalled or retained in a manner to prevent damage.

E. Disassemble as required to permit removal from building.

F. Package small and loose parts to avoid loss.

G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.

H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.

I. Deliver salvaged items to District. Obtain signed receipt from District.

J. Carefully store building components and equipment indicated to be reinstalled.

2.5 DEMOLITION REQUIREMENTS

A. Disposition of Existing Improvements:
   1. Materials forming portions of permanent structure designated for demolition shall become Contractor's property, and Contractor shall be responsible for their removal unless otherwise noted.
   2. Personal property and movable furniture remain District's property. Contractor to store items in future storage area and protect from damage. Consider items not claimed by District as debris. District's final verification is required before removal.

B. Sprinkle or wet down Work and areas affected by this Work as required to prevent dust and dirt from rising. Provided hoses and water connections required for this purpose.

2.6 DEMOLITION

A. Perform work in accordance with ANSI A10.6 unless otherwise noted.

B. Conduct demolition to minimize interference with adjacent and occupied building areas.

C. Maintain protected egress from and access to adjacent existing buildings at all times.

D. Do not close or obstruct roadways and sidewalks without permits.

E. Cease operations immediately when structure appears to be in danger and notify District's Representative

F. Disconnect, cap, and identify designated utilities within demolition areas.

G. Remove designated interior structures, parts, and finishes at beginning of work to minimize hazardous working conditions and to provide comparatively clean surfaces for installation of new work.

H. Perform demolitions as much as possible with small tools. Demolish in small sections. Remove loading before cutting or removing structural members.

I. Demolish in an orderly and careful manner. Protect existing supporting structural members.

J. Concrete:
   1. Demolish by means of saw cutting, drilling, chipping, breaking, or a combination thereof, as indicated or required to satisfactory accomplish the Work without damage to existing improvements not being removed.
   2. If jack hammering is permitted do not jack hammer within 2 inches of reinforcing or structural steel; remove final 2 inches of material with chipping gun.

3. Demolish concrete and masonry in small sections, less than 3 feet in any direction.
4. Cut concrete at nearest control joint to line shown on the Drawings, so that new concrete can be installed continuing the adjacent existing joint pattern.

K. At concrete and other materials where edges of cuts and holes will remain exposed in the completed work, make cuts using power sawing and coring equipment. Do not over cut at corners of cut openings.

L. Where existing resilient flooring, carpeting, carpet padding, tile and other similar adhesive or mortar applied finishes are required to be removed to permit application of new finishes, grind, stone, sand or otherwise remove all adhesives, mortar, fasteners, and similar materials to the extent that no ridges, lumps or other protrusions will telegraph through surface of new finish or be apparent when the substrate is left exposed.

M. Lower heavy structural framing members by hoist or crane.

2.7 CUTTING

A. Cutting of concrete and asphalt shall be made clean and neat.

B. At limits of demolition Work shown or specified, provide neat, orderly, and clean joints, lines, and edges of surfaces, whether for junctions with new materials or surfaces or whether to be left as existing. Where demolitions methods or controls may not permit the intended jointure, submit conditions and alternatives to District's Representative, and obtain resolutions prior to commencing.

C. Cutting of concrete and asphalt shall be made clean and neat.

D. Do not cut or alter structural members unless indicated to do so on the Drawings.

E. Take care not to damage reinforcing or structural steel scheduled to remain in place.

2.8 REMOVAL OF DEBRIS

A. Remove debris in accordance with requirements of the specifications, District, and City of San Jose.

B. Remove demolished materials from site except where specifically noted otherwise.

C. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

D. Remove salvage and debris as they accumulate. Do not permit presence of debris to delay progress of related work.

E. Remove materials in a manner to prevent spillage.

F. Nothing to be removed from site shall be stored, sold, burned, or buried on site.

2.9 REPAIRS

A. Promptly repair damage to adjacent construction caused by demolition operations.

B. Where repairs to existing surfaces are required, patch to restore surface to original or better condition.

C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

2.10 CLEANING

A. Clean adjacent improvements scheduled to remain of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before building demolition operations began.

END OF SECTION 02 41 19

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03 10 00

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Requirements of Division 1 apply to all work of this section.

1.2 SCOPE

A. Design, furnish and install forms for concrete as indicated on drawings and specified here. Remove forms and shores at specified time. Clean up.

1.3 RELATED WORK (See also Table of Contents)

A. Reinforcing Steel: Section 03 21 00.

B. Cast-In-Place Concrete: Section 03 30 00.

C. Structural Steel: Section 05 12 00.

D. Metal Fabrications: Section 05 50 00.

E. Rough Carpentry: Section 06 10 00.

F. Items relating solely to mechanical or electrical work are included under those Divisions, except as specifically indicated otherwise on Drawings.

1.4 QUALITY ASSURANCE

A. General:
   1. Conform to all requirements of ACI 347 and ACI 318 Section 6.1 and 6.2.
   2. Concrete formwork shall be designed and constructed to safely support fluid concrete and superimposed construction loads without excessive deflection or concrete leakage. Provide bracing to maintain accurate alignment and to resist all anticipated lateral loads. Forms shall conform with drawings as to shape, line, and dimension. Design, engineering and construction of forms shall be Contractor's responsibility. Formwork for exposed concrete shall be constructed to tolerances indicated in ACI 303R.
   3. Cooperate and coordinate with other trades who furnish and/or install piping, conduit, reglets, anchors, inserts, sleeves, hangers, etc., as their work requires; including provisions for recesses and chases.

B. Submittals: (Submit under provisions of Section 01 32 19)
   1. Product Data. Provide manufacturers data and installation instructions for the following:
      a. Tie rods and spreaders.
      b. Formwork for exposed concrete.
      c. Form coatings and release agents.

C. Standards and References: (Latest Edition unless otherwise noted)
   1. 2013 California Building Code (CBC) with State of California Amendments.
   2. American Concrete Institute (ACI).
      a. ACI 303R - “Guide to Cast-In-Place Architectural Concrete Practice”
      b. ACI 318 – “Building Code Requirements for Structural Concrete”
      c. ACI 347 - "Recommended Practice for Concrete Formwork”

3. Standard Grading and Dressing Rules #17, West Coast Lumber Inspection Bureau (For Douglas Fir Form Lumber).
4. U.S. Product Standard PS 1-83 (For Plywood Form Lumber).

PART 2 **-** PRODUCTS

2.1 MATERIALS

A. Form Material:
1. Smooth Concrete exposed to view: 5/8 inch minimum APA Plyform or steel.
2. Concrete concealed from view: 5/8 inch minimum APA Plyform, steel or clean and sound 1 x 8 Standard Grade Douglas Fir.

B. Fiber Forms: Tubular column forms spirally constructed of laminated plies of fiber. Plies shall be laminated using a non-water sensitive adhesive and surface wax impregnated for moisture protection. Forms shall give a smooth and seamless appearance to the cast concrete. Provide reveals, as shown on the drawings, as supplied by the form manufacturer. Forms shall be as manufactured by Sonoco Products, plastic lined; Burke Smoothtube by Burke Co.; or approved equal.

C. Form Clamps: Assembly to have cone washers, (1 inch break back) 3/8” inch center rod.

D. Form Ties:
1. Concrete exposed to view: Snap ties allowing full 1 inch break back.
2. Concrete concealed from view: Snap ties or wire.
3. Verify special spacing requirements with architectural drawings at exposed concrete.

E. Spreaders: Metal (no wood).

F. Form Coating: Non-grain and non-staining types of form coating that will not leave a residual matter on the face of the concrete or adversely affect proper bonding of any subsequent paint or other surface applications.
1. Form coating containing mineral oils or other non-drying materials will not be permitted for any concrete work.

G. Joint Tape: No. 471 plastic film tape 3 inches wide, as manufactured by the Industrial Tape Division of 3M Company.

H. Expansion Joint Filler (Preformed): ½ inch thick; Flexcell by Celotex Corporation, Elastic Fiber Expansion Joint by Phillip Carey Mfg. Co., or Sealtight Fiber Expansion Joint by W.R. Meadows, Inc.

I. Extruded Polystyrene Foam: ASTM C578 type IV. Dow Chemical Corp. "Styrofoam", UC Industries "Foamular", or approved equal.

PART 3 - EXECUTION

3.1 FORM CONSTRUCTION

A. Construct substantial forms to the shapes, lines, grades and elevations shown, sufficiently tight to prevent leakage of mortar, and tied, clamped and braced to prevent spreading, shifting or settling. Plywood joints shall be square and tight; plywood shall be arranged in such manner as to minimize number of joints and to provide a smooth, attractive finished concrete surface.

B. Apply form coating to forms before reinforcing steel is in place.

C. Sleeves, anchors and bolts, including those for angle frames, supports, ties and other materials in connection with concrete construction, shall be secured in position before the concrete is placed.

D. Proper provisions shall be made for openings, blockouts, sleeves, offsets, sinkages, recesses and depressions required by other trades and suppliers prior to placing concrete.
   1. The Contractor shall also see that sleeves have been installed and other provisions have been made for the installation of mechanical, electrical and other equipment.
   2. Coordinate with all trades to insure proper placement of all items in forms and to provide proper blockouts wherever required.

E. Concrete work out of alignment, level or plumb will be cause for rejection of the whole work affected and, if so rejected, such work shall be removed and replaced, as directed by Architect, with no additional cost to the Owner.

F. Form Not Required: Concrete footings may be poured directly against cut earth where feasible and when the Architect's approval has been obtained.
   1. See structural drawings for requirements for placing concrete footings directly against earth without forms.

G. Use ¾ inch minimum wood chamfer strips typical at all exposed corners unless noted otherwise on drawings.

3.2 CLEANING OF FORMS

A. All dirt, chips, sawdust, rubbish, water, etc. shall be completely removed from form by water hosing and air pressure before any concrete is deposited therein. No wooden ties or blocking shall be left in concrete except where indicated for attachment of other work.

B. Thoroughly clean and patch all holes in formwork and re-coat as required before reusing. Forms not suited to obtain concrete surfaces and tolerances in conformity with Contract requirements will be rejected by Architect.
   1. Reuse of forming materials shall be limited only as required to produce the finishes as specified, free from blemishes and other defects unless covered by other building materials in which case blemish free concrete is not required.

3.3 INSPECTION OF FORMS

A. Notify the Architect at least 48 hours in advance of the beginning of pouring operations and at the completion of formwork and location of all construction joints. An inspection of forms and joints will be made for approval of finished work and general layout only. The foregoing inspection shall in no way relieve the Contractor of responsibility of design and safety or formwork, bulkheads and shorings.

3.4 REMOVAL OF FORMS AND SHORING

A. Do not remove forms until concrete has attained sufficient strength to support its weight and any construction loading. Concrete must be allowed to cure long enough to avoid damage during form removal. Contractor or his representative in charge of concrete construction shall be present during removal of forms and shores, and shall be personally responsible for safety of this operation at all times and under all conditions.

B. As a minimum, formwork and shoring shall remain in place for the following periods:
   1. Concrete on grade: 24 hours
   2. Walls and Columns: 3 days
   3. Formwork may be removed and reshores installed before the times indicated above, provided the concrete has cured sufficiently to avoid damage when formwork is removed.

Shores must be immediately replaced with reshores in a sequence designed to avoid inducing stress in the concrete member.

3.5 ADJUSTING AND CLEANING

A. Upon completion of this Work, clean up and remove from Site all equipment and debris resulting from this work.

B. Surfaces to be painted shall be smooth and free of substances such as dirt, wax, excessive latence, grease or materials that would prevent proper bonding of finishes.
   1. Removal of foregoing contaminants, and complete removal of parting and curing compounds affecting proper paint bond, shall be responsibility of this Section of Work. Sandblast cleaning shall not be employed without specific approval of Structural Engineer.

END OF SECTION – 03 10 00

SECTION 03 21 00

REINFORCING STEEL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Requirements of Division 1 apply to all work of this Section.

1.2 SCOPE

A. Unless noted otherwise, furnish and install reinforcing for all concrete, including dowels, chairs, spacers, bolsters, etc., necessary for supporting and fastening reinforcement in place as shown on the Drawings and specified herein.

1.3 RELATED WORK (See also Table of Contents)

A. Concrete Formwork: Section 03 10 00.

B. Cast-In-Place Concrete: Section 03 30 00.

1.4 QUALITY ASSURANCE

A. General:
   1. Acceptable Manufacturers: Regularly engaged in the manufacture of steel bar and welded wire fabric reinforcing.
   2. Installer Qualifications: Installation shall be done only by an installation firm normally engaged in this business. All work shall be performed by qualified mechanics working under an experienced supervisor.
   3. Welding Qualifications: Welding procedures, welding operators and welders shall be qualified in accordance with AWS D1.4 - "Structural Welding Code Reinforcing Steel".
      a. Welders whose work fails to pass inspection shall be re-qualified before performing further welding.
   4. Reinforcement Work shall conform to ACI 301 and ACI 318 Chapter 7, as minimum standards.
   5. Allowable Tolerances:
      a. Fabrication:
         1) Sheared length: 1 inch.
         2) Depth of truss bars: Plus or minus ½-inch.
         3) Ties: Plus or minus ½-inch.
         4) All other bends: Plus or minus 1 inch.
      b. Placement:
         1) Concrete cover to form surfaces: Plus or minus ¼-inch.
         2) Minimum spacing between bars: Plus or minus ¼-inch.
         3) Crosswise of members: Spaced evenly within 2 inches of stated separation.
         4) Lengthwise of members: Plus or minus 2 inches.
      c. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 2 bar diameters.

B. Standards and References: (Latest Edition unless otherwise noted):
   1. 2013 California Building Code (CBC) with State of California Amendments.

   2. American Concrete Institute (ACI).
      a. ACI 301 - "Specifications for Structural Concrete for Buildings".
      b. ACI 315 - "Details and Detailing of Concrete Reinforcing".

c. ACI 318 – “Building Code Requirements for Structural Concrete”

3. American Society for Testing and Materials (ASTM).
   a. ASTM A82 - "Cold Drawn Wire for Concrete Reinforcement".
   b. ASTM A185 - "Welded Steel Wire Fabric for Concrete Reinforcement".
   c. ASTM A615 - "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement".
   d. ASTM A706 – “Low Alloy Steel Deformed Bars for Concrete Reinforcement”.
4. Concrete Reinforcing Steel Institute (CRSI) - "Manual of Standard Practice".
5. American Welding Standard (AWS).
   a. AWS D1.4 - "Structural Welding Code – Reinforcing Steel".

C. Submittals: (Submit under provisions of Section 01 32 19)
1. Shop Drawings: Prepare in accordance ACI 315. Indicate bending diagrams, assembly diagrams, splicing and laps of bars and shapes, dimensions and details of bar reinforcing and assemblies. Correctness of all reinforcing requirements and work is the responsibility of Contractor. Identify such shop drawings with reference thereon to sheet and detail numbers from Contract Drawings.
   a. Do not use scaled dimensions from Contract Drawings in determining the lengths of reinforcing bars.
   b. No reinforcing steel shall be fabricated without approved shop drawings.
   c. Any deviations from the contract documents must be clearly indicated as a deviation on the shop drawings.
   d. Areas of high congestion, including member joints and embed locations shall be fully detailed to verify clearances and assembly parameters and coordination with other trades.
2. Certified mill test reports of supplied reinforcing indicating chemical and physical analysis. Tensile and bend tests shall be performed by the mill in accordance with ASTM A615.
3. Product Data:
   a. Manufacturer's specifications and installation instructions for splice devices.
   b. Bar Supports.
4. Certificates of Compliance with specified standards:
   a. Reinforcing bars.
   b. Welded wire fabric.
   c. Welding electrodes.
5. Samples: Only as requested by Architect.

D. Tests and Inspections:
1. A testing program is required prior to start of construction. Testing program to be done in compliance with the CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
2. All reinforcing steel whose properties are not identifiable by mill test reports shall be tested in accordance with ASTM A615. One Series of tests for each missing report to be borne by the Contractor.
3. When inspections are indicated for reinforcement placement on the Structural drawings, a special inspector shall be employed to inspect reinforcing placement per CBC Section 1704A.
4. When tests are indicated for reinforcing steel on the structural drawings, the reinforcing steel used shall be tested in accordance with ASTM A615. One tensile and one bend test for each 2-1/2 tons of steel or fraction thereof, shall be made.
5. Inspect shop and field welding in accordance with AWS D1.4, including checking materials, equipment, procedure and welder qualification as well as the welds. Inspector will use non-destructive testing or any other aid to visual inspection that he deems necessary to assure himself of the adequacy of the weld.

6. Tests and inspection shall be performed by Owners testing agency except when needed to justify rejected work, in which case the cost of retests and reinspection shall be borne by the Contractor.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.

B. Handle and store materials to prevent contamination.
   1. Store reinforcement in a manner that will prevent excessive rusting or coating with grease, oil, dirt, and other objectionable materials. Storage shall be in separate piles or racks so as to avoid confusion or loss of identification after bundles are broken.

C. Deliver and store welding electrodes in accordance with AWS D1.4.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcement Bars: ASTM A615, Grade 60 for all bars.
   1. Bar reinforcement to be welded shall meet chemical requirements of ASTM A706.
   2. Longitudinal reinforcement in columns and beams of special moment-resisting frames shall meet the chemical requirements of ASTM A706.

B. Stirrups and Ties: ASTM A615, Grade 60 for all bars.

C. Steel Dowels: Same grade as bars to which dowels are connected.

D. Welded wire Fabric: ASTM A185.

E. Tie Wires: FS-QQ-W-461, annealed steel, black, 16 gauge minimum.

F. Welding Electrodes: AWS D1.4, low hydrogen, E70XX series.

G. Bar Supports:
   1. Typical, unless noted otherwise; CRSI Class 2 wire supports.
      a. Do not use wood, brick or other objectionable materials.
      b. Do not use galvanized supports.
   2. Supports placed against ground: Pre-cast concrete blocks not less than 4 inches square with embedded wire.

H. Mechanical Couplers: Comply with CBC section 1905A.1.7 and ACI 318 section 12.14.3.

PART 3 - EXECUTION

3.1 FABRICATION

A. Shop fabricate reinforcement to meet requirements of Drawings.

B. Fabricate reinforcement in accordance with the requirements of ACI 315 where specific details are not shown or where Drawings and Specifications are not more demanding.

C. Steel reinforcement shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the Drawings shall not be used. Heating of bars for bending will not be permitted.

D. Reinforcing shall not be field bent or straightened without structural engineer’s review.

E. Provide offsets in rebar (1:6 maximum) where required to maintain clearances.

3.2 CONDITION OF SURFACES

A. Examine surfaces and conditions receiving or affecting the work. Do not proceed until unsuitable conditions have been corrected.

3.3 GENERAL

A. Concrete shown without reinforcing shall be reinforced as similar parts shown with reinforcing except where concrete is specifically noted to be unreinforced.

3.4 PLACEMENT

A. All reinforcement shall be accurately set in place, lapped, spliced, spaced rigidly and securely held in place and tied with specified wire at all splices and crossing points. All wire tie ends shall point away from the form. Carefully locate all dowel steel to align with wall and column steel.
   1. Bars shall be in long lengths with laps and splices as shown. Offset laps in adjacent bars. Place steel with clearances and cover as shown. Bar laps shall be as indicated on the Drawings. Tie all laps and intersections with the specified wire.
   2. Maintain clear space between parallel bars not less than 1-1/2 times nominal diameter, but in no case shall clear space be less than 1-1/2 times maximum size concrete aggregate.
   3. Reinforcing dowels for slabs shall be placed as detailed. Sleeves may be used if reviewed by the Structural Engineer before installation. Install dowel through all construction and expansion joints for all slabs on grade.

B. Bar Supports: Support and securely fasten bars with chairs, spacers and ties to prevent displacement by construction loads or placement of concrete beyond the tolerances specified. Conform to CRSI as a minimum standard.

C. Steel Adjustment:
   1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.
   2. Do not move bars beyond allowable without concurrence of Structural Engineer.
   3. Do not heat, bend, or cut bars without concurrence of Structural Engineer.
   4. Reinforcement shall not be bent after being embedded in hardened concrete.

D. Splices:
   1. Splice reinforcing as shown.
   2. Lap Splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
   3. Splice Devices: Install in accordance with manufacturer's written instructions. Obtain Structural Engineer’s review before using.
   4. Do not splice bars except at locations shown without concurrence of Structural Engineer.
      a. Where splices in addition to those indicated are required, indicate location on shop drawings clearly and highlight "for Engineer’s approval".

E. Welding:
   1. Welding is not permitted unless specifically detailed on Drawings or approved by Engineer.
   2. Employ shielding metal-arc method and meet requirements of AWS D1.4.
   3. Welding is not permitted on bars where the carbon equivalent is unknown or is determined to exceed 0.55.

4. Welding shall not be done within two bar diameters of any bent portion of a bar which has been bent cold.
5. Welding of crossing bars is not permitted.

F. Welded Wire Fabric: Install in long lengths, lapping 24 inches at end splices and one mesh at side splices. Offset laps in adjacent widths. Place fabric in approximately the middle of the slab thickness unless shown otherwise on the Drawings by dimension. Wire tie lap joints at 12-inch centers. Use concrete blocks to support mesh in proper position.

G. Reinforcement shall be free of mud, oil or other materials that may reduce bond at the time concrete is placed. Reinforcement with tightly adhered rust or mill scale will be accepted without cleaning provided that rusting has not reduced dimensions and weights below applicable standards. Remove loose rust.

H. Protection against rust:
1. Where there is danger of rust staining adjacent surfaces, wrap reinforcement with impervious tape or otherwise prevent rust staining.
2. Remove protective materials and clean reinforcement as required before proceeding with concrete placement.

I. Drawing Notes: Refer to notes on Drawings for additional reinforcement requirements.

J. Mechanical and Electrical Drawings: Refer to Mechanical and Electrical Drawings for formed concrete requiring reinforcing steel. All such steel shall be included under the work of this Section.

END OF SECTION – 03 21 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Requirements of Division 1 apply to all Work of this Section.

1.2 SCOPE

A. Furnish, place and finish cast in place concrete and related work as indicated on the Drawings and specified here.
   1. Install miscellaneous metal and other items furnished by other trades to be installed in concrete work.
   2. Provide facilities for job curing of test cylinders and transporting to Testing Laboratory.

B. Provide grouting of steel base plates as indicated on the Drawings and specified here.

1.3 RELATED WORK (See also Table of Contents)

A. Concrete Formwork: Section 03 10 00.

B. Reinforcing Steel: Section 03 21 00.

C. Structural Steel: Section 05 12 00.

D. Metal Fabrications: Section 05 50 00.

1.4 QUALITY ASSURANCE

A. Standards and References: (Latest Edition unless otherwise noted)
   1. 2013 California Building Code (CBC), with State of California Amendments.
   2. American Concrete Institute (ACI)
      a. ACI 117 – “Standard Tolerances for Concrete Construction and Materials”
      b. ACI 211.1 – “Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete”
      c. ACI 211.2 – “Standard Practice for Selecting Proportions for Structural Lightweight Concrete”
      d. ACI 301 – “Structural Concrete for Buildings”
      e. ACI 302 – “Guide for Concrete Floor and Slab Construction”
      f. ACI 305R – “Hot Weather Concreting”
      g. ACI 306R – “Cold Weather Concreting”
      h. ACI 318 – “Building Code Requirements for Structural Concrete”
      i. ACI 360 – “Design of Slabs-On-Ground”
   3. American Society for Testing and Materials (ASTM)
      a. ASTM C31 – “Making and Curing Concrete Test Specimens in the Field”
      b. ASTM C33 – “Concrete Aggregates”
      c. ASTM C39 – “Compressive Strength of Cylindrical Concrete Specimens”
      d. ASTM C42 – “Obtaining and Testing Drilled Cores and Sawed Beams of Concrete”
      e. ASTM C94 – “Ready-Mixed Concrete”
      f. ASTM C109 – “Test of Hydraulic Cement Concrete”
      g. ASTM C143 – “Slump of Hydraulic Cement Concrete”
      h. ASTM C150 – “Portland Cement”
      i. ASTM C172 – “Sampling Freshly Mixed Concrete by the Volumetric Method”

j. ASTM C192 – “Making and Curing Concrete Test Specimens in the Laboratory”
k. ASTM C260 – “Air-Entraining Admixtures for Concrete”
l. ASTM C330 – “Lightweight Aggregates for Structural Concrete”
m. ASTM C494 – “Chemical Admixtures for Concrete”
n. ASTM C618 – “Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete”
o. ASTM C685 – “Volumetric Batching and Continuous Mixing”
p. ASTM C1157 – “Hydraulic-Cement”

B. Submittals: (Submit under provisions of Section 01 32 19)
1. Concrete mix designs. See “Mix Design” below. Include results of test data used to establish proportions.
2. Certificates of Compliance from Manufacturer
a. Cement per CBC Section 1913A.1. Cement without certificate shall not be used.
b. Aggregates
c. Admixtures.
3. Data regarding hardeners and sealers.
4. Grout samples for sacked surface textures and colors upon Architects request only.
5. Layout drawings for construction, control and expansion joints.
6. Transit-mix delivery slips:
a. Keep record at the job site showing time and place of each pour of concrete, together with transit-mix delivery slips certifying contents of the pour.
b. Make the record available to the Architect for his inspection upon request.
c. Upon completion of this portion of the work, deliver the record and the delivery slips to the Architect.
7. See Section 03 21 00 for reinforcing steel submittals.

C. Tests and Inspections:
1. A testing program is required prior to start of construction. Testing program to be done in Compliance with the CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
2. The following tests shall be made by a recognized testing laboratory selected by the Owner and approved by the governing agency. All tests shall be in accordance with the previously mentioned standards and CBC Section 1903A.1 and 1913A.1. A complete record of all tests and inspections shall be kept per CBC Section 1913A.
a. Compressive Strength: Make and cure in accordance with ASTM C-31. Test in accordance with ASTM C-39 and ACI Section 5.6.
1) A record shall be made of time and of locations of concrete from which samples were taken.
2) Four identical cylinders shall be taken from each pour of 50 cubic yards or 2000 square feet or part thereof, being placed each day per ACI 318 Section 5.6.2. One cylinder shall be tested at age 7 days, and two at age 28 days unless otherwise specified. Preserve remaining cylinder for future use.
b. Drying Shrinkage: (applies to lightweight concrete only unless noted otherwise)
1) A record shall be made of time cylinders and of locations of concrete from which samples were taken.
2) Three identical 4" x 4" x 11" specimens shall be made from same concrete as used in structure. Percent of shrinkage shall be reported at 21 days after 7 day moist curing period. Average results of 3 specimens shall be used as the accepted value. The value for laboratory cast specimens shall not exceed .075%. If field test specimens are used in lieu of laboratory specimens, a tolerance of +33% may be used.
3) Test specimens in accordance with ASTM C157.
c. Concrete consistency (slump) shall be tested in accordance with ASTM C143.

3. Provide full time inspection per CBC Section 1704A.3 during the taking of test specimens and during the placing of all concrete and embedded steel.
4. See Section 03 21 00 for reinforcing steel tests and inspections.
5. Provide concrete batch plant inspections per CBC Section 1705A.3.2.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Portland Cement: ASTM C 150, Type II or Type V. One brand of cement shall be used throughout to maintain uniform color for all exposed concrete.

B. Concrete Aggregate: Fine and coarse aggregates shall be regarded as separate ingredients. Each size of coarse aggregate, as well as combination of sizes when two or more are used, shall conform to grading requirements of appropriate ASTM Standards and CBC Section 1903A.6.
   1. Concrete Aggregates for Standard Weight Concrete: ASTM C 33. Aggregate shall be crushed granite or Perkins type.
   2. Concrete Aggregates for Lightweight Concrete: ASTM C330 to produce concrete weighing no more than 115 pcf at 28 days. Aggregate shall be vacuum saturated expanded shale as produced through the rotary kiln method.

C. Water: Clean and free from injurious amounts of oil, acids, alkali, organic matter and other deleterious substances; suitable for domestic consumption.

D. Admixtures shall be subject to prior approval by the Engineer, in accordance with ACI 318 Section 3.6. Calcium Chloride is not permitted.
   1. Water Reducing
      a. ASTM C494 Type A - for use in cool weather.
      b. ASTM C494 Type D - for use in hot weather.
   2. Air Entraining
      a. Conform to ASTM C 260
   3. Fly Ash
      a. Conform to ASTM C 618
   4. Mid-Range Water-Reducers
      a. Master Builders “Polyheed” or approved equal.
   5. Fly Ash Pozzolan
      a. Conforming to ASTM A-618 Class F

E. Slab on Grade Vapor Retarder
   1. Vapor Retarder must have the following qualities:
      a. 15 mil thickness minimum
      b. WVTR less than 0.008 as tested by ASTM E 96
      c. ASTM E 1745 Class A (Plastics)

   2. Vapor Retarder Products
      a. Stego Wrap Vapor Retarder by STEGO Industries LLC.
      b. W.R. Meadows Premoulded Membrane with Plasmatic Core.
      c. Zero-Perm by Alumiseal.

   3. Vapor Retarder Tape
      a. Water Vapor Transmission Rate: ASTM E 96, 0.3 perms or lower
      b. Minimum 8-mils thick
      c. Minimum 3 3/4 inches wide
      d. Manufactured from High Density Polyethylene
      e. Pressure Sensitive Adhesive

F. Sand: Clean, dry, well graded.

G. Abrasive aggregate for non-slip finish: Fused aluminum oxide grits, graded 12/30. Use factory-graded rustproof and non-glazing material that is unaffected by freezing, moisture and cleaning materials.
   1. Products offered by manufacturers to comply with the above requirements include: A-H Alox; Anti-Hydro Waterproofing Co., Toxgrip; Toch Div. - Carboline, or approved equal.

H. Expansion Joint Filler:
   1. Joint fill shall be a preformed non-extruded resilient filler, saturated with bituminous materials and conforming to ASTM D 1751. Products shall be equivalent to Burke "Fiber Expansion Joint", W.R. Meadows "Fibrated Expansion Joint Filler", or approved equal.

I. Bonding Agent: Sonneborn "Sonobond"; the Euclid Chemical Company "Euco-Weld"; Larsen Products Corp., "Weld-Crete" or approved equivalent.

J. Concrete Sealer: Cure and Seal, as manufactured by the Euclid Chemical Company "Aqua-Cure VOX", Sonneborn "Kure-N-Seal WB", Burke "Spartan-Cote",W.R. Meadows "Intex" or approved equal conforming to ASTM C-309, Type I, Class B requirements, and conforming to State of California Air Resources Board VOC Regulations.

K. Concrete Hardener/Sealer: Clear, water soluble, sprayable in-organic silicate based hardener/sealer or acrylic co-polymer resin. Products shall be equal to Euclid Chemical Company "Eucosil", Burke "Spartan-Cote", Sonneborn "Sonosil", W.R. Meadows "Pena-Lith", or approved equal and must conform to State of California Air Resources Board VOC Regulations.

L. Concrete Cure: Water based curing compound conforming to ASTM C-309, Type 1, Class A and B, and AASHTO Specification M-148; Type 1, Class A and B requirements, and State of California Air Resources Board VOC Regulations. Product shall be equivalent to Euclid Chemical Company "Kurez VOX", Burke "No. 1127" or "Aqua-Resin Cure", W.R. Meadows "1100 Clear", or approved equal.

M. Non-Shrink Grout: See Section 2.2.A.6.

2.2 CONCRETE

A. Concrete Mixes:
   1. Type A Concrete:
      Strength: 3000 lbs. per square inch at 28 days.
      Maximum Aggregate Size: 1-1/2 inch.
      Cement Content: As required by mix design (ACI Section 5.3).
      5.0 sacks per yard minimum.
      Maximum Water to Cement Ratio: 0.58
      Admixture: Water Reducing.
      Weight: 145 lbs. per cubic foot
      Use for unexposed foundation concrete except as otherwise specified. At Contractor's option, Type B concrete may be substituted for this.

   2. Type B Concrete:
      Strength: 3500 lbs. per square inch at 28 days.
      Maximum Aggregate Size: 1 inch.
      Minimum Cement Content: As required by mix design (ACI Section 5.3).
      5.5 sacks per yard minimum.
      Maximum Water to Cement Ratio: 0.45
      Admixture: Water reducing.
      Weight: 145 lbs. per cubic foot
      Use for building slab on grade

Maximum Fly Ash content as a percentage of total cementitious material: 15%

3. Grout shall be non-shrink, non-metallic, flowable Type "713" or "928" by Master Builders.
   a. Metallic grout equivalent to Master Builders "Embeco" may be used only where covered by earth, concrete, or masonry.
   b. Acceptance by Architect required before using.

B. Consistency of Concrete: Concrete slump, measured in accordance with ASTM C 143, shall fall within following limits.
1. For General concrete placement: 3 inch plus or minus 1 inch.
2. Mixes employing the specified mid-range water reducer shall provide a measured slump not to exceed 7 inch ±1 inch after dosing, 2 inch ±1 inch before dosing.
3. Concrete slump shall be taken at point of placement. Use water reducing admixtures as required to provide a workable consistency for pump mixers. Water shall not be added at the jobsite without written review by the structural engineer.

C. Mix Design:
1. Initial mix designs shall be prepared for all concrete in accordance with ACI 318 Section 5.3 by recognized testing laboratory (approved by Architect). Mix proportions shall be determined in accordance with ACI Section 5.3 or 5.4. In the event that additional mix designs are required due to depletion of aggregate sources, aggregate not conforming to Specifications, or at request of Contractor, these mixes shall be prepared as above.
2. Contractor shall notify the Testing Laboratory and Architect of intent to use concrete pumps to place concrete so that mix designs can be modified accordingly.
3. Fly ash shall not exceed fifteen percent of the total cementitious material.
4. Provide 6% air entrainment typical for mixes exterior concrete to freeze-thaw cycles.
5. Owner’s testing laboratory shall review all mix design before submittal.

D. Mixing:
1. Equipment: All concrete shall be machine mixed. Provide adequate equipment and facilities for accurate measurement and control of materials.
2. Method of Mixing:
   a. Transit Mixing: Comply with ASTM C 94. Ready mixed concrete shall be used throughout, except as specified below.
   b. On-Site Mixing: Use only if method of storing material, mixing of material and type of mixing equipment is approved by Architect. Approval of site mixing does not relieve Contractor of any other requirements of Specifications.
   c. Mixing shall be in accordance with ACI 318 Section 5.8.
3. Mixing Time: After mix water has been added, concrete shall be mixed not less than 1-1/2 minutes nor more than 1-1/2 hours. Concrete shall be rejected if not deposited within the time specified.
4. Admixtures:
   a. Air entraining and chemical admixtures shall be charged into mixer as a solution and shall be dispensed by an automatic dispenser or similar metering device. Powdered admixtures shall be weighed or measured by volume as recommended by manufacturer. Accuracy of measurement of any admixture shall be within plus or minus 3%.
   b. Two or more admixtures may be used in same concrete, provided such admixtures are added separately during batching sequence, and provided further that admixtures used in that combination retain full efficiency and have no deleterious effect on concrete or on properties of each other.
   c. All admixtures are to be approved by Structural Engineer prior to commencing this work.

5. Retempering:
   a. Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall be discarded, not retempered.

b. Indiscriminate addition of water to increase slump is prohibited.
c. When concrete arrives at project with slump below that suitable for placing, water may be added only if neither maximum permissible water-cement ratio nor maximum slump is exceeded. Water shall be incorporated by additional mixing equal to at least half of total mixing time required. Any addition of water above that permitted by limitation of water-cement ratio shall be accompanied by a quantity of cement sufficient to maintain proper water-cement ratio. Such additions shall only be used if approved by Architect. In any event, with or without addition of cement, not more than 2 gallons of water per cubic yard of concrete, over that specified in design mix, shall be added.

6. Cold Weather Batching: When average of the highest and lowest air temperature falls below 40 degrees F for more than three consecutive days, provide adequate equipment for heating concrete materials. No frozen materials or materials containing ice shall be used. When placed in forms, concrete placed in these temperatures shall have a minimum temperature based on dimensions of concrete sections placed per ACI 301.
7. Hot Weather Batching: Concrete deposited in hot weather shall have a placing temperature below 90 degrees F per ACI 301. If necessary, ingredients shall be cooled to accomplish this.

2.3 FLOOR LEVELING AND FILL MATERIALS

A. Epoxy Concrete Mortar: Floor leveling, non-shrink trowel applied epoxy concrete mortar; TPM 115 General Polymers Corp., A-H Emery Epoxy Topping #170 Anti-Hydro Corp., or approved equal, where areas to fill are less than 1/4 inch thick.

B. Concrete Mortar: Floor leveling, patching and repair, non-shrink trowel applied concrete mortar; Master Builders EMBECO 411-A, Euclid EUCO, or approved equal, where areas of fill are greater than 1/4 inch thick.

C. Cementitious Floor Leveling Material: Shall be self-leveling or trowelable with a minimum 28 day compressive strength of 3000 psi in accordance with ASTM C-109. Material shall be equal to Quickrete No. 1249, Ardex V-800/K-55, Mapei "Ultra/Flex" or approved equal.

PART 3 - EXECUTION

3.1 PLACEMENT

A. Before any concrete is placed, the following items of work shall have been completed in the area of placing.
1. Forms shall have been erected, adequately braced, cleaned, sealed, lubricated if required, and bulkheaded where placing is to stop.
2. Any wood forms other than plywood shall be thoroughly water soaked before placing any concrete. The wetting of forms shall be started at least 12 hours before concreting.
3. Reinforcing steel shall have been placed, tied and supported.
4. Embedded work of all trades shall be in place in the forms and adequately tied and braced.
5. The entire place of deposit shall have been cleaned of wood chips, sawdust, dirt, debris, hardened concrete and other foreign matter. No wooden ties or blocking shall be left in the concrete except where indicated for attachment of other work.
6. Reinforcing steel, at the time the concrete is placed around it, shall be cleaned of scale, mill scale or other contaminants that will destroy or reduce bond.
7. Concrete surfaces to which fresh concrete is to be bonded shall be brush cleaned to remove all dust and foreign matter and to expose the aggregate, and then coated with the bonding adhesive herein specified.
8. Prior to placing concrete for any slabs on grade, the moisture content of the subgrade below the slabs shall be adjusted to at least optimum moisture.
9. No concrete shall be placed until formwork and reinforcement has been approved by Architect. Clean forms of all debris and remove standing water. Thoroughly clean reinforcement and all handling equipment for mixing and transporting concrete. Concrete

shall not be placed against reinforcing steel that is hot to the touch. Notify Structural Engineer 48 hours in advance of concrete pour.

B. Conveying: Handle concrete from mixer to place of final deposit by methods which will prevent separation or loss of ingredients. Deposit concrete in forms as nearly as practicable at its final position in a manner which will insure that required quality is obtained. Chutes shall slope not less than 4 inches and not more than 6 inches per foot of horizontal run.

C. Depositing: Deposit concrete into forms in horizontal layers not exceeding 24 inches in thickness around building, proceeding along forms at a uniform rate and consolidating into previous pour. In no case shall concrete be poured into an accumulation of water ahead of pour, nor shall concrete be flowed along forms to its final place of deposit. Fresh concrete shall not be permitted to fall from a height greater than 6 feet without use of adjustable length pipes or, in narrow walls, of adjustable flexible hose sleeves. Concrete shall be scheduled so that placing is a continuous operation for the completion of each section between predetermined construction joints. If any concreting operation, once planned, cannot be carried on in a continuous operation, concreting shall stop at temporary bulkheads, located where resulting construction joints will least impair the strength of the structure. Location of construction joints shall be as shown on the drawings or as approved by Structural Engineer. The rate of rise in walls shall not be less than 2 feet per hour.

1. Consolidation: Concrete shall be thoroughly compacted and worked to all points with solid continuous contact to forms and reinforcement to eliminate air pockets and honeycombing. Power vibrators of approved type shall be used immediately following pour. Spading by hand, hammering of forms or other combination of methods will be allowed only where permitted by Structural Engineer. In no case shall vibrators be placed against reinforcing steel or used for extensive shifting of deposited fresh concrete. Provide and maintain standby vibrators, ready for immediate use.
2. Hot Weather Concreting: Unless otherwise directed by the Architect, perform all work in accordance with ACI 305 when air temperature rises above 75 degrees F and the following:
   a. Mixing Water: Keep water temperature as low as necessary to provide for the required concrete temperature at time of placing. Ice may be required to provide for the design temperature.

      Aggregate: Keep aggregate piles continuously moist by sprinkling with water.

      Temperature of Concrete: The temperature of the concrete mix at the time it is being placed in the forms shall not exceed 90 degrees F per ACI 301. The method employed to provide this temperature shall in no way alter or endanger the design mix or the design strength required.

      Dampen subgrade and formwork before placing concrete. Remove all excess water before placing concrete. Keep concrete continuously wet when air temperature exceeds 85 degrees F for a minimum of 48 hours after placing concrete. For slab on grade construction, see Section 3.1.E.

      Protection: Minimize evaporation from concrete in place by providing shade and windbreaks. Maintain such protection in place for 14 days minimum.
3. Cold Weather Concreting: Follow recommended ACI 306 procedures when average of the highest and lowest air temperature falls below 40 degrees F for more than three consecutive days, as approved by Architect. Concrete placed in these temperatures shall have a minimum temperature based on dimensions of concrete sections placed as shown in ACI 301. No chemicals or salts shall be used to prevent freezing and no accelerating agents shall be used without prior approval from Architect.

D. Construction Joints: Install only as indicated and noted on Drawings. Joints not indicated on Drawings shall be so located, when approved, as to least impair strength of structure, and shall conform to typical details. Construction joints shall have level tops, vertical sides. Horizontal construction joints shall be thoroughly cleaned and roughened by removing entire surface film and exposing clean aggregate solidly embedded in mortar matrix. Joints between concrete and masonry shall be considered construction joints. Vertical construction joints need not be roughened. See Drawings for doweling and required keys.

1. Roughen construction joints by any of following methods:
   a. By sandblasting joint.
   b. By thoroughly washing joint, using a high pressure hose, after concrete has taken initial set. Washing shall be done not less than 2 hours nor more than 4 hours after concrete has been poured, depending upon setting time.
   c. By chipping and wire brushing.
2. All decisions pertaining to adequacy of construction joint surfaces and to compliance with requirements pertaining to construction joints shall be reviewed with the Structural Engineer.
3. Just before starting new pour, horizontal and vertical joint surfaces shall be dampened (but not saturated).
4. Before placing regular concrete mix, horizontal construction joint surfaces shall be covered with a layer of mortar composed of cement and fine aggregate of same proportions as that used in prescribed mix, but omitting coarse aggregate.
5. For slabs, construction joints shall be in locations shown on plan. If not shown, locate at intervals not exceeding 150 feet in each direction. Refer to drawings for proper details for reinforcing at construction joints.

E. Concrete Slabs on Grade:
1. Exterior and interior concrete slabs on grade shall be poured as required under this Section. Base shall be accurately leveled and compacted prior to placing of concrete.
2. Typically, interior slabs on grade shall be poured over a minimum of four (4 inch) inches of compacted crushed rock, unless otherwise indicated, over a vapor retarder.
3. Protect slab on grade subbase from moisture prior to placing concrete. Avoid wetting rock layer to allow adequate concrete curing and avoid future vapor transmission. If the subbase has been wet excessively, verify that water has been eliminated prior to placement of concrete.
4. Vapor Retarder installation shall be in accordance with manufacturer's instructions and ASTM E 1643-98.
   a. Unroll Vapor Retarder with the longest dimension parallel with the direction of the pour.
   b. Lap Vapor Retarder over footings and seal to foundation walls.
   c. Overlap joints 6 inches and seal with specified tape.
   d. Seal all penetrations (including pipes) per manufacturer's instructions.
   e. No penetration of the Vapor Retarder is allowed except for reinforcing steel and permanent utilities.
   f. Repair damaged areas by cutting patches of Vapor Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

F. Control Jointing - Slabs on Grade:
1. Joints shall be in locations indicated on Drawings, or as directed by Architect.
2. Joints in interior slabs shall be made by one of following methods:
   a. By use of construction joints laid out in checkerboard pattern; pour and allow alternate slabs to set; fill out balance of checkerboard pattern with second pour.
   b. By use of dummy groove joints at least 1/4 depth of slab, and at least 1/8 inch wide. These joints may be sawcut as soon as wet concrete can support the weight of the equipment and operator. Delaying sawcutting past this point will make jointing ineffective.
3. Control jointing in exterior paving slabs shall be laid out in a checkerboard pattern; pour as described above, but with joint edges tooled to provide a uniform joint at least 3/8 inch in depth.
4. Slab reinforcing need not be terminated at control joints.
5. Construction and expansion joints shall be counted as control joints.

G. Expansion Joints:
1. Unless otherwise indicated, use 3/8 inch thick expansion joint filler. See Section 2.1.H.
2. Joints in interior slabs on grade shall be only in locations indicated.

3. Joints in exterior slabs on grade shall be installed at each side of structures, at curb transitions opposite apron joints, at ends of curb returns, at back of curb when adjacent to sidewalk, and at uniformly spaced intervals not exceeding 20 feet.
4. Edges of concrete at joints shall be edger finished to approximately 3/8 inch radius.
5. Interrupt reinforcing at all expansion joints.

H. Score markings on exterior slabs on grade shall be located as indicated. Where not indicated, mark slabs into rectangles of not less than 12 square feet nor more than 20 square feet using a scoring tool which will leave edges of score markings rounded.

3.2 CURING AND PROTECTION

A. Curing: Exposed surfaces of all concrete used in structure shall be maintained in a moist condition for at least 7 days after placing. The following final curing processes shall normally be considered to accomplish this. Concrete shall be maintained at not less than 50 degrees F nor more than 100 degrees F for a period of 72 hours after being deposited.
1. Flatwork to be exposed, stained, or painted shall have curing process submitted and approved by the architect prior to construction
2. Initial Curing Process - Flat Work:
   a. Mist Spraying: As soon as troweling of concrete surfaces is completed, exposed concrete shall be sprayed continuously with a special atomizer spray nozzle, capable of producing a fine mist. Spraying shall be done without any dripping of water from nozzle. Amount of spraying shall be such as to maintain surface of concrete moist without any water accumulating on surface. Maintain spraying for a minimum of 12 hours, or until such time as hereinafter described curing process is applied. Mist spraying will not normally be required when the ambient air temperature is below 90 degrees F.
3. Final Curing Process - Flatwork: Except as noted, use any of following:
   a. Water Curing: Concrete shall be kept wet by mechanical sprinklers or by any other approved method which will keep surfaces continuously wet.
   b. Saturated Burlap Curing: Finished surfaces shall be covered with a minimum of two layers of heavy burlap which shall be kept saturated during the curing period.
   c. Curing Compounds: Membrane curing compounds of chlorinated rubber or resin type conforming to ASTM C309 may be used only if specifically approved by Architect. Use of membrane curing compound will not be permitted on surfaces to be painted, or to receive ceramic tile, membrane water-proofing or hardeners and sealers. Membrane curing compound may be used in areas to receive resilient floor tile, provided it is wax-free, compatible with adhesive used and approved by adhesive manufacturer. Agitate curing compounds thoroughly by mechanical means continuously during use and spray or brush uniformly in accordance with manufacturer's recommendations. Apply immediately following final finishing operation. All curing compounds shall conform to State of California Air Resources Board VOC Regulations.
   d. Waterproof paper conforming to ASTM C 171, or opaque polyethylene film, may be used. Concrete shall be covered immediately following final finishing operation. Anchor paper or film securely and seal all edges in such a manner as to prevent moisture escaping from concrete.
4. Curing Process - Formed Surfaces: Forms heated by sun shall be kept moist during curing period. If forms are to be removed during curing period, curing as described for flatwork shall be commenced immediately.

B. Refer to Drawings for areas of concrete slab not to receive curing compounds or hardening compounds. Where concrete floors are to receive heavy duty coatings, waterproof coatings and the like, verify with coating installer the type of finish required for specified coating.

C. Protection: Contractor shall be responsible for protection of finished concrete against injury by rain, cold, vibration, animal tracks, marking by visitors, vandalism, etc.

D. Provide additional curing agents or compounds, not necessarily listed herein, but as recommended and or required for use with shake type hardeners or other special coatings and coverings by their manufacturers for a complete and proper installation.

3.3 FINISHES

A. Formed Surfaces:
   1. Rough Form Finish: Surfaces shall be reasonably true to line and plane with no specified requirements for selected facing materials. Tie holes and defects shall be patched and fins exceeding 1/4 inch in height shall be rubbed down with wooden blocks. Fins and other rough spots at surfaces to receive membrane waterproofing shall be completely removed and the surfaces rubbed smooth. Otherwise, surfaces shall be left with the texture imparted by forms.
      a. Rough finish shall be used for the following areas:
         1) Below grade and unexposed surfaces.
   2. Smooth Plywood Form Finish: Finish shall be true to line and plane. Tie holes and defects shall have been patched and ground with surface fins removed. Arrangement of plywood sheets shall be orderly, symmetrical, as large as practical and free of torn grain or worn edges. Surface concrete shall be treated with 1 part muriatic acid, in three parts water solution, followed immediately by a thorough rinsing with clear water. Surfaces which are glazed, have efflorescence, or traces of form oil, curing compounds or parting compounds shall be cleaned or treated to match other formed surfaces, except as otherwise indicated or specified.
      a. Smooth Plywood Form Finish shall be used for the following areas:
         1) All surfaces above grade unless otherwise specified.
         2) At Contractor's option, may also be used in lieu of rough form finish.
   3. Smooth Plastic Liner Finish: Surface shall be smooth, concrete free of honeycombing, air pockets larger than 1/8 inch in diameter, and fins.
      a. This finish shall be used only where indicated on the Drawings.

B. Flatwork (Slabs and Floors):
   1. Unless otherwise indicated or specified, flatwork shall have an integral monolithic finish.
   2. Integral Monolithic Finish: Apply as soon as freshly poured concrete slabs will bear weight of workers. Pour slabs full thickness to finish floor elevations indicated. At proper time, tamp surface repeatedly with a wire mesh or grid tamper in a manner to force aggregate down below surface and to bring sufficient mortar to surface to provide for a smooth coating of cement mortar over entire surface. Allow surface mortar to partially set, then float with wooden floats and finish with one of following, as required.
      a. Broom Finish: Steel trowel surface to a smooth dense surface free of lines, tool marks, cat faces and other imperfections. After troweling, and before final set, give surface a broom finish, brushing in direction noted on Drawings, or as directed. Broom finish shall be used typically on exterior flatwork except as otherwise indicated or specified and shall be "medium" texture as approved by Architect.
      b. Smooth Steel Trowel Finish: Apply 2 steel trowelings to obtain hard, smooth surface. All lips, irregularities, uneven levels, etc. shall be worked out before last troweling. All interior flatwork shall have a smooth steel trowel finish unless specified otherwise.
   3. Tolerances:
      a. For tolerances not indicated, refer to ACI 117.
      b. Slabs on grade – Comply with F_F & F_L as specified by Architect, or at a minimum shall be sufficiently even to contact a 10' long straightedge with a tolerance of 1/8 inch.
      c. Concrete over metal deck – Refer to Section 05 30 00 for minimum requirements.
      d. Elevated slabs – Comply with Architectural requirements.
      e. Finished surfaces of exterior integral finished flatwork shall not vary more than 1/4 inch from a 10' long straightedge, except at grade changes.

C. Sacked Surfaces: Exposed surfaces that are unacceptable in appearance to the Architect shall be sacked.

1. Prepare concrete surfaces in accordance with the referenced standards. Remove any form release materials by stoning by hand, power grinding or other method approved by the Architect.
2. Prepare concrete surfaces to receive sack finishing with a light sand blasting.
3. For best results, grout application and rubbing should be performed when areas to be treated are shaded and during cool, damp weather. When work is to be performed in hot and dry weather, a fog spray should be available for continuous use.
4. Prepare grout samples for matching of concrete surfaces for approval by the Architect. These shall be made in the following proportions of gray cement to white cement to sand: 1:1:2, 1:2:3, and 2:1:3, etc. until the correct matching color is obtained on the test areas. Sand should be fine enough to pass the Number 30 sieve. Mixes should be made to a good workable consistency in a clean container and the mix with the best color chosen, or modified if needed.
5. Provide sufficient qualities of sand and cement from the same source for the complete work at the job site.
6. Mixing and Application:
    a. Mixing of grout on the job should be timed for it to be used up within 1 to 1-1/2 hours.
    b. Let the grout stand 20 to 30 minutes after mixing, and then remixed before applying.
    c. Soak the concrete surface thoroughly with water at least 15 minutes before applying grout and again just before application so that the surface is adequately wet during the operation.
    d. Apply grout with plasterer's trowel or sponge rubber float in sweeping strokes from the bottom up. Brush or spray gun applications may be used when approved by the Architect.
    e. Work in freshly applied grout vigorously with a sponge rubber float, then let sit until some of its plasticity is gone but not until it loses its damp appearance. At this point it shall be rubbed with clean, dry burlap to remove the excess grout, leaving no visible film on the surface but filling all air holes.
    f. Keep the surface wet for a day after grouting and sack rubbing are completed.
7. Alternate methods of application and materials shall be subject to the approval of the Architect.

3.4 PATCHING

A. Formed Surfaces:
1. Promptly upon removal of contact forms and after concrete surfaces have been inspected, form ties shall be removed and all necessary patching and pointing shall be expertly done.
2. Honeycombed areas shall be removed down to sound concrete, coated with a bonding grout or approved compound and patched using a low shrinkage high bond mortar. Patched areas shall be cured by being kept damp for at least 5 days.
3. Tie holes shall be cleaned, dampened and filled solid with patching mortar or cement plugs of an approved variety.

B. Slabs on Grade: After entire slab is finished, shrinkage cracks that may appear shall be patched as follows:
1. Where slab is not exposed or where appearance is not important, cracks larger than 1/32 inch wide shall be filled with cement grout and struck off level with surface.
2. Where slab is exposed and appearance is important, unsightly cracks shall be repaired in a manner satisfactory in appearance to Architect. If this cannot be accomplished, concrete shall be considered defective.

3.5 DEFECTIVE CONCRETE

A. Defective concrete shall mean any of the following:
1. Concrete not meeting 100 percent of the specified 28 day compressive strength.

2. Concrete exhibiting rock pockets, voids, spalls, streaks, cracks, exposed reinforcing to extent that strength, durability, or appearance is adversely affected.
3. Concrete significantly out of place, line, or level.
4. Concrete not containing the required embedded items.

B. Upon determination that concrete strength is defective:
1. Should cylinder tests fall below minimum strength specified, concrete mix for remainder of work shall be adjusted to produce required strength. Core samples shall be taken and tested from cast-in-place concrete where cylinders and samples indicate inferior concrete with less than minimum specified strength.
a. Cores of hardened concrete shall be taken and tested in accordance with ASTM C 42 and C 39. Number and location of such cores shall be subject to the approval of Architect.
b. Cost of core sampling and testing will be paid for by the Contractor.
c. “85 percent” reduction in ACI 318 Section 5.6.5 will not justify low cylinder tests.

C. Upon determining that concrete surface is defective, Contractor may restore concrete to acceptable condition by cutting, chipping, pointing, patching, grinding, if this can be done without significantly altering strength of structure. Permission to patch defective areas will not be considered a waiver of the right to require removal if patching does not, in the opinion of the Architect, satisfactorily restore quality and appearance.

D. If core tests indicate that concrete is below the strength specified, or if patching does not restore concrete to specified quality and appearance, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.

E. No repair work shall begin until procedure has been reviewed by the Architect and Structural Engineer.

3.6 SURFACE HARDENER AND SEALER

A. Seal all interior exposed flatwork with clear sealer, except surfaces receiving ceramic tile, quarry tile, poured flooring or other special finishes specified, or as scheduled on the Drawings.
1. Apply sealer in 2 or 3 coats, in accordance with manufacturer's directions, using the maximum quantity recommended.
a. Concrete floors must be thoroughly cured for a minimum of 30 days and completely dry before treatment.
b. Surfaces to be treated must be clean, free of membrane curing compounds, dust, oil, grease and other foreign matter.
c. Upon completion, concrete surfaces shall be clean and without discoloration or traces of excess hardener left on the surface.

B. Apply sprayable hardener/sealer at locations as scheduled or as indicated on the Drawings. Apply in accordance with the manufacturer's favorably reviewed application instructions and recommendations.

3.7 GROUTING

A. Prepare and place grout materials at locations as indicated on the Drawings in accordance with the manufacturer's recommendations and installation instructions.

B. Pack grout materials solidly between bearing surfaces and bases or plates as indicated and to ensure no voids.

3.8 ADJUSTING AND CLEANING

A. Remove all debris, excess materials, tools and equipment resulting from or used in this operation at completion of this work.

END OF SECTION – 03 30 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 04 21 29.13

TERRA COTTA RAINSCREEN SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section Includes:
   1. Exterior terra cotta rainscreen cladding system including terra cotta panels, aluminum subgirts, angle brackets, vertical carrier extrusions, clips and installation anchors and accessories.
   2. Interior terra cotta cladding system including terra cotta panels, subgirts, brackets, clips, and installation anchors and accessories.

B. Related Sections:
   1. Cold formed metal framing is specified in Section 05 40 00.

1.2 SUBMITTALS

A. Samples: Two samples, minimum 12-inch x 12-inch, of each type, finish and color of terra cotta required. Show range of color, pattern, and finish.

B. Shop Drawings: Show terra cotta panel sizes, dimensions, sections and profiles, arrangement and provisions for jointing, anchoring, and fastening panels in place, back-up support system including subgirts, angles, vertical carrier extrusions, and other supports, and details for lifting devices and reception of other work.

C. Mock-Up: Refer to Section 01 43 39 for mock-up requirements.

D. Calculations: Furnish for information only, calculations signed by a registered structural engineer, showing that terra cotta, anchorage, and setting materials comply with code requirements. Include test data and/or reports to verify characteristics of materials as required by codes.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have a minimum of 10-years demonstrated capability to produce terra cotta panels of the quality and scope required. Manufacturer shall be capable of providing detailed shop drawings, field service representation during construction, and approval of acceptable installers and approval of application method.

B. Installer Qualifications: Experienced in the installation of stone cladding systems similar to that required for this Project and acceptable by the manufacturer.

C. Pre-Installation Meetings: Conduct pre-installation meeting to verify Project requirements, substrate conditions, manufacturer’s installation instructions, and manufacturer's warranty requirements.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

B. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle material and components to avoid damage. Protect material against damage from elements, construction activities, and other hazards before, during and after installation.

1.5 WARRANTY

A. Warrant terra cotta cladding system to be free from defects in materials and workmanship for a period of 5-years from date of Substantial Completion. This warranty shall be in addition to and not a limitation of other rights the District may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Faveton CERAM series ventilated ceramic facade.
   1. The manufacturer shall supply all the materials and accessories needed for a complete installation and a fully warranted system.

2.2 MATERIALS

A. Terra Cotta Panels: Hollow chamber cross section double leaf with a 0.984” thickness.
   1. Performance Requirements:
      a. Absorption: less than 1%, ASTM C67.
   2. d. Linear Coefficient of Thermal Expansion: 0.04-percent.
   3. e. Hardness Resistance: 7 to 9.
   4. f. Efflorescence: No efflorescence, ASTM C67.
   5. g. Chemical Resistance Test: No change in color or texture, ASTM C126.
   6. h. Dimensions and Tolerances:
      1) Length: +/- 0.40-inch for cut length
      2) Height: +/- 0.100-inch
      3) Thickness: +/- 0.060-inch.
      4) Straightness: _+/- 0.25-percent of length.
      5) Diagonal Flatness: +/0 0.25-percent of diagonal.
      6) Vertical Flatness: +/- 1.0-percent of height.
      7) Torsion: +/- 0.25-percent of diagonal.
   7. Panel Sizes: 1ft x 4ft.
   8. Color and Finish: Smooth Surface, Match Terrart 6.01-1 Color.

2.3 ATTACHMENT SYSTEM

A. ALLFACE F2.20Z (overall depth 3.90”).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other Sections) are acceptable for product installation in accordance with manufacturer’s instructions.

   1. Field Measurements: Verify actual measurements/openings by field measurements before fabrication. Confirm recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

3.2 INSTALLATION

A. Install terra cotta cladding system systems plumb, level and true to line, with manufacturer's prescribed tolerances and installation instructions. Provide supports and anchor in place.
   1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
   2. Coordinate installation with wall flashings and other components of construction.

B. Where interior and exterior terra cotta cladding systems meet, the face of exterior and interior terra cotta panels shall be flush.
   1. Factory cut miter exterior corners.

3.3 PROTECTION AND CLEANING

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect terra cotta panels from damage from harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to District's acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION – 04 21 29.13

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 05 12 00

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Requirements of Division 1 apply to all Work of this Section.

1.2 SCOPE

A. Furnish and install all structural steel as shown and specified including, but not necessarily limited to the following:
   1. Prime coat painting and touch up.
   2. All cast-in-place anchor bolts, nuts, plates, etc.
   3. 10 gauge steel or 3/4 inch plywood templates for column anchor bolts.

1.3 RELATED WORK (See also Table of Contents)

A. Metal Decking: Section 05 30 00.

B. Metal Fabrications: Section 05 50 00.

C. Cast-In-Place Concrete: Section 03 30 00.

1.4 QUALITY ASSURANCE

A. General:
   1. Comply with the referenced ASTM standards for materials.
   2. Perform all welding only with AWS certified welders.
   3. Verification of accuracy:
      a. Engage and pay for a registered civil engineer or licensed land surveyor to check the alignment, plumbness, elevation, and overall accuracy of the erected framing at appropriate stages during construction and at completion of erection. Prior to erection, a survey shall be made of the as-built locations of all anchor rods and other embedded items associated with the attachment of structural steel. The party providing the survey shall submit written verification that the entire installation is in accordance with the contract documents and meets the allowable erection tolerances as set forth in the AISC "Code of Standard Practice for Steel Buildings and Bridges".
      b. Columns shall be verified at each lift. Column shim details and procedures shall be submitted for review.
   4. Paint:
      a. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use thinners approved by paint manufacturer, and use within recommend limits.
      b. Coordination of Work: Review other Sections in which prime paints are to be provided to ensure compatibility of coatings system for various substrates. Upon request, furnish information or characteristics of finish materials to be used.
      c. Requirements of Regulatory Agencies: Comply with applicable rules and regulations of governing agencies for air quality control.

B. Except where other requirements are specified, comply with the following standards by American Institute of Steel Construction (AISC) and American Welding Association (AWS):
   1. AISC 360-10 "Specification for Structural Steel Buildings".

2. AISC 303-10 "Code of Standard Practice for Steel Buildings and Bridges".
3. AISC 341-10 “Seismic Provisions for Structural Steel Buildings”
4. AISC 358-10 “Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications”
5. RCSC "Specifications for Structural Joints Using High Strength Bolts".
6. AISC 303-10 Section 10, Architecturally Exposed Structural Steel, Code of Standard Practice for Steel Buildings and Bridges
7. AWS D1.1 "Structural Welding Code - Steel" – latest edition
8. AWS D1.8 “Structural Welding Code – Seismic Supplement” – latest edition
9. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".
10. SSPC-Vis 1 Pictorial Surface Preparation Standards for Painting Steel Structures
11. SSPC-SP2 Hand Tool Cleaning
12. SSPC-SP3 Power Tool Cleaning
13. SSPC-SP6 Commercial Blast Cleaning
14. SSPC-PA2 Measurement of Dry Paint Thickness with Magnetic Gauges
15. 2013 California Building Code (CBC).

C. Submittals: (Submit under provisions of Section 01 32 19)
   1. Product Data: Include laboratory test reports and other data to show compliance with specifications (include specified standards). Include certified copies of mill reports covering chemical and physical properties of each type of structural steel.
   2. Shop Drawings:
      a. Shop drawings shall include complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
      b. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld.
      c. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.
      d. Dimensions required to locate structural steel for manufactured items such as mechanical equipment, electrical equipment, dock levelers, etc., shall be coordinated and provided by the General Contractor. General Contractor shall also coordinate and provide dimensions to locate structural steel for window washing supports such as davits, tie-backs, etc.
   3. Procedures:
      a. Provide weld procedures for both prequalified welds and special welds to be submitted to the Owner's Testing Laboratory and the Architect.
      b. Provide installation procedure and inspection for direct tension indicator washers detailed in supplemental specifications provided by the manufacturer for approval.
      c. Procedures shall be submitted for both shop and field welds.

D. Tests and Inspections:
   1. A testing program is required prior to start of construction. Testing program to be done in Compliance with the 2013 CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
   2. Testing Laboratory:
      a. An inspection and testing laboratory will be selected by the Owner for testing and inspection as required by the Contract Documents. The selected laboratory shall conform to the requirements of ASTM E329 (Recommended Practice for Inspection and Testing Agencies used in Construction). Documentary evidence of such conformance shall be submitted to the Owner and the governing agency.
      b. All materials, work, methods and equipment shall be subject to inspection at the mill, fabricating plant and at the building site. Material or workmanship not complying fully

with the Contract Documents will not be accepted. The Contractor shall give the Testing Laboratory reasonable notice when ready for inspection and shall supply samples and test pieces and all facilities for inspection without extra charge. The Owner will assume the expense of making the tests and inspection except as otherwise specified in Division

3. Cost of Testing and Inspection: Costs of testing and inspection of structural steel, except as specified hereunder and in Division 1, will be paid for by the Owner.
   a. All transportation costs and per diem living costs for inspection at fabricators' plant further than 75 miles from the job site will be back-charged to the Contractor.
   b. It is assumed that all fabrication will take place in one shop location only. All additional inspection costs will be back-charged to the Contractor.
   c. All mill tests and costs of re-test of plain materials shall be at the expense of the Contractor.
   d. Costs of tests required due to Contractor's failure to provide steel identifiable in accordance with the indicated ASTM designation shall be at the expense of the Contractor.
4. Structural Steel Testing and Inspection:
   a. Structural Steel: If structural steel tests are indicated as required on the structural drawings, one tension and one bend test shall be made for each size of structural shape, plate and for each tube and pipe size. Tests to be made in accordance with requirements of appropriate ASTM designations.
   b. If structural steel tests are not indicated as required on the structural drawings, then for shapes, plates, bars, pipe and tubing, manufacturer's certified mill test reports and analysis for each heat will be acceptable for steel identifiable in accordance with indicated ASTM designation. Mill test reports shall indicate the physical and chemical properties of all structural steel used. Correlate individual heat numbers with each specified structural section.
   c. Unidentifiable Steel:
      1) For Fy less than or equal to 36.0 ksi : Provide one tension and elongation test and one bend for each 5 tons or fraction thereof for each size.
      2) For Fy greater than 36.0 ksi : Provide one tension and elongation test and one bend or flattening for each piece.
   d. Costs of retests and additional testing required by the use of unidentifiable steels shall be the Contractor's responsibility. Additional costs of testing incurred by the Owner shall be deducted from the Contract Final Payment.
5. Expansion Anchors: Load test as indicated on drawings.
6. Welding Inspection:
   a. For Moment Resisting Frame Welding inspection and testing requirements, see specification Section 05 12 24 - Welding of Moment Resisting Frames.
   b. If shop or field welding inspection is indicated on the structural drawings or required by the applicable referenced standards, shop and field welded operations shall be inspected in accordance with AISC 360 Section N by a qualified welding inspector employed by the Testing Laboratory. Such inspector will be a person trained and thoroughly experienced in inspection of welds. The inspector's ability to distinguish between sound and unsound welding will be reliably established
   c. The welding inspector will make a systematic record of all welds. This record shall include:
      1) Identification marks of welders.
      2) List of defective welds.
      3) Manner of correction of defects.
   d. The welding inspector will check the material, equipment and procedure, as well as the welds. He will also check the ability of the welder. He will furnish the Architect with a report, duly verified by him that the welding which is required to be inspected is proper, and has been done in conformity with the Contract Documents, and that he has used all means to determine the quality of the welds.
   e. All full penetration groove welds will be subject to ultrasonic testing, as per AWS D1.1,

Clause 6 "Inspection, Part "F", Ultrasonic Testing (UT) of Groove Welds. All defective welds shall be repaired and retested with ultrasonic equipment at the Contractor's expense.

f. Column Flanges: An area extending 6 inches above and below point where girder flanges are attached will be inspected. Column flange edges will be inspected visually and entire area ultrasonically for lamination, plate discontinuities, and non-metallic inclusions.
g. When ultrasonic indications arising from the weld root can be interpreted as either a weld defect or the backing strip itself, the Engineer will be notified. The Engineer may require the removal of backing strip. The backing strip will be removed at the expense of the Contractor, and if no root defect is visible the weld will be retested. If no defect is indicated on this retest, and no significant amount of base and weld metal have been removed, no further repair of welding is necessary. If a defect is indicated, it will be repaired and retested at Contractor's expense.
h. The ultrasonic instrumentation will be calibrated by the technician to evaluate the quality of the welds in accordance with AWS D1.1.
i. Other methods of inspection, for example, X-Ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if felt necessary by the inspection laboratory, and with the approval of the Engineer.
j. Base metal thicker than 1-1/2 inches, when subjected to through thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such weld before and after joint completion.
k. End-welded studs shall be sampled, tested, and inspected per the requirements of AWS D1.1, Clause 7 Stud Welding.
l. At the discretion of the owner's testing agency, the ultrasonic testing frequency may be reduced but may not be less than the following:
m. Initially, all welds requiring ultrasonic testing will be tested at the rate of 100 percent in order to establish the qualifications of each individual welder. If the reject rate is demonstrated to be less than 5 percent of the welds tested for each welder, then the frequency of testing for that welder may be reduced to 25 percent. If the reject rate increases to 5 percent or more, 100 percent testing will be re-established until the rate is reduced to less than 5 percent. The percentage of rejects will be calculated for each welder independently.
n. A sampling of a least 40 completed welds will be made for such reduction evaluation. Reject rate is defined as the number of welds containing rejectable defects divided by the number of welds completed. For evaluating the reject rate of continuous welds over 3 ft in length where the effective throat is 1” or less, each 12 inch increment or fraction thereof shall be considered as one weld. For evaluating the reject rate of continuous welds over 3 ft in length where the effective throat is greater than 1”, each 6 inch of length or fraction thereof shall be considered one weld.

7. High Strength Bolting Tests and Inspection:
   a. Furnish certified test reports for each lot of bolts in accordance with Section 9 of ASTM A325 and A490. Install bolts under the supervision of a qualified inspector in accordance with Section 9, Research Council "Specifications for Structural Joints using ASTM A325 or A490 Bolts".
   b. If high strength bolting inspection is indicated on the structural drawings or required by the applicable referenced standards, the testing laboratory shall provide inspection in accordance with AISC 360 Section N.
   c. While the work is in progress, the Inspector shall determine that the requirements of this Specification are met in the work. The Inspector shall observe the calibration procedures and shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is properly used to tighten all bolts.
      1) In addition to the requirement of the foregoing paragraph, for all connections specified to be slip critical (SC), the Inspector shall assure that the specified

procedure was followed to achieve the pretension specified in the AISC. The pretension shall be verified by the inspector for these bolts.

2) Bolts in connections identified as not being slip-critical nor subject to direct tension need not be inspected for bolt tension other than to ensure that the piles of the connected elements have been brought into snug contact.

1.5 PRODUCT HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

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

1.6 SEQUENCING/SCHEDULING

A. Cooperate and coordinate this work with other trades for anchor bolts, and other required inserts, templates, etc. Align this work prior to installation of other materials.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel: Except where indicated on drawings.
1. W shapes: ASTM A572-50 or ASTM A992-50 unless indicated otherwise on drawings.
2. Channels and other rolled shapes: ASTM A36 unless indicated otherwise on drawings.
3. Angles, plates and bars: ASTM A36 unless indicated otherwise on drawings.

B. AISC group 4 and 5 shapes and plates greater than 2 inches thick: ASTM A36 and/or ASTM A572 Grade 50 with supplementary requirements S91 Fine Austenitic Grain Size and S5 Charpy V-Notch Impact Test. For location of Charpy V-Notch test, see ASTM A6 Supplementary Requirement S30. Charpy V-Notch test shall be per ASTM A673, frequency P and shall meet a minimum average value of 20 ft-lbs absorbed energy at 70^{o} F.

C. Cold-Formed Steel Tubing: ASTM A500, Grade B.

D. Steel Pipe: ASTM A53, Type E or S, Grade B.

E. Anchor Bolts: All anchor bolts cast in concrete or masonry shall be headed bolts with cut threads conforming to ASTM F1554 grade 36, 55 (weldable per S1 Supplementary Requirements), or 105 as indicated on drawings.

F. Machine Bolts: ASTM A307.

G. High Strength Bolts, Nuts and Washers: Install in accordance with requirements for A325 and A490 slip critical and snug tight conditions as indicated on drawings. Install high strength bolts with snug tight type connections with threads included in shear plane except as otherwise noted. Install hardened washers in conformance with AISC Specifications.
1. Bolt Specifications: Bolts shall conform to the requirements of the current edition of the Specifications of the American Society for Testing and Materials for High-Strength Bolts for Structural Steel Joints, ASTM A325, Heat Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength, ASTM A490 as indicated on drawings.
2. Bolt Geometry: Bolt dimensions shall conform to the current requirements of the American National Standards Institute for Heavy Hex Structural Bolts, ANSI Standard B18.2.1. The

length of bolts shall be such that the end of the bolt will be flush with or outside the face of the nut when properly installed.

3. Nut Specifications: Nuts shall conform to the current chemical and mechanical requirements of the American Society for Testing and Materials Standard Specification for Carbon and Alloy Steel Nuts, ASTM A563, Appendix Table X1.1. Provide Grade A Heavy Hex nuts for Grade 36 and 55 threaded rods. Provide Grade DH or ASTM A194-2H Heavy Hex nuts for Grade 105 threaded rod.
4. Washers: Flat circular washers and square or rectangular beveled washers shall conform to the current requirements of the American Society for Testing and Materials Standard Specification for Hardened Steel Washers, ASTM F436. Washers for base plates shall conform to ASTM F844 and shall be placed top and bottom of plate.
5. Tension Control Fastener System: Bolts shall conform to the requirements of the current edition of the Specifications of the American Society for Testing and Materials for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, ASTM F1852, providing equivalent properties to ASTM A325 or A490 as indicated on drawings.

H. Headed Stud-Type Shear Connectors: ASTM A108 Grade 1015 or 1020 Cold-finished carbon steel with dimensions complying with AISC Specifications.
1. Tensile strength, 60,000 psi.
2. Elongation in 2 inches, 20 percent
3. Reduction of area, 50 percent.

I. Provide hexagonal heads and nuts for all connections per ASTM A563, Appendix Table X1.1.

J. Electrodes for Welding: Comply with AWS Code, E70 Series minimum. Fabricator to select proper electrodes according to weld procedures as submitted.

K. Shop Primer – See Section 3.4, Painting and Cleaning

L. Powder Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems.

M. Expansion Bolts: Hilti Fastening Systems “Kwik-Bolt Concrete Expansion Anchors” to concrete; Ramset “Dynabolt Sleeve Anchors” to masonry or approved equal.

PART 3 - EXECUTION

3.1 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assembly structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated to provide the flattest floor possible. The contractor shall coordinate member tolerances with finishes.

Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as indicted. Bolt field connections, except where welded connections or other connections are indicated.

C. Unless noted otherwise, make holes 1/16 inches larger than the nominal bolt diameter.

D. Welding, Shop and Field: Weld by shielded arc method, submerged arc method, flux cored arc method, or other method approved by AWS. Perform welding in accordance with AWS Code. All welders, both manual and automatic, shall be certified in accordance with AWS "Standard Qualification Procedure" for the Work to be performed. See paragraph "welding" herein, for detailed requirements. If sizes of fillet welds are not shown on drawings, use AWS minimum weld size but not less than 3/16 inch fillet welds.

E. Bolt Holes for Other Work: Provide holes required for securing other work to structural steel framing.

Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

Cut, drill, or punch holes perpendicular to metal surfaces and remove all burrs. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

F. AISC Group 4 and 5 shapes and built up members shall meet the requirements for joints in AISC Sections J1.5, J1.6, J2.7 and M2.2.

G. High Strength Bolts:
1. Installation and Tightening:
   a. Handling and Storage of Fasteners: Fasteners shall be protected from dirt and moisture at the job site. Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protected storage. Fasteners not used shall be returned to protected storage at the end of the shift. Fasteners shall not be cleaned of lubricant that is present in as-delivered condition.
   b. Tension Calibrator: A tension measuring device shall be required at all job sites where bolts in slip-critical joints are being installed and tightened. The tension measuring device shall be used to confirm: (1) the suitability to satisfy the requirements of AISC for the complete fastener assembly, including lubrication if required to be used in the work, (2) calibration of wrenches, if applicable, and (3) the understanding and proper use by the bolting crew of the method to be used. The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in 1.d. below, as applicable. The accuracy of the tension measuring device shall be confirmed through calibration by an approved testing agency at least annually.
   c. Joint Assembly and Tightening of Shear/Bearing Connections: Bolts in connections not within the slip-critical category shall be installed in properly aligned holes, but need only be tightened to the snug tight condition. The snug tight condition is defined as the tightness that exists when all plies in a joint are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. If a slotted hole occurs in an outer ply, a flat hardened washer or common plate washer shall be installed over the slot.
   d. Joint Assembly and Tightening of Connections Requiring Full Pre-tensioning. Slip-critical connections shall be installed in properly aligned holes and tightened by one of the following methods.
      1) Turn-of-nut Tightening: When turn-of-nut tightening is used, hardened washers are not required except as specified in the AISC. A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension. The test shall demonstrate that the method of estimating the snug-

tight condition and controlling turns from snug tight to be used by the bolting crews develops a tension not less than five percent greater than the tension required for slip-critical connections.

2) Installation of Alternate Design Bolts: A representative sample of not less than three bolts of each diameter, length and grade shall be checked at the job site in a device capable of indicating bolt tension. The test assembly shall include flat hardened washers, if required in the actual connection, arranged as in the actual connections to be tensioned. The calibration test shall demonstrate that each bolt develops a tension not less than five percent greater than the tension required by AISC. Manufacturer's installation procedure shall be followed for installation of bolts in the calibration device and in all connections. When alternate design features of the fasteners involve an irreversible mechanism such as yield or twist-off of an element, bolts shall be installed in all holes of the connection and initially brought to a snug tight condition. All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual fasteners. In some cases, proper tensioning of the bolts may require more than a single cycle of systematic tightening.

e. Mark bolts that have been completely tightened with an identifying symbol.

3.2 WELDING

A. General: Quality of materials and design and fabrication of all welded connections shall conform to AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Building," "AWS Code for Welding in Building Construction," and requirements of this section.

Location and type of all welds shall be as shown. Make no other welded splices, except those shown on drawings, without prior approval of the architect.

B. Automatic Welding: Use electrode wire and flux for automatic and semi-automatic welding acceptable to Structural Engineer. All methods, sequences, qualification and procedures, including preheating, and post heating if necessary, shall be detailed in writing and submitted to the Structural Engineer for review.

C. Qualification of Welders:
1. Structural steel welding: Manual and automatic welds for structural steel construction shall be made only by operators who have been previous qualified by tests, as prescribed in AWS D1.1 to perform type of work required.
2. Welders shall be checked by welding inspector. Those not doing satisfactory work may be removed, and may be required to pass qualification tests again. All qualification testing shall be at the Contractor's expense.
3. Only welders whose weld procedures and pre-qualification by testing that have passed shall be considered qualified for such welds.

D. Control cooling process after weld is completed by either step down post heat or thermal blankets as determined by procedures and prequalification.

E. Box columns and built-up members shall have ultrasonic testing before and after welding.

F. Flame cut surfaces shall be ground to remove contaminated steel layer to provide welds proper fusion without impurities.

G. Preparation of surface: Surfaces to be welded shall be free of loose scale, slag, rust, grease, paint, and any other foreign material.

H. Welding equipment: Welding equipment to be used in each case shall be acceptable to welding inspector. Use equipment with suitable devices to regulate speed, and manually adjust operating amperage and voltage. The amperage capacity shall be sufficient to overcome line drop, and to give adequate welding heat.

I. Remove runoff tabs and grind surfaces smooth where the tabs would interfere with fireproofing and architectural finishes.

J. End-welded studs:
   1. Automatic end-welded studs: Automatically end-weld in accordance with the manufacturer's recommendations in such a manner as to provide complete fusion between the end of the stud and the plates. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate. The stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch, and 3/16 inch for 3/4 inch diameter. Stud sizes indicated on drawings represent the finish stud height.
   2. Fillet-end welded studs: Studs may be welded using prequalified FCAW, GMAW, or SMAW processes provided the requirements of the AWS D1.1 Chapter 7 Section 7.5.5 are met as well as any other pertinent requirements of D1.1.

K. Provide mill camber as shown on the construction documents within AISC tolerance. Place mill tolerance upward for all beams specified no camber.

3.3 ERECTION

A. Structural steel erection: Comply with AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Building", latest edition.

B. Erection Sequence: Erect steel in accordance with special erection sequences where special erection sequences are indicated on the contract documents.

C. Before and during erection, keep all structural steel clean. Ship, handle and store steel in manner to avoid injury to members. Steel members showing evidence to rough handling or injury will be rejected.

D. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.

E. Provide sufficient bracing, shoring and guys to effect safe and satisfactory erection. Provide bracing and shoring capable of holding steel work plumb and properly aligned while field connections are being made, and until lateral force resisting elements are deemed by Architect capable of bracing structure. Temporary bracing shall be adequate to resist lateral forces from wind or seismic prior to the completion of the lateral resisting system.

F. Set bearing and base plates with extreme care. Bring level, to line and grade with leveling plates or by leveling nuts and bolts. Grout solid under plates with a flowable non-shrink grout per Section 03 30 00 prior to applying vertical load.

G. Field Assembly: Set structural framing accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

Shimming or other adjustments not indicated on drawings shall be approved by the Engineer prior to installation. Level and plumb individual members of the structure within specified AISC tolerances except as noted herein. Column shimming shall be 1/4 inch.

H. All welds shall be full and clean, and conform to AISC and AWS specifications.

I. Erection Tolerances: Individual pieces shall be erected so that the deviation from plumb, level and alignment shall not exceed 1 to 500 plus:
   1. The maximum displacement of the center line of columns adjacent to elevator shafts, from the established column line, shall not be more than 1 inch at any point.
   2. In order to provide a true, flat plane for the exterior elevations, install all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building. Also install each vertical member on such grids so that its vertical center line does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.
   3. All columns and beams shall adhere to Section M2.7 of the referenced "Specification for Structural Steel for Buildings" which states that completed members shall be free of twists, bends, and open joints. Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.

J. Temporary Flooring:
   1. Provide planking and scaffolding necessary in connection with erection of structural steel, support of erection machinery, and construction materials. Temporary floors and use of steel shall be as required by applicable regulatory requirements.
   2. If steel decking is used as a working platform, it shall be temporarily tack-welded to supports to extent necessary for such use in accordance with applicable regulatory requirements. The concentrated loading from welding machines and other heavy machinery required for steel erection shall be distributed by planking or other approved means. Metal decking that becomes damaged as the result of being used as a working platform shall be replaced at no additional cost to the Owner.

K. Tower Crane: The design for the support and bracing for a tower crane shall be the responsibility of the General Contractor. The design shall be prepared by a structural engineer licensed in the state of California. Drawings and calculations shall be stamped and signed by the structural engineer. Concentric, torsional, and/or eccentric loading to the main structure shall be resolved by the addition of structural steel for shear tabs, stiffeners, drag ties, bracing struts, etc., Such items shall be designed, detailed, furnished and installed by the contractor.

3.4 PAINTING AND CLEANING

A. Prior to prime coat application, clean all loose rust, mill scale, oil, dirt, and all other materials from all steel to be left exposed. Use hand tool, power tool, sandblasting, chemical cleaning, and any other method necessary to provide a smooth, sound surface for painting.

B. Shop prime all steel except the following:
   1. Steel encased in concrete.
   2. Contact surfaces for slip-critical (sc) high strength bolts.
   3. Areas within 4 inches of field welds.
   4. Tops of members to receive metal decking.
   5. Steel to be fireproofed.
   6. Surfaces to be galvanized.

C. Use the following Type A shop painting systems on all normal environment interior steelwork:

1. Surface Preparation: SSPC-SP2 Hand Tool Cleaning or SSPC-SP3 Power Tool Cleaning. Where jobsite exposure is expected to exceed 6 months, SSPC-SP6 Commercial Blast Cleaning is required.
2. Application: Follow coating manufacturer's printed directions.
3. Material: Type A Tnemec Company, Inc., Series V10; Sherwin Williams Steel Spec Universal; Metal Case 94-231 Series or approved equal
4. Number of Coats: One
5. Dry Film Thickness: 2.0 mils minimum.
6. Volume Solids: 56.0 +/- 2.0% minimum
7. Generic Description: Modified Alkyd.

D. Unless noted otherwise in subsection H, use the following Type B shop painting systems on all exterior steelwork and interior steelwork subjected to wet conditions or fumes (see subsection H for additional requirements)
1. Surface Preparation: SSPC-SP6 Commercial Blast Cleaning
2. Application: Follow coating manufacturer's printed directions.
3. Material: Type B Tnemec 90-97 Tneme-Zinc primer or approved equal
4. Number of Coats: One
5. Dry Film Thickness: 2.5 to 3.5 mils
6. Volume Solids: 63% +/- 2%
7. Generic Description: Zinc-Rich Urethane

E. Unless noted otherwise in subsection H, use the following finish painting systems on all exterior steelwork and interior steel work subjected to wet conditions or fumes (see subsection H for additional requirements):
1. Application: Follow coating manufacturer’s printed directions. Apply over Type B primer system above.
2. Material: Tnemec Series 750 UVX paint or approved equal
3. Number of Coats: One
4. Dry Film Thickness: 2.5 to 5 mils
5. Volume Solids: 72% +/- 2%
6. Generic Description: Polyfunctional Hybrid Polyurethane

F. Primers and paints shall meet all federal and state environmental and air quality requirements.

G. Apply two shop prime coats to areas which will be inaccessible after erection.

H. All exterior steelwork and all interior steelwork subjected to wet conditions or fumes, including all welds, bolts, washers and other connection components, shall be primed and painted or hot-dip galvanized, as specified by the Architectural finish specifications. In the absence of Architectural finish specifications, all exterior steelwork and all interior steelwork subjected to wet conditions and fumes, including all welds, bolts, washers and other connection components, shall be hot-dip galvanized, conforming to the requirements set forth in ASTM A123/A123M and ASTM A153/A153M.

I. Clean contact surfaces of high strength bolts of all burrs and material which might prevent solid seating of the parts. Steel to receive bolts shall be primer painted except beneath the contact area of slip-critical bolts.

J. After erection, field touch up all welded areas, high strength bolts and damaged areas. For all steel to remain exposed, remove all blemishes, paint drips, and touch up prime coat.

3.5 HOISTING AND BRACING

A. Provide all hoisting and erecting equipment and power.

B. Provide and maintain any and all safety railings, toe boards, etc., required for the erection of steel framing and metal decking.

C. Brace the erected frame in a manner which will assure safety and proper alignment to receive the metal decking and until the concrete slabs have been poured and have set.

Erect building frame true and level. Erect columns in a manner to allow for movement due to welding shrinkage and thermal expansion and contraction of framing. Check plumbness after erection of each level. Maintain structural stability of frame during erection. Provide temporary bracing where necessary to maintain frame stability and to support required loads, including equipment and its operation.

END OF SECTION 05 12 00

SECTION 05 12 13

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Architecturally exposed structural steel, complete, as shown and specified.

B. Work Specified Elsewhere:
   1. Finish Painting in the Field: Section 09 90 00.

C. Other Applicable Sections: Work of this Section is governed by applicable provisions of the following Sections:
   1. Section 05 12 00 Structural Steel.

1.2 REFERENCE STANDARDS

A. American Institute of Steel Construction (AISC) 303-10:
   1. Section 10, Architecturally Exposed Structural Steel, Code of Standard Practice for Steel Buildings and Bridges.

B. The Society for Protective Coatings (SSPC):
   1. SSPC Painting Manual, Volume 2

1.3 SUBMITTALS

A. Product Date, Shop Drawings, and Certificates: As specified in Section 05 12 00.

1.4 PRODUCT HANDLING

A. Delivery: Use special care in unloading items to protect surfaces and to prevent distortion and other damage.

B. Storage: Under cover and off ground.

C. Protection: Protect items until erected and accepted.

PART 2 - PRODUCTS

2.1 MATERIAL

A. General: Provide for structural steel where marked AESS or ACHITECTURALLY EXPOSED STRUCTURAL STEEL. Comply with more stringent requirements of Section 05 12 00 and Reference Standard, except as follows.

B. Quality: Smooth, clean, sound, free from surface defects, handling marks, die or roller marks, pits, mill scale, rust, pitting left by rust removal, cracks, laminations, and slag inclusions.

C. Tubes and Pipes: Seamless type.

D. Stainless Steel: 300 Series, non-magnetic stainless steel.

E. Manufacture: Use only members which have been manufactured not longer than 6 months prior to fabrication.

2.2 FABRICATION

A. General: Comply with more stringent requirements of Section 05 12 00 and Reference Standards, except as follows.

B. Connections: Fabricate shear plates and beam flanges and webs at connections as shown.

C. Bolts: Hexagonal head.

D. Welds: Grind and polish every weld smooth and uniform, unless otherwise noted. Grind butt welds and welds at external corners flush and smooth. Completely remove back-up bars, weld spatter, and run-off tabs where exposed to view. Fill web cutouts at backup bars. Weld show-through not acceptable.

E. Marks: Manufacturer's names and identification marks not permitted on exposed surfaces. Do not apply erection marks, symbols, or painted notes to exposed surfaces.

2.3 SHOP PAINTING

A. General: Prepare surfaces and apply materials to concealed and exposed surfaces per coating system manufacturer's recommendations. Coordinate prime coat with body and finish coats.

B. Surface Preparation:
1. Steel: Remove oil and grease with volatile solvents per SSPC SP-1 and commercial blast clean per SSPC SP-6/NACE No. 3. Apply prime coat before rust bloom appears, but not more than 8 hours after cleaning.
2. Stainless Steel: Remove oil and grease with volatile solvents per SSPC SP-1 and scarify surfaces.

C. Exterior Work:
1. Prime Coat: Tnemec Co. Inc.'s 94H20 Tneme-Zinc, or approved equal; zinc-rich urethane with not less than 80 percent zinc in dried film; at 2.5 to 3.5 mils dry film thickness.
2. Body and Finish Coats: Concealed and exposed surfaces; polyaspartic urethane enamel coating system as specified under Section 09 90 00.

D. Interior Work:
1. Prime Coat:
a. Shop Applied: Tnemec Co. Inc.'s Series 27WB Epoxy Coating, or Engineer approved equal, applied at 4.0 to 5.0 mils dry film thickness.

2. Finish Coats: As specified under Section 09 90 00.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Before staring work, examine adjoining work on which execution is in any way dependant for workmanship and fit. Give written notification of any existing deficiencies detrimental to proper and timely installation of work under this Section. Do not proceed until conditions are satisfactory.

3.2 ERECTION

A. General: As specified under Section 05 12 00.

3.3 CONNECTIONS

A. General: As specified under Section 05 12 00, except as modified under Paragraph Fabrication of this Section.

B. Bolts: Orient heads in same direction.

3.4 FIELD QUALITY CONTROL

A. General: As specified under Section 05 12 00.

3.5 FIELD TOUCH-UP OF SHOP PAINTED SURFACES

A. General: As specified under Section 05 12 00 except, at Contractor's option, preparation for tough-up by SSPC-SP-11 may be substituted for SSPC-SP-6.

END OF SECTION 05 12 13

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 05 30 00

METAL DECKING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of Division 1 apply to all Work of this Section.

1.2 SCOPE

A. Provide all steel decking, accessories and cutting and reinforcing of all holes as indicated on Drawings and specified here.

1.3 RELATED WORK (See also Table of Contents):

A. Cast-in-place concrete: Section 03 30 00.

B. Structural Steel: Section 05 12 00.

C. Metal Fabrications: Section 05 50 00.

D. Holes for Mechanical and Electrical Work: Divisions 21, 22, and 26.
   1. Cutting and reinforcing of holes for plumbing and electrical conduits shall be part of this work providing holes are located by the mechanical and electrical contractors prior to or during installation. Cutting and reinforcing of holes after installation shall be the responsibility of those trades requiring them.
   2. Miscellaneous connection requirements for Mechanical and Electrical Work: Divisions 21, 22 and 26.

1.4 QUALITY ASSURANCE

A. Standards and References: (Latest Edition unless otherwise noted)
   1. 2013 California Building Code (CBC), with State of California Amendments
   2. American Iron and Steel Institute (AISI). "Specification for the Design of Cold-Formed Steel Structural Members."
   3. American Welding Society (AWS): AWS D-1.3 "Structural Welding Code - Sheet Steel".

B. Submittals: (Submit under Provisions of Section 01 32 19)
   1. Shop Drawings. Submittal required. Indicate deck sheet layout and all installation details. Contract documents may not be used as shop drawings.
   2. Manufacturer's specifications for each Deck Type. Submittal required.
   3. Certification: Provide affidavits from the manufacturer listing mill test certificates by number for each size and type of decking.
   4. Manufacturer shall provide affidavits of approval by the International Code Council Evaluation Service (ICC-ES) for the metal decking shapes proposed.

C. Tests and Inspections:
   1. A testing program is required prior to start of construction. Testing program to be done In Compliance with the 2013 CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
   2. All materials, methods and equipment shall be subject to inspections by the Testing Laboratory at any time.

3. Material Testing: Test reports establishing conformity to the specifications shall be furnished to the Owner for each heat prior to installation.
4. Welding Inspection: Welding of metal deck shall be performed under the inspection of the Testing Laboratory. Inspection shall conform to CBC Section 1704.
5. Powder Actuated Fasteners (shotpins): Where decking is attached with shotpins, the pins shall be inspected for proper installation by a special inspector. Twenty-five percent (25%) of all pins shall be verified using the inspection tool supplied by Hilti Inc.

1.5 PRODUCT HANDLING

A. Protect metal decking before installation and protect the installed work and materials of other trades.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS - DECK SYSTEMS

A. Acceptable Manufacturers:
1. ASC Steel Deck.
2. Verco Manufacturing Co.
3. Manufacturers of materials are indicated to set a standard for design and product performances.
4. Subject to the requirements of Division 1, products of manufacturers not indicated may be proposed for substitution, provided that they are equal in design, product performance and warranty to the products specified and have ICBO approval.
5. The burden of proof of equality of proposed products is on the Contractor.

B. Provide deck sections, type and gage as indicated on the drawings. Other manufacturers producing deck complying with these Specifications, and having equivalent properties and dimensions will be subject to the Architect’s review upon submission of substantiating data, and may be used only if equivalent to deck sections specified, in the Architect’s opinion.

C. All deck units shall be approved by International Code Council Evaluation Service (ICC-ES) for use as a diaphragm.
1. Diaphragm shear capacities shall be comparable (within 5%) to those listed on the drawings for the deck, welding, and spans indicated.

D. Units shall be in lengths to span two or more supports. Where steel layout does not permit two-span minimums, notify the Structural Engineer prior to fabrication.

E. For limitations of loads to metal decking see Section 01 84 15.

F. All deck units shall have male and female interlocking side joints.

G. Acoustical cellular rood decking by Verco Manufacturing Co., or equal, as specified on the drawings.

H. Prior to covering or filling with insulation, roofing, or placing concrete over metal decking, verify and coordinate installation requirements of suspended metal framing, suspended acoustical ceiling systems, mechanical and electrical work or other items as required. Provide inserts, clips, anchors or fasteners as indicated or as otherwise required to provide for the complete and proper installation of suspended items from the metal deck.
1. Verify and coordinate locations, patterns, spacing, etc. of suspension members and connectors required by other Sections of the Specifications and as shown on drawings.
2. Where suspension or hanger wires are required under other Sections, verify and coordinate locations, patterns, spacings, etc. with the appropriate trade. Drill holes at bottom of deck flutes of sufficient size to pass support wires. Wire supports shall be looped and secured with

a minimum of three (3) tight turns around a minimum 1-1/2" x 8" long furring channel or No. 3 x 12" long reinforcing bar centered above the hole and laid in the deck flutes. Pig-tail loops into the concrete will not be permitted unless approved by the General Contractor. Place no wires in flute with side lap.

3. At unfilled metal deck or as otherwise indicated, required or shown, provide individual 18 gauge by 1-1/2" wide galvanized hanger tabs 6" long and having 2" round holes for attaching tie wires. Tabs shall be hooked over male portion of each edge joint at 16" on center before female joint of next sheet is placed over it. As an alternate, #3x12" long reinforcing bars centered above the hole and laid in the deck flutes may be used. No loading other than suspended ceilings may be suspended from metal deck without concrete fill. Suspend all piping, ducting, conduit and equipment from steel beams.

I. Structural Properties: Deck shall have minimum structural properties as indicated on Structural Drawings.

J. Accessories to be furnished shall include the following:
1. Cell closures where shown on Drawings.
2. Light gauge plate fillers attached to deck to provide an uninterrupted roof plane.
3. Drain sumps and/or roof drain mounting plates as detailed.
4. Cell end closures column flashing and miscellaneous closures to prevent concrete leakage.
5. Miscellaneous accessories incidental to erection of deck.

2.2 MATERIALS

A. Provide deck of type and gage shown on the drawings. Deck units and all necessary items shall be formed from steel sheets conforming to ASTM-A653, structural quality. The steel sheets shall have received, before being formed, a metal protective coating of zinc conforming to ASTM-A653 Class G60 coating.

B. Powder Actuated Fasteners (shotpins): Where decking is attached with shotpins, they shall be by Hilti Inc., of the type indicated on the drawings and ICC-ES approved for use in a diaphragm.

C. Welding rods: E60XX minimum.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine areas to receive work specified. Do not begin work until underlying work is complete, all required inspections have been made, and all conditions which might prevent proper installation or impair performance of work have been corrected.

B. Beginning installation means accepting conditions of underlying work.

C. If supporting steel work is not properly aligned or sufficiently level to permit proper bearing of metal decking, such deficiency shall be corrected by the Contractor before placing units.

3.2 ERECTION

A. Deck shall be laid true to line, shall conform to profile shown on Drawings, and shall be without deformations, creases, wrinkles or noticeable defects.

B. Connections: Deck shall be secured to structural frame by use of 3/4" diameter fusion welds. Minimum number and spacing of connections shall be as indicated on Structural Drawings.

C. The metal deck shall be fastened to all structural members both parallel and perpendicular. Spread deck and modify layout where structural members are parallel to the metal deck ribs.

D. Bend decking to conform to slopes and warps as required for solid contact to framing that allows proper welding.

E. Shoring for metal decking shall be provided by the contractor as required and as indicated in the corresponding ICC-ES report. Coordinate shoring requirements for construction live load (and concrete placement) with the manufacturer.

F. All deck units shall break over beams.

G. Provide low ribs at all beams parallel to deck. As an alternate, the deck may be broken and infilled with a flat pan to provide deck welding to parallel beams.

H. Butt deck units tight over steel beams.

I. Provide ¾" clear concrete cover around all welded studs.

3.3 DEFECTIVE DECK

A. Units of decking that become deformed or damaged to such extent that they are weakened or unsuitable for use shall be removed and replaced at no cost to the Owner.

3.4 TOUCH UP AND CLEANING

A. All welds and abrasions on deck surfaces not covered by concrete shall be touched up using a zinc dust-zinc oxide primer.

B. Burn spots on supporting exposed steel shall be touched up with same primer as used on adjacent surface.

C. Clean surfaces of installed deck by effective means to receive sprayed-on fireproofing or finish painting as indicated.

END OF SECTION 05 30 00

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of Division 1 apply to all Work in the Section.

1.2 SCOPE

A. Furnish and install all components and related items pertaining to cold-formed metal framing systems.

1.3 RELATED WORK SPECIFIED ELSEWHERE (See also Table of Contents)

A. Cast-in-place concrete: Section 03 30 00.

B. Structural Steel: Section 05 12 00.

C. Metal Deck: Section 05 30 00.

1.4 QUALITY ASSURANCE

A. General:
   1. Welders: Qualified for welding in horizontal, vertical, and overhead positions in accordance with AWS D1.3.
   2. Wall system shall provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperatures.
   3. Wall system shall accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

B. Standards and References: (Latest Edition unless noted otherwise)
   1. 2013 California Building Code (CBC), with State of California Amendments
   2. ASTM A653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process..
   3. Framing components shall conform to Standards of the Steel Stud Manufacturers Association (ICC-ES ER-3064P).

C. Submittals: (Submit under provisions of Section 01 32 19).
   1. Manufacturers catalog with sizes to be used indicated.
   2. ICC-ES report.
   3. Mill certificates verifying steel properties.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect metal framing units from rusting and damage.

B. Deliver to Project site in manufacturer's unopened containers or bundles, identified with name, brand, type and grade.

C. Store off ground in a dry ventilated space or protect with suitable waterproof covering.

PART 2 - PRODUCTS

2.1 ACCEPTED MANUFACTURERS

A. Members of the Steel Stud Manufacturer's Association (SSMA), or approved equal.

2.2 METAL FRAMING

A. System Components: Provide steel studs, joists, tracks, straps, runners, blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories as shown on the Drawings for applications indicated. All studs, joists, tracks, and blocking shall conform to ICC-ES ER-3064P.

B. Materials and Finishes:
   1. 54 Mils (16 Gauge) and Thicker: Fabricate metal framing components of structural quality (SQ) steel sheet with a minimum yield point of 50,000-psi, conforming to ASTM A653, SS Grade 50 Class 1 or ASTM A1003, Grade 50 Type H (ST50H).
   2. 43 Mils (18 Gauge) and Thinner: Fabricate metal framing components of structural quality (SQ) steel sheet with a minimum yield point of 33,000-psi, conforming to ASTM A653, SS Grade 33 or ASTM A1003, Grade 33 Type H (ST33H).
   3. Finish: Galvanized complying with ASTM A653, G60. Finish accessories to match main framing components.

C. See drawings for section properties and details.

D. Studs and joists shall be of the size, shape, and gauge indicated, with a flange and flange return lip as shown on the Structural Drawings.

E. Welding Electrodes: E60XX.

F. Galvanizing Repair Paint: High zinc-dust content paint for repair of galvanized surfaces damaged by welding.

G. Material Thickness: All sections are to be roll formed in various depths with the following minimum bare metal thicknesses:

Minimum Thickness (inch)	Minimum Design Thickness (inch)	Gauge	Mils
0.0179	0.0188	25	18
0.0329	0.0346	20	33
0.0428	0.0451	18	43
0.0538	0.0566	16	54
0.0677	0.0713	14	68
0.0966	0.1017	12	97
0.1180	0.1240	10	118

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install metal framing systems in accordance with the Structural Drawings. Where drawings conflict with manufacturer's recommendations, the Structural Drawings will govern.

B. Runner Tracks:
   1. Install continuous tracks sized to match studs. See Structural Drawings.
   2. Align at base and tops of studs.
   3. Attach tracks with screws, welding, bolting or shotpins as indicated on the Structural Drawings.
   4. Fasten corners and ends of tracks as shown.

C. Studs:
   1. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces.
   2. Where studs abut structural columns or walls, anchor ends of stiffeners to supporting structure.
   3. Secure studs to top and bottom runner tracks by screw fastening at both flanges.
   4. Install studs in one piece for full height; splicing of studs is not permitted.
   5. Provide deflection allowance of 1/2" minimum in stud track, directly below horizontal building framing for all non-bearing wall framing. See Structural Drawings.
   6. Install ends of studs tight to web of track at all bearing wall framing. Compress track against end of stud as required to achieve tight fit prior to installation of stud to track screw attachments. See Structural Drawings.
   7. Install supplementary backing and bracing wherever walls or partitions are indicated to support equipment, services, casework, heavy trim and furnishings and similar work requiring attachment to wall or partition. Comply with stud manufacturer's instructions and industry standards.
   8. See Structural Drawings for opening framing.
   9. Frame both sides of expansion and control joints, with separate studs; do not bridge the joint with components of stud system.
   10. Install one row of metal blocking or bridging at mid-height of all studs over 10'-0" in height in addition to bracing that may be required at studs that do not receive sheathing (see item 11 below).
   11. Install strapping to all sides of studs that do not receive sheathing as indicated on the structural drawings.

3.2 TOUCH-UP PAINTING

A. Touch-up shop-applied protective coatings damaged during handling and installation.

B. Use compatible primer for prime coated surfaces; use galvanizing repair paint for galvanized surfaces.

END OF SECTION – 05 40 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Requirements of Division 1 apply to all Work of this Section.

1.2 SCOPE

A. Shop fabricated metal items and miscellaneous metal work.

B. Refer to Schedule at end of this Section.

1.3 RELATED WORK (See also Table of Contents)

A. Structural Steel: Section 05 12 00.

1.4 QUALITY ASSURANCE

A. Standards and References: (Latest Edition unless otherwise noted)
   1. 2013 California Building Code (CBC), with State of California Amendments
   2. American Society for Testing and Materials (ASTM) Specifications as listed in the Section.

B. Submittals: (Submit under provisions of Section 01 32 19)
   1. Shop Drawings: Submit shop drawings indicating profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevation, and details where applicable. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.
   2. Manufacturer's descriptive data: Submit for manufacturer's items.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver all parts ready for erection; store in close proximity to final locations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sections: ASTM A36.

B. Steel Tubing: ASTM A500, Grade B.

C. Steel Pipe: ASTM A53, Type E or S, Grade. B.

D. Steel Bolts, Nuts, and Washers: ASTM A307.

E. Welding Materials: AWS D1.1; type required for materials being welded.

F. Galvanizing: Hot-dip process ASTM A123 typical and ASTM A153 for threaded fasteners performed after fabrication into largest practical section. Weight of coating not less than 2 oz. per sq. ft. of surface. Where damaged, repair surface with one coat of hot process galvanizing repair compound, "Galvalloy", Galvweldalloy", or approved equal.

G. Primer: Tnemec Company "Series V10 Red Primer", Sherwin-Williams "Kern Primer"; or approved equal.

H. Dissimilar Materials: Separate dissimilar surfaces in contact with or in close proximity to non-compatible metals, concrete masonry, or plaster with neoprene gasket; or other approved means.

I. Expansion Bolts: Hilti "Kwik Bolt TZ" Expansion Anchor Bolts, galvanized unless otherwise indicated.

J. Non-shrink Grout: Master builders 928 or equal.

2.2 FABRICATION

A. Verify dimensions on site prior to shop fabrication.

B. Fabricate items with joints tightly fitted and secured.

C. Fit and shop assemble in largest practical sections, for delivery to jobsite.

D. Grind exposed welds flush and smooth adjacent finished surfaces. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.

F. Make exposed joints butt tight, flush and hairline.

G. Supply components required for anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, except where specifically noted otherwise.

2.3 FINISH

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact bond with concrete or where field welding is required.

C. Prime paint interior items with one coat unless scheduled to be galvanized.

D. Galvanize exterior items and scheduled interior items to minimum 2.00 oz/sq ft zinc coating.

PART 3 - EXECUTION

3.1 PREPARATION

A. Obtain Architect's approval prior to site cutting or making adjustments not scheduled.

B. Clean and strip primed steel items to bare metal where site welding is scheduled.

C. Make provision for erection loads with temporary bracing. Keep work in alignment.

D. Supply items required to be cast into concrete with setting templates, for installation under appropriate Sections.

3.2 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Perform field welding in accordance with AWS D1.1.

C. After installation, touch-up field welds, scratched or damaged surfaces with primer, except repair exposed galvanized work (not to be painted) with hot process field galvanizing, in accord with manufacturer's published directions.

3.3 SCHEDULE

A. Provide and install items listed in Schedule and shown on Drawings with anchorage and attachment necessary for installation. The following Schedule lists principal items only. Refer to drawing details for items not specifically scheduled.
   1. Miscellaneous plates or angles not attached to structural steel; complete with anchorage for embedment.
   2. Exterior mounted ladders.
   3. Handrails and guardrails.
   4. Bollards.
   5. Roll up door supports
   6. Folding door supports
   7. Indoor decorative canopy

END OF SECTION – 05 50 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 05 58 00

FORMED METAL FABRICATIONS

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
   1. Factory-formed: exposed-fastener, metal wall panels.
   2. Finish must conform to the "Metal Construction Association Certified Premium Painted™" designation

1.3 RELATED SECTIONS

A. Division 5 Section “Cold Formed Metal Framing”

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

B. System shall meet performance criteria as installed. Either test data or signed and sealed engineering calculations shall document the performance of the panel system to meet design loads required.

C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24lbf/sq. ft.

D. Water Penetration: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

1.5 SUBMITTALS

A. Product Data: Manufacturer's current product specifications and installation instructions.

B. Shop Drawings: Include small-scale elevations, as required. Show details of trim and flashing conditions, fastening and anchorage methods, weatherproofing techniques, terminations, and penetrations.

C. Samples:
   1. Selection Samples: Submit actual metal chips with full range of colors available for Architect's selection.
   2. Verification Samples: Submit two samples of each type of metal panel required, not less than 12 inches (305mm), and illustrating finished panel profile.

D. Product Test Reports: Submit copies of test reports or load tables verifying performance capability of panel system:

1. Metal Wall Panels: Include reports for UL 790/ASTM E 108, ASTM E 283, ASTM E 331, Field Tested, UL 2218, ASTM E 84 Flame Spread Rating, Paint Performance Tests.
2. Fastener test and pull-out calculations
3. Load tables
4. Maintenance Data

1.6 QUALITY ASSURANCE

A. Installer: Company specializing in the type of work required for this project, with not less than 2 years of documented experience.

B. Pre-Installation meeting: Convene meeting not less than one week prior to beginning installation between general contractor, installing contractor, owner's representative and manufacturer.

1.7 DELIVERY, STORAGE & HANDLING

A. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.

B. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.

C. Do not allow storage of other materials or allow staging of other work on installed metal panel system.

D. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment for damage and for completion of the consignment.

1.8 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Fluoropolymer Finish Warranty Period: 30 years from date of Substantial Completion.

B. Special Installer's Warranty: Specified form in which Wall Installer agrees to repair or replace components of custom-fabricated sheet metal wall that fail in materials or workmanship within 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer's Qualifications: All panels are to be factory formed and packaged per job requirements.
1. Manufacturer shall have a minimum of ten (10) years experience in the factory fabrication of metal wall panels.
2. Manufacturer must be certified to ISO 9001:2008 with design.

B. Specification is based upon the products of ATAS International, Inc. No other manufacturer of metal wall systems shall be accepted as an alternate product without prior written approval. These substitution requests must meet specifications and must be submitted a minimum of ten (10) days prior to date of bid.

C. Coordinate with insulation requirements as noted by Architect.

D. Secondary framing members as required for load criteria and wind requirements.

2.2 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

A. Exposed-fastener, Lap seam Metal Wall Panels: Provide Factory-formed, designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weather tight installation.

B. Ribbed-Profile, Exposed-Fastener Metal Wall Panels
1. Basis-of Design Product: ATAS International, Inc.; Belvedere™ BWK360
2. Available Manufacturers:
   a. ATAS International, Inc.
3. Profile: Ribbed as indicated on drawings.
4. Material: Aluminum - .032 thick
   a. Texture: Smooth
   b. Finish: KYNAR 5000® PDVF or HYLAR 5000® Finish
   c. Color: Champagne (31) PREMIUM COLOR
5. Panel Coverage: 36"
6. Panel Height: 1-1/2"
7. Perforation: A23 0.25 Staggered – 0.50 – 23% open area
8. Panel Application Orientation: Vertical.
9. Major Rib Spacing: 6"

2.3 FABRICATION

A. Panels:
1. Panels to be Factory fabricated in a controlled environment.
2. Panels to be tension leveled during roll forming process.
3. Panels to be produced in longest lengths possible, except when modular units are utilized.

B. Form all components true to shape, accurate in size, square and free from distortion or defects. Cut panels to precise lengths indicated on approved shop drawings or as required by field conditions.

C. Accessories: Factory fabricates trim and flashing components in standard 12-foot lengths.
1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
2. Fabricate wall panels as required to maintain fabrication tolerances and to withstand design loads.

D. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

F. Panels, fabrication and installation shall meet the requirements of the Metal Construction Association Preformed Metal Wall Guidelines

PART 3 - EXECUTION

3.1 PREPARATION

A. Field Measurements

1. Field measurements should be taken by the installer for verification of dimensional correctness in relationship to original plans, prior to providing manufacturer with a bill of material.

B. Delivery, Storage and Handling
1. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.
2. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.
3. Do not allow storage of other materials or allow staging of other work on installed metal panel system.
4. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment or damage and for completion of the consignment.

C. Sequencing and Scheduling
1. Installer shall coordinate with general contractor as to scheduled delivery time after receipt of field verified bill of material by manufacturer as it relates to actual project scheduling.

3.2 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cutting of metal wall panels by torch is not permitted.
2. Rigidly fasten metal wall panels and allow for thermal expansion and contraction as required by the panel manufacturer. Pre-drill panels as required.
3. Install screw fasteners.
4. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
5. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing and material compatibility.
6. Provide weatherproof seals for pipe and conduit penetrating exterior walls.

B. Fasteners: Use fasteners of size and length as required for compatibility with substrate.
1. Aluminum Wall Panels: Use stainless-steel fasteners or metallic coated fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for surfaces exposed to the interior.
2. Exposed fasteners shall have a high performance factory applied coating to match paint color.
3. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.
4. Coat back side of aluminum wall panels with bituminous coating where wall panels will contact wood, ferrous metal, or cementitious construction.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies.

3.3 ACCESSORY INSTALLATION
A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete sheet metal roofing assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
3. Panels, fabrication and installation shall meet the requirements of the Metal Construction Association Preformed Metal Wall Guidelines.

B. Coordinate with installation of:
1. Cold Formed Metal Framing, as noted in Section 5

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed. Maintain in a clean condition during construction.

B. Protection:
1. Provide as required completed work of this section will be without damager or deterioration at date of substantial completion.

C. Touch up minor abrasions with matching paint provided by panel manufacturer. Remove and replace panels that cannot be satisfactorily touched up. See Metal Construction Association Technical Bulletin #95-1051.

D. Sweep and remove chips, shavings and dust from roof on a daily basis during installation period. Leave installed work clean, free from grease, finger marks and stains. Remove all protective masking from material immediately after installation of product.

E. Upon completion of installation, remove scraps and debris from project site.

F. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt and sealant.

END OF SECTION 05 58 00

SECTION 06 05 60

DECORATIVE PLASTIC LAMINATE

PART 1 - GENERAL

1.1 SUMMARY

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Section, apply to this section.

B. Sections Includes:
   1. Standard decorative laminate finishing casework and countertops as indicated, including accessories and trim needed for a complete installation.

1.2 RELATED WORK

A. Work of this section is related to work specified in the following sections:
   1. Division 10 Section “Toilet Partitions”.
   2. Division 12 Section “Casework”.
   3. Division 22 Section “Plumbing Fixtures”.

1.3 REFERENCES

A. Reference Standards: In addition to requirements, comply with applicable provisions of following for design, materials, fabrication, and installation of components parts:
   1. NEMA LD3-2005.

1.4 SUBMITTALS

A. Product Data: Manufacturer’s technical literature for decorative plastic laminate material, adhesive for bonding plastic laminate, miscellaneous accessories and related components.

B. Samples:
   1. Decorative plastic laminates, 5 by 7 inches (125 by 175 mm), for each type, color, pattern, and surface finish with 1 sample applied to core material and specified edge material applied to 1 edge.

C. Information Submittals: Submit following packaged separately from other submittals:
   1. Manufacturer’s written handling, storage and installation instructions.

1.5 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: Company specializing in fabricating and installing decorative plastic laminate finished work with a minimum 3 years’ experience.

B. Source Limitations: Obtain decorative plastic laminate materials through one source from a single manufacturer.

C. Fire-Test-Response Characteristics: Provide decorative plastic laminate with the following surface burning characteristics as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle, and protect materials in accordance with manufacturer's written instructions.
   1. Provide protective coverings of suitable material. Take special precautions at corners.

1.7 SEQUENCING

A. Coordinate sizes and locations of plumbing, cut-outs and other related work specified in other sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Manufacturer: Formica Corp., 10155 Reading Road, Cincinnati, OH, 45241 (513-786-3400).

2.2 MATERIALS AND COMPONENTS

A. Decorative Plastic Laminate: Manufacturers standard and custom decorative surface papers with melamine resins, bonded under heat and pressure to Kraft paper backing sheet with phenolic resins.

B. Standard Decorative Laminate – General Purpose Type Decorative Laminate Backing Sheet:
   1. Grade: See Finish Schedule.
   2. Thickness See Finish Schedule.
   3. Surface burning characteristics in accordance with ASTM E84.
   4. Finish: See Finish Schedule
   5. Colors and Patterns: See Finish Schedule.

C. Solid Color Decorative Laminate:
   1. Grade: Grade CC, HCS
   2. Thickness: .040 Inches (1.02mm).
   3. Surface burning characteristics in accordance with ASTM E84.
   4. Finish: See Finish Schedule
   5. Colors and Patterns: [As indicated Match Architect's samples.

2.3 ACCESSORY MATERIALS

A. Adhesive for Bonding Plastic Laminate: [Unpigmented contact cement] [Contact cement] [PVA] {Urea formaldehyde] [Resorcinol].

B. Adhesive for Bonding Edge Molding: Provide type as specified in manufacturer's written installation instructions.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine surfaces for conditions that would adversely affect decorative plastic laminate surfacing or edge performance.

3.2 INSTALLATION

A. General: Install decorative plastic laminate in accordance with manufacturer's written installation instructions, approved Submittals and requirements of Division 6 Section "Finish Carpentry"
   1. Provide templates and rough-in measurements.

3.3 CLEANING AND PROTECTION

A. Cleaning:
   1. Clean decorative plastic laminate surfaces and edge moldings in accordance with manufacturer's instructions.

B. Protection
   1. Do not permit construction near unprotected surfaces.

END OF SECTION – 06 05 60

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 06 05 73

WOOD TREATMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section describes the requirements for preservative treated and fire-retardant treated wood where required.

B. Related Sections:

1. Miscellaneous carpentry items are specified in Section 06 10 53.

1.2 SUBMITTALS

A. Wood Treatment Data: Treatment manufacturer's instructions for handling, storing, installing and finishing of treated material.

B. LEED Submittals:
1. Credit MR 2.1 and 2.2: Waste management plan as specified in Division 01.

1.3 QUALITY ASSURANCE

A. Wood Treatment Plant: Experienced in performing work required in this Section that has specialized in treatment of wood similar to that required for this Project and is licensed by the wood treatment manufacturer.

1.4 ENVIRONMENTAL QUALITY ASSURANCE

A. Protect against airborne transmission of chemical treatments to surrounding area.

B. Where ground treatment is required, protect ground water from contamination.

C. Available LEED Credits:
1. Credit MR 2.1 and 2.2 – Construction Waste Management.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store treated wood materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer. Prevent exposure to precipitation during shipping, storage or installation. Store material off ground and under cover.

B. For interior fire-retardant treated wood, avoid exposure to precipitation during shipping, storage and installation. If wood becomes wet, replace or allow to dry to a maximum moisture content of 19-percent for lumber and 15-percent for plywood prior to covering or enclosure by gypsum board, roofing or other construction materials.

PART 2 - PRODUCTS

2.1 PRESERVATIVE TREATED WOOD

A. Provide preservative-treated wood at areas where wood is in contact with ground, concrete, masonry, roofing and flashings.

B. Material: Waterborne Alkaline Copper Quaternary (ACQ) preservative system containing no arsenic and no chromium.

C. Comply with AWPA Standard U1 and T1.

D. Retention Rates: As recommended by manufacturer for applications required.

E. End Cut Preservative: Acceptable to manufacturer of ACQ preservative.

F. All ACQ preservative treated wood members shall bear an end tag or permanent ink stamp indicating name of wood treating company, treatment plant city and state, symbol for alkaline copper quaternary (ACQ), preservative retention level, approved use, and code report number.

2.2 FIRE-RETARDANT PRESSURE TREATED WOOD

A. Exterior lumber and plywood to be exterior fire retardant treated shall be pressure impregnated with fire-retardant chemicals and shall have a flame spread rating of 25 or less when tested in accordance with ASTM E84. When test conditions are extended to 30-minutes, the flame spread shall not progress more than 10-1/2-feet beyond the center line of the burners, with no evidence of significant progressive combustion.

B. Each piece of fire-retardant treated lumber and plywood shall be manufactured under Timber Products Inspection or other independent third party follow-up inspection service, and each piece shall bear the appropriate qualified inspection agency's label indicating surface burning characteristics in the 30-minute ASTM E84 flame spread test. Each piece shall be labeled indicating kiln dried after treatment (KDAT) and identifying the treating company and location.

C. Interior Wood:
1. Structural performance of fire retardant treated wood shall be evaluated in accordance with ASTM D5664 for lumber and ASTM D5516 for plywood. Evaluation of plywood data shall be in accordance with ASTM D6304. The resulting design value and span rating adjustments shall be published in ICC Evaluation Service Report (ESR) – 1791 issued by the ICC Evaluation Service, Inc. which includes evaluation of high temperature strength testing for roof applications.
2. Interior fire retardant treated lumber and plywood shall have equilibrium moisture content of not over 28-percent when tested in accordance with ASTM D3201 at 92-percent relative humidity.
3. Interior fire retardant treated wood shall be kiln dried after treatment to a maximum moisture content of 19-percent for lumber and 15-percent for plywood.
4. The fire retardant formulation shall be free of halogens, sulfates, chlorides, arsenic, ammonium phosphate, formaldehyde, and urea formaldehyde.
5. Provide lumber of the appropriate grade and species as specified by the design criteria of the intended application after consideration of design value adjustment.
6. Provide plywood of the appropriate size, grade and species as specified by the design criteria of the intended application after consideration of span rating adjustments.

D. Exterior Wood:
1. Exterior fire retardant treated wood shall be kiln dried after treatment to a maximum moisture content of 19-percent for lumber and 15-percent for plywood.
2. Exterior fire retardant treated lumber and plywood shall use design value adjustments and span ratings as published by the manufacturer.
3. The fire retardant formulation shall be free of halogens, sulfates, chlorides, and ammonium phosphate.
4. Provide lumber of the appropriate grade and species as specified by the design criteria of the intended application.
5. Provide plywood of the appropriate size, grade and species as specified by the design criteria of the intended application.

E. Fire-retardant treatment shall be a clear product and shall not change the appearance of the wood.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Preservative-Treated Wood: Handle, store, and install fire-retardant-treated wood in compliance with recommendations of chemical treatment manufacturer, including those for adhesives where required for installation.
1. Field Cuts: Where cut or drilled in field, treat cut ends with preservative solution used in original treatment by brushing, spraying, dipping, or soaking. Treat end cuts of ACQ preservative treated wood members with field-applied end coat prior to installation.

B. Fire-Retardant Treated Wood: Handle, store, and install fire-retardant-treated wood in compliance with recommendations of chemical treatment manufacturer, including those for adhesives where required for installation.
   1. Field Cuts:
      a. Lumber: Do not rip or mill fire retardant treated lumber. Cross cuts, joining cuts, and drilling holes are permitted.
      b. Plywood: Fire retardant plywood may be cut in any direction.
   2. Do not install interior fire-retardant treated wood in areas where it is exposed to precipitation, direct wetting, or regular condensation. Do not install as sill plates; use exterior fire-retardant treated wood.

3.2 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Division 01 including, but not limited to:
   1. Hazardous waste shall be separated, stored and disposed of according to local regulations.

END OF SECTION – 06 05 73

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 06 08 00

FACTORY-APPLIED WOOD COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: wall, roof, and soffit sheathing.

B. Related Sections:
1. Section 06 10 00 Rough Carpentry.
2. Section 06 20 00 Finish Carpentry.

1.2 REFERENCES

A. 1.3.2 ASTM International, Reference Standards:
1. 1.3.2.1 ASTM E 84-01, Standard Test Method for Surface Burning Characteristics of Building Materials.
2. 1.3.2.2 ASTM E108-00, Standard Test Methods for Fire Tests of Roof Coverings.
3. 1.3.2.2 ASTM E 119-00a, Standard Test Methods for Fire Tests of Building Construction and Materials.
4. 1.3.2.4 ASTM D 55-16-99a, Standard Test Method for Evaluating the Flexural Properties of Fire Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.
5. 1.3.2.5 ASTM D 6305-9801, Standard Practice for Calculating Bending Strength Design Adjustment Factors for Fire-Retardant-Treated Plywood Roof Sheathing.
6. 1.3.3 NFPA 286-00, Standard Test Method of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth, National Fire Protection Association.
7. 1.3.4 UL 790-97, Standard for Tests for Fire Resistance of Roof Covering Materials – with Revisions through July, 1998.
8. 1.3.5 UL 1715-97, Standard for Fire Test for Interior Finish Material, Underwriters Laboratories Inc.
9. 1.3.6 UBC 26-2, Test Method for the Evaluation of Thermal Barriers, 1997 Uniform Building Code TM.
10. 1.3.7 ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12).

B. Canadian Construction Materials Centre (CCMC):
1. Underwriters Laboratories
a. UL 723 Standard for Surface Burning Characteristics of Building Materials.

C. California Office of the State Fire Marshall
1. Exterior Wall Siding and Sheathing SFM Standard 12-7A-1.
2. Under Eave SFM Standard 12-7A-3.

1.3 SUBMITTALS

A. General: Submit listed submittals in accordance with Contract Conditions and Section 01 33 00 – Submittal Procedures.

B. Product Data: Submit the following for specified products:
1. Product data, including manufacturer’s data sheet, for specified products.
2. Manufacturer’s installation instruction.
3. Material Safety Data Sheets (MSDS).

C. Test Reports: Certified test reports from recognized testing laboratories showing compliance with specified structural fire sound and performance characteristics and physical properties.

D. Evaluation Report: ICC-ESR1365.

E. Closeout Submittals:
1. Warranty: Submit warranty documents specified.

1.4 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer:
a. Has a minimum 15 years' experience manufacturing components similar to or exceeding requirements of project. Has sufficient capacity to produce and deliver required materials without causing delay in work.
2. Installer:
a. Experienced in performing work of this section and who has specialized in installation of work similar to that required for this project.
b. Acceptable to the manufacturer.

1.5 DELIVERY, STORAGE & HANDLING

A. Delivery and Acceptance Requirements:
1. Deliver material in accordance with Section 01 61 00 – Common Product Requirements and in accordance with manufacturer's written instructions.

B. Storage and Handling Requirements:
1. Store materials protected from exposure to harmful weather conditions.
a. Keep materials dry and store on a hard, dry, level surface not in contact with the ground.
b. Store materials in wrapped and strapped bundles stacked no more than 10 feet (3m) high.
c. Support bundles to prevent excessive bowing. Support and separate bundles with 2 x 4 or larger dimension lumber spaced no more than 4 feet apart.
2. Handle individual pieces in a manner to prevent physical damage during measuring, cutting and installation.

C. Packaging Waste Management:
1. Separate waste materials for recycling in accordance with Section 01 74 19 – Construction Waste Management and Disposal.
2. Remove packaging materials from site and dispose of at appropriate recycling facilities.
3. Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate onsite bins for recycling.
4. Fold metal and plastic banding, flatten and place in designated area for recycling.

1.6 WARRANTY

A. Refer to Contract Conditions and Section 01 78 36 – Warranties for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and does not limit, other rights Owner may have under other Contract Documents.

PART 2 - PRODUCTS

2.1 FIRE-RESISTANT SHEATING

A. Manufacturer: LP – Building Products.

1. Contact: 414 Union Street, Nashville, TN 37219; Telephone: (800) 999-9105, (910) 762-9878; Fax: (916) 763-8178; Email: customer.support@lpcorp.com; website: www.lpcorp.com.
2. Single Source Responsibility: Provide components and materials specified in this section from a single manufacturer.
3. Substitution Limitations: No substitutions permitted.

B. Description and Performance Requirements: Oriented Strand Board with a proprietary, fire-resistant coating, produced and applied by Barrier Technology Corporation, Watkins, MN. Panels meet the following minimum standards:
1. Flamespread and Smoke Developed Performance:
   a. Panels shall exhibit a flamespread rating of less than 25 and a smoke developed index of less than 100 when tested on the coated side in a standard 10-minute test in accordance with ASTM E84, UL 723, or NFPA 255. Advance of flame shall not exceed 10.5 feet after extending test to 30 minute duration.
   b. Each panel shall bear a Underwriters Laboratories (UL) and Omega Point Laboratory (OPL) classification and inspection stamp.
   c. Coated panels in Category 15/32 and higher shall exhibit a thermal barrier index of at least 20 minutes when tested in accordance with ASTME-119, UBC 26.2 or UL 1715.
2. Structural Performance and Durability:
   a. Panels in each Performance Category (formerly called Thickness Category) shall meet or exceed the structural and Exposure 1 requirements described in the manufacturer's specifications, as well as the properties for structural panels described in US Voluntary Product Standard PS2-04.
   b. Panels shall meet or exceed the bond durability and weather resistance requirements of all tests described in ICC Acceptance Criteria AC264.
   c. Each panel shall bear a Progressive Engineering Inc (PEI) stamp as certification of compliance with AC264 criteria and PS2-04 standards.
   d. Each panel shall bear a stamp describing the Performance Category (formerly called Thickness Category) and span rating of the panel.

2.2 RELATED MATERIALS

A. Wood materials: Refer to Division 6 Sections for information on related wood framing materials.

B. Fasteners: Use code-compliant fasteners as specified in shop drawings and manufacturer's installation guide. LP FlameBlock is non-corrosive, and does not require corrosion-resistant fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate installation of LP Flameblock in accordance with Section 01 73 00 – Execution and Section 01 73 19 – Installation.

B. Coordinate installation of LP Flameblock with work of other trades for proper time and sequence to avoid construction delays.

C. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions and approved shop drawings.
1. Accurately fit, align, securely fasten and install free from distortion or defects.
2. Impose no loads other than the weight of the erectors on the structure before it is permanently sheathed.
3. Exercise caution when removing temporary bracing to apply sheathing.

4. After sheathing, do not exceed design loads on members with construction materials.

3.2 FINISHING

A. Perform cleanup in accordance with Section 01 74 00 – Cleaning and Waste Management.

B. Upon completion, remove surplus materials, rubbish, tools and equipment.

3.3 CLEANING

A. Product may be painted with commonly available latex and oil-based paints.

B. Product may be coated with mold inhibitors or other protectants. Check with manufacturer prior to application to verify compatibility with OSB substrate and fire-resistant coating.

3.4 PROTECTION

A. Protect installed product from damage during and after construction in accordance with Section 01 76 00 – Protecting Installed Construction.

B. Repair damage to adjacent materials caused by LP Flameblock installation.

END OF SECTION – 06 08 00

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of Division I apply to all Work of this Section.

1.2 SCOPE

A. Provide all labor, materials, tools, facilities and equipment required for the fabrication and installation of rough carpentry and associated items (except that which is specified elsewhere) indicated on Drawings and necessary to complete the Work. Items include, but are not necessarily limited to, the following:
   1. Blocking, backing, stripping, furring, and nailers.
   2. Rough hardware.
   3. Wood framing.
   4. Plywood sheathing.
   5. Preservative treatment.
   6. Drilling, saw cuts, knock-outs and framing for ventilation.
   7. Wood sheathing backing at tile walls.

1.3 RELATED WORK (See also Table of Contents)

A. Concrete Formwork: Section 03 10 00.

B. Cast-in-Place Concrete: Section 03 30 00.

C. Structural Steel: Section 05 12 00.

D. Glued Laminated Construction: Section 06 18 00.

E. Structural Composite Lumber: Section 06 71 13.

1.4 QUALITY ASSURANCE

A. General:
   1. Coordinate the work of all trades to ensure proper placement of all materials, anchors, etc., as well as providing for openings and anchors for the installation of surface mounted materials and equipment.
   2. Qualifications for Workmen: Provide sufficient skilled workmen and supervisors who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.
   3. Rejection: In the acceptance or rejection of rough carpentry, no allowance will be made for lack of skill on the part of the workmen.

B. Standards and References: (Latest Edition unless otherwise noted)
   1. 2010 California Building Code (CBC), with State of California Amendments.
   2. Lumber: West Coast Lumber Inspection Bureau (WCLIB); Standard Grading Rules for West Coast Lumber No. 17.
   3. Lumber: Western Wood Products Association (WWPA); Western Lumber Grading Rules 05.
   4. Redwood: Redwood Inspection Service (RIS); Standard Specifications for Grades of California Redwood Lumber.
   5. Plywood Sheathing: The Engineered Wood Association; Specifications and Grades.

a. Structural Plywood: United States Product Standard PS1, Group 1 Douglas Fir.

6. Wood Preservative: American Wood-Preservers' Association (AWPA):
   a. U1, Use Category System: User Specification for Treated Wood.
   b. M4, Standard for the Care of Preservative-Treated Wood Products.
7. 2005 National Design Specification for Wood Construction (NDS).

C. Submittals: (Submit under provisions of Section 01 32 19)
1. Certification:
   a. Preservative Treated Wood: Certification for waterborne preservative and that moisture content was reduced to 19 percent maximum, after treatment.

D. Tests and Inspections:
1. A testing program is required prior to start of construction. Testing program to be done in Compliance with the 2013 CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
2. If indicated on the Structural Drawings, load test expansion and epoxy anchors as indicated on the drawings.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protection:
1. After delivery, store all materials off the ground, covered, and in such a manner as to ensure proper ventilation and drainage and to protect against damage and the weather. Maintain wood at the maximum moisture levels indicated in Materials Section.
2. Keep all material clearly identified with all grade marks legible; keep all damaged material clearly identified as damaged, and separately store to prevent its inadvertent use. Do not allow installation of damaged or otherwise non-complying material.
3. Use all means necessary to protect the installed work and materials of all other trades.
4. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sawn Lumber:
1. Lumber (Wood Framing): Meet requirements of following minimum grades. All grades to WCLIB Grading Rules No. 17. Species shall be Douglas Fir - Larch

Item	Sizes	Grade	Maximum Moisture Content at Initial Use	Notes
All Material	2x	No. 1	19%	Unless Noted Otherwise
All Material	3x,4x	No. 1	19%	Unless Noted Otherwise
All Material	6x	No. 1	19%	Unless Noted Otherwise
Decking	2x	Select Dex	19%	

2. "At initial use" shall be that point at which nails, screws, bolts, split rings, shear plates or other fasteners or the holes for said fasteners are placed in the wood.
3. All sawn lumber is assumed to be enclosed in the dry building envelope in the final service condition, unless noted otherwise, and free to dry to moisture content less than 19%.

4. The Contractor shall use whatever means necessary, including site drying to ensure that the moisture contents above are not exceeded.
5. All studs, plates, joists, rafters and beams 3x and thicker shall be free of heart center in accordance with the specified grading standards.

B. Plywood Sheathing:
1. Roof and Wall Structural Sheathing: PS1 APA rated sheathing with exterior glue. Thickness type and grade shall be as indicated on Drawings.
2. Where indicated on the Architectural Drawings as interior wall backing behind tile and in all toilet rooms behind sheet rock, to be C-C APA rated sheathing with exterior glue. Thickness shall be 5/8-inch at all locations.
3. Flooring: C-C APA Performance rated tongue and groove with exterior glue. Thickness type and grade shall be as indicated on the Drawings.
4. Sheathing rated by agencies other than APA must be submitted for approval as a substitution.

C. Building Paper: Fed. Spec. UU-B-790a, Type I, Grade B (15 lb. min. unless noted elsewhere.).

D. Rough Hardware Fastenings and Connections: All types including bolts, lag screws, nails, spikes, screws, washers and other rough hardware, of kinds that may be purchased and that require no further fabrication, shall be furnished and installed for all finish and rough carpentry and shall conform to 2012 NDS Standards and dimensions. All hardware exposed to weather shall be hot-dipped galvanized per ASTM A153 Standards and CBC 2318A.3.4. All nails used into pressure treated lumber shall be hot-dipped galvanized per ASTM A153 or stainless steel.
1. Common wire nails or spikes unless noted otherwise on the Drawings. Box nails and sinker nails are not permitted. Vinyl coating is permitted on nails when not exposed to weather.
2. Bolts: Bolt material shall conform to ASTM A307, Grade A. Bolt dimensions shall conform to ANSI/ASME B18.2.1 with hex head of sizes indicated.
3. Lag Screws: Lag screws shall conform to ASTM 307, Grade A. All lag screws shall have hex heads where exposed.
4. Washers: Standard flat washers shall conform to ANSI B18.22.1, Type A, Wide Pattern. Steel plate washers shall be Simpson BP or BPS or equivalent. Malleable iron washers shall be standard malleable iron washers.
5. Powder Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems or equivalent. See Drawings for size, type and embedment.
6. Expansion Anchors: See Section 03 30 00 for anchors to concrete and Section 04 20 00 for anchors to masonry.
7. Adhesive Anchors: See Section 03 30 00 for anchors to concrete and Section 04 20 00 for anchors to masonry.
8. Fabricated Metal Timber Framing Connectors: Connectors shall be punched for nailing and bolting. Nails and nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. All connectors must have specific ICC approval. Types as noted on Drawings are Simpson Strong-Tie. Hardware suppliers other than Simpson shall submit a comparative material list itemizing product designation, load rating and supported member size for review by the enforcement agency and the Structural Engineer.

2.2 FABRICATION

A. Lumber:
1. All lumber shall be air or kiln-dried to the maximum moisture content indicated in Materials Section.
2. Furnish S4S unless otherwise noted.

3. Size to conform to rules of governing standard. Sizes shown are nominal unless otherwise noted.

B. Wood Treatment:
1. Preservative Treatment: The treating process and results thereof shall conform to the appropriate AWPA Standards for exterior, above ground use (3B) and as indicated in CBC Section 2303.1.8.
2. After treatment and prior to shipping, air or kiln-dry lumber to maximum 19 percent moisture content.
3. All treated wood shall be identified with a label meeting the requirements of CBC Section 2303.1.8.1.
4. The amount of preservative to be injected into the wood shall be as required by the AWPA standard for each type of installation.
5. All wood in contact with concrete or masonry shall be preservative treated.
6. Cut surfaces and bored holes in pressure treated wood shall be protected in accordance with AWPA Standard M4.

C. Fire Treatment: All fire-retardant-treated wood shall be identified with a label meeting the requirements of CBC Section 2303.2.1. The treating process and results thereof shall meet the requirements of CBC Section 2303.2. Moisture content of fire-retardant-treated wood shall meet CBC Section 2303.2.4. Treater shall submit design and fastener valves for treated wood to Structural Engineer for review. See Drawings for location of fire-retardant-treated wood.

2.3 SOURCE QUALITY CONTROL

A. Grade Mark each piece of lumber. Marking must be done by recognized agency.
1. Douglas Fir shall bear WCLIB or WWPA grade stamp.
2. Pressure treated Douglas Fir shall bear AWPA Quality mark.

B. Wood Sheathing: Each panel shall be legibly identified as to type, grade and specie by APA grade. If plies are spliced, the slope of the scarf shall not be steeper than 1:8. White pockets will not be permitted in face plies.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:
1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly proceed.
2. Verify that rough carpentry may be performed in strict accordance with the original design and all pertinent codes and regulations.

B. Discrepancies: In the event of discrepancy, immediately notify Architect. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 WORKMANSHIP

A. General: All rough carpentry shall produce joints true, tight, and well nailed with all members assembled in accordance with the Drawings and with all pertinent codes and regulations.

B. Selection of Lumber Pieces: Carefully select all members. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing or making proper connections. Cut out and discard all defects which will render a piece unable to serve its intended function.

C. Lumber may be rejected by the Architect, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.

D. Shimming: do not shim any framing component.

E. Care shall be taken that notching and boring of members is in strict conformance with the Drawings and that there are no over-cuts.

3.3 FASTENING

A. Nailing: Except as otherwise indicated on Drawings or specified, all nailing shall be as required by CBC Table 2304.9.1 - Fastening Schedule.
   1. Nails or Spikes shall be common wire unless noted otherwise. Penetration of nails or spikes shall be one-half the length of the nail or spike into the piece receiving the point. However, to connect pieces 2" in thickness, 16d nails shall be used unless noted otherwise.
      a. Bore holes for nails wherever necessary to prevent splitting.
      b. Use finish or casing for finish work.
      c. Use of machine nailing is subject to a satisfactory installation of nails. Minimum edge distances shall be maintained. Nails installed through sheathing with nail guns shall not penetrate into the outer plies deeper than hand nailing. Submittal of guns and nails is required.
      d. All nailing into Pressure-Treated lumber shall utilize hot-dipped zinc coated galvanized nails or stainless steel nails per CBC Section 2304.9.5.

B. Bolts and Lag Screws: Bolts shall be sizes indicated on Drawings. Holes for bolts shall be 1/16-inch larger than the bolt diameter. Malleable, Steel plate or standard flat washers shall be used where heads or nuts would otherwise bear directly on wood surfaces. Malleable or plate washers shall be used on all anchor bolts. Cut washers are not permitted. Lag screws shall be screwed (not driven) into place. For the shank, holes shall be bored the same depth and diameter as shank. For threaded portion, holes shall be pre-drilled as follows:

Lag Screw Size	Thread Portion Pre-Drill
1/2” diameter	1/4” diameter
5/8” diameter	5/16” diameter
3/4 diameter	3/8” diameter
7/8” diameter	1/2” diameter
1” diameter	5/8” diameter

Soap Lag screws prior to installation. Tighten all bolts and screws before closing in.

C. Framing Devices: Install according to the manufacturer’s instructions unless otherwise noted.

3.4 FRAMING AND ROUGH CARPENTRY

A. Sills: Shall be in long lengths of sizes shown, fastened with anchor bolts as indicated, a minimum of two anchor bolts per piece. Place steel plate washers (but not standard flat or malleable iron washers) under nuts bearing on wood. Set sills level and true.

B. Studs, Posts and Columns: Shall be full length. Corners shall be as detailed. Partitions or walls containing plumbing, heating or other piping shall be so formed as to give proper clearance for materials. Cut members as required to provide full bearing at ends. Connect to structure as indicated.

C. Plates: Shall be full length of wall segment or 12-foot minimum and spliced as shown.

D. Blocking: Blocking shall be same thickness and width of studs or joists unless shown otherwise. Blocking shall not be spaced over 8'-0" c.c. Install fire blocking in accordance with CBC. Horizontal fire blocking in walls shall be placed at floor lines and ceiling lines unless noted otherwise. Install blocking at all plywood joints where noted on the Drawings. Install wall width full height solid blocking at floor joists beneath all posts in walls. Blocking shall be installed around all wall, floor and roof penetrations.

E. Joists and Beams: Shall be full span length and spliced over bearings unless shown otherwise. Install with crown side up. Beams or headers indicated to be built up of two or more joists shall be fabricated on the job using full length members. For two piece 2x members, stitch nail pieces together with 16d common nails spaced not over 12 inches c.c. and staggered. Clinch nails protruding through members. For three or more piece members, stitch bolt pieces together with ½" bolts spaced not over 12 inches c.c. and staggered.
   1. Provide double joists and headers at all openings through roof unless otherwise shown on Drawings.
   2. Provide typical headers at all openings through walls where one or more studs are required to be cut. For penetration through walls narrower than stud spacing, provide solid blocking on all sides for fastening finish materials.

F. Wood Sheathing: Install to pattern indicated and provide blocking at joints where noted on the Drawings. Center all joints over bearing supports. Nail to framing as indicated. Install wood sheathing with face plies perpendicular to joists or studs unless indicated otherwise. Wall wood sheathing shall continue uninterrupted by ceilings or soffit from floor to floor or floor to roof unless specifically detailed on the Structural Drawings.

G. Wood Furring, Stripping: Install as shown or required to provide nailing materials or passage of pipes, conduits, etc., not otherwise accommodated including ceiling stripping for gypsum drywall construction.

H. Bridging: Space not over 8'-0" c.c. for spans over 16'-0". Joists 8 inches or less in depth shall not require bridging unless specifically indicated.

I. Solid Wood Backing: Solid wood backing shall be provided for all wall and ceiling finishes and for supporting of mounted items for all trades, including but not limited to metal toilet partitions, toilet room accessories, frames, cabinets, casework, mirrors, trim, applied wall finishes, athletic equipment, food service equipment, piping, conduit, ducts, etc. Contractor shall coordinate placement of backing and supports with Subcontractor supplying mounted items.

J. Building Paper: Install in all locations indicated except where included in other sections of the specifications.

K. Cant Strips and Crickets: Shape to sizes shown. Rigidly fasten to construction. Form neat mitered corners.

L. Wood Sheathing Backing: All toilet rooms, restrooms, single or joint occupancy shall have all walls backed with 5/8-inch thick wood sheathing with no surface voids. Install sheathing between the framing members and wallboard. The same wood sheathing shall also be provided and installed at all tile locations. At tile locations wood sheathing shall be installed between the framing members and the resin-cement backing board.

3.5 MISCELLANEOUS CARPENTRY WORK

A. Install all items under other sections specified to be furnished and installed in other sections which relate to the rough carpentry work.

B. Miscellaneous Carpentry Work not included under other sections but, indicated or required yet not specified elsewhere shall be furnished and installed hereunder, including appropriate fastening devices. Contractor shall provide miscellaneous carpentry work for all sections and divisions of work identified.

C. Wood Curbs for Equipment: Construct all wood curbs for roof mounted equipment as detailed. Provide all miscellaneous blocking, bracing, supports, and other wood items as shown or required to complete the work.

D. Plywood Backing for Electrical, telephone, and similar types of wall mounted equipment shall be provided hereunder where required. Plywood shall be 3/4-inch thick exterior A-C plywood with 'A' face exposed.

E. Fire/Draft Stops: Construct fire and drafts stops in furred attic spaces where indicated or required by CBC code. Unless otherwise indicated on Drawings construct of not less than 5/8-inch Type 'X' gypsum wallboard or ½" wood sheathing, adequately supported by 2x4's at 24 inches c.c., braced diagonally to the roof structure. Draft stop and installation work shall conform to code requirements.

F. Shoring and Bracing: Shore or brace for temporary support of all work as required during the construction period except any shoring and bracing specified and included under other sections of these specifications.

G. Temporary Enclosures: Provide and maintain all barricades and enclosures required to protect the work in progress.

H. Protect all work in progress and all work installed, as well as the work of all other trades. Any work damaged as a result of the work under this section shall be corrected to its original condition or replaced if directed by the Architect at no increase in cost to the Owner.

I. Ventilation: Contractor shall include all labor and materials necessary to provide ventilation requirements of roof overhangs, eaves, attics, and all other components of the building required by codes to be ventilated. Work shall include removing knock-outs in wood I-joists for cross ventilation, drilling of blocking, wood sheathing, and other wooden components of the structure necessary to comply with requirements of the CBC for ventilation of buildings.

END OF SECTION – 06 10 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section describes the requirements for miscellaneous rough carpentry items, including but not limited to the following;
   1. Wood blocking and backing.
   2. Perimeter nailers at single ply roofing.
   3. Plywood backing at mechanical, electrical and telecommunications rooms.

B. Related Sections:
   1. Wood treatment is specified in Section 06 05 73.

1.2 ENVIRONMENTAL QUALITY ASSURANCE

A. Provide composite wood and agrifiber products having no added urea-formaldehyde resins.

B. Available LEED Credits:
   1. Credit MR 7 – Certified Wood.
   2. Credit EQ 4.1 – Low-Emitting Materials, Adhesives & Sealants.
   3. Credit EQ 4.4 – Low-Emitting Materials, Composite Wood & Agrifiber Products.

1.3 PRODUCT HANDLING

A. Keep materials under cover and dry. Protect against exposure to weather and contact with wet or damp surfaces.

B. Stack lumber, plywood and other panels; provide for air circulation within and around stacks and under temporary coverings.

PART 2 - PRODUCTS

2.1 LUMBER

A. Manufacture lumber to comply with PS 20 and with applicable grading rules of inspection agencies certified by ALSC Board of Review.

B. Factory-mark each piece of lumber identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

C. Moisture Content: 19 percent maximum.

D. Species and Grade: Douglas Fir, No. 2.

2.2 PLYWOOD BACKING

A. Plywood products shall contain no added urea-formaldehyde resin as a binder.

B. Standards: Comply with requirements of PS 1 Voluntary Product Standard "Construction and Industrial Plywood" for veneer plywood and APA PRP-108 "Performance Standards and Policies for Structural-Use Panels" for performance-rated panels.

C. Miscellaneous Exposed Plywood: APA A-D Interior, minimum 3/4-inch thick.

2.3 FASTENERS

A. General: Provide fasteners with hot-dip zinc coating in accordance with ASTM A153 or stainless steel.

B. Nails, Wire, Brads, Staples: FS FF-N-105.

C. Bolts: ASTM A307, Grade A; with hex nuts and flat washers.

D. Screws: Type, size and length appropriate for securing plywood backing to metal studs.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects which might impair quality of work, and units in sizes that would require an excessive number or poor arrangement of joints.

B. Cut and fit miscellaneous carpentry accurately. Install members plumb and true to line and level.

C. Securely attach carpentry work to substrate by anchoring and fastening as indicated and required.

D. Use fasteners of appropriate type and length. Install fasteners without splitting wood; pre-drill as required.

3.2 WOOD GROUNDS, NAILERS, AND BLOCKING

A. Provide where required for screeding or attachment of other work. Form to shapes indicated and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces.

C. Provide permanent grounds of dressed, preservative treated, key- beveled lumber not less than 1-1/2-inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PLYWOOD BACKING

A. Saw cut plywood accurately for tight fit.

B. Install with grain of outer plies at right angles to supports.

C. Fasten securely at each support with self-tapping sheet metal screws driven flush with face of plywood, and terminate ends only over supports.

D. Maintain tight joints but do not force panels into place.

3.4 CONSTRUCTION WASTE MANAGEMENT

A. Comply with applicable provisions of Division 01 including, but not limited to:
   1. Separate the following categories for salvage or re-use on the site:
      a. Sheet materials larger than 2-sq. ft.
      b. Solid wood trim longer than 16-inches and multiple offcuts of any size larger than 12-inches.
   2. The following categories may be re-used in the manufacture of particleboard or medium density fiberboard:
      a. Composite wood.
      b. Clean dimensional lumber.
   3. Separate the following categories for disposal and place in designated areas for hazardous materials:
      a. Treated, stained, painted, or contaminated wood.

END OF SECTION – 06 10 53

SECTION 06 16 43

GYPSUM SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Fiberglass-mat faced, moisture and mold resistant gypsum sheathing.

B. Related Sections:
1. Section 05 41 00 Structural Metal Stud Framing.
2. Section 06 10 00 Rough Carpentry.
3. Section 09 21 16 Gypsum Board Assemblies.

1.2 REFERENCES

A. ASTM International (ASTM):
1. ASTM C473 Standard Test Methods for Physical Testing of Gypsum Panel Products.
2. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
3. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
4. ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
5. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
6. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
7. ASTM D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers**.**
8. ASTM E72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
9. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
10. ASTM C1396 Standard Specification for Gypsum Board
11. ASTM E 136 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
12. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

B. Gypsum Association (GA): GA-253 Application of Gypsum Sheathing.

1.3 SUBMITTALS

A. Product Data: Manufacturer’s specifications and installation instructions for each product specified.

1.4 WARRANTY

A. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay) commencing with the date of installation of the product in such structure.

B. Manufacturer’s Warranty:

1. Five years against manufacturing defects from the date of purchase of the product for installation

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Georgia-Pacific Gypsum LLC:
   1. Fiberglass-Mat Faced Gypsum Sheathing: DensGlass Sheathing.
   2. Fiberglass-Mat Faced Gypsum Sheathing, Type X for Fire Rated Designs: DensGlass Fireguard Sheathing.

2.2 MATERIALS

A. Fiberglass-Mat Faced Gypsum Sheathing: ASTM C1177:
   1. Thickness: 1/2 inch.
   2. Width: 4 feet.
   3. Length: 8 feet
   4. Weight: 1.9 lb/sq. ft.
   5. Edges: Square.
   6. Surfacing: Fiberglass mat on face, back, and long edges.
   7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 540 pounds per square foot, dry.
   8. Flexural Strength, Parallel (ASTM C473): 80 lbf, parallel.
   9. Humidified Deflection (ASTM C1177): Not more than 2/8 inch.
   10. Permeance (ASTM E96): Not less than 23 perms.
   11. R-Value (ASTM C518): 0.56.
   12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
   13. Microbial Resistance (ASTM D6329, UL Environmental GREENGUARD 3-week protocol): Will not support microbial growth.
   14. Acceptable Products:
      a. 1/2 inch DensGlass Sheathing, Georgia-Pacific Gypsum LLC.

B. Fire-Rated Fiberglass-Mat Faced Gypsum Sheathing: ASTM C1177, Type X:
   1. Thickness: 5/8 inch.
   2. Width: 4 feet.
   3. Length: 8 feet
   4. Weight: 2.5 lb/sq. ft.
   5. Edges: Square.
   6. Surfacing: Fiberglass mat on face, back, and long edges.
   7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 654 pounds per square foot, dry.
   8. Flexural Strength, Parallel (ASTM C1177): 100 lbf, parallel.
   9. Humidified Deflection (ASTM C1177): Not more than 1/8 inch.
   10. Permeance (ASTM E96): Not less than 17 perms.
   11. R-Value (ASTM C518): 0.67.
   12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
   13. Microbial Resistance (ASTM D6329, UL Environmental GREENGUARD 3-week protocol): Will not support microbial growth.
   14. Acceptable Products:
      a. 5/8 inch DensGlass Fireguard Sheathing, Georgia-Pacific Gypsum LLC.

2.3 ACCESSORIES

A. Screws: ASTM C1002, corrosion resistant treated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Inspection: Verify that project conditions and substrates are acceptable, to the installer, to begin installation of work of this section.

3.2 INSTALLATION

A. General: In accordance with GA-253, ASTM C1280 and the manufacturer's recommendations.
   1. Manufacturer's Recommendations:
      a. Current "Product Catalog", Georgia-Pacific Gypsum.

3.3 PROTECTION

A. Protect gypsum board installations from damage and deterioration until date of Substantial Completion.

END OF SECTION 06 16 43

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 06 18 00

GLUED LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of Division 1 apply to all Work of this Section.

1.2 SCOPE

A. Provide all labor, materials, tools, appliances, facilities and equipment required for the fabrication and delivery to job site of all glued laminated wood members.

1.3 RELATED WORK INCLUDED IN OTHER SECTIONS

A. Rough Carpentry: Section 06 10 00.

B. Structural Composite Lumber: Section 06 71 13.

1.4 QUALITY ASSURANCE

A. General:
   1. Qualifications of Manufacturer: The fabricator shall have been engaged in the continuous manufacturing of glued laminated timbers for a minimum of at least two years and shall have the authority to use the AITC "Quality Inspected Stamp". Each timber member shall be stamped and placed in such a position not to be visible on finished erected members.

B. Submittals: (Submit under provisions of Section 01 32 19):
   1. Shop drawings showing full dimensions of each member and layout of entire structural system.
   2. Show large scale details of connections, connectors and other accessories.
   3. Indicate species and laminating combination, adhesive type, and other variables in required work.

C. Tests and Inspections:
   1. A testing program is required prior to start of construction. Testing program to be done in Compliance with the 2013 CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
   2. Each structural glued-laminated member shall be stamped with an identifying mark. Mark shall include all pertinent data, such as grade and species of lumber, type of glue, extremes of moisture content and other such information as may be required.
   3. Certificate of compliance with the above data.

D. Standards and References: (Latest Edition unless specified otherwise)
   1. 2013 California Building Code (CBC), with State of California Amendments.
   2. 2012 National Design Specification for Wood Construction (NDS).
   3. American Institute of Timber Construction, "Standard Specifications for Structural Glued Laminated Timber of Softwood Species, AITC 117.
   4. ANSI/AITC Standard A190.1
   5. ASTM D3737 “Design and Manufacture of Structural Glued Laminated Timber”.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver undamaged products to site in manufacturer's protective wrappings with legends intact. Store on site secure from weather, soil and physical damage.

B. Transport, handle and store in strict accordance with the manufacturer's recommendations. Use padded, non-marring slings.

C. Architectural Appearance Grade members shall be shipped, handled and stored with complete weather and damage protection wrapping. Maintain wrappings in place until immediately prior to deck installation.

D. Industrial Appearance Grade glued laminated timber members shall be wrapped in a water resistant covering during transit. Contractor shall be responsible for protection during hauling and unloading at job site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber:
1. Lumber used for laminating structural members shall be well manufactured and shall conform to requirements of Standard Grading and Dressing Rules No. 17, West Coast Lumber Inspection Bureau. Such lumber shall be inspected, identified by individual piece, and certified as meeting requirements of said standard specifications by an approved lumber grading agency. It is assumed that each lamination is graded on basis of requirement for nominal size of individual lamination. When lumber is resawn, it shall be regraded on basis of new size.

B. Type: Glued Laminated Timber Protected from Weather
1. Species: Douglas Fir or Western Larch
2. Stress Grade: AITC Combination 24F-V4 for simple beams, 24F-V8 for cantilever or continuous beams.
3. Extreme fiber bending - F_b = 2400 psi
4. Adhesives: Wet use
5. Appearance Grade: AITC Industrial for concealed uses, Architectural appearance at exposed uses.
6. Laminations: Provide outer tension laminations or proof load testing as required by ANSI/AITC A190.1.
7. Sealing: Shop seal all surfaces with 2 coats of clear penetrating sealer.

C. Type: Glued Laminated Timber Exposed to Weather
1. Species: Alaskan Yellow Cedar
2. Stress Grade: AITC Combination 20F-V12 for simple beams, 20F-V13 for cantilever or continuous beams.
3. Extreme fiber bending - F_b = 2000 psi
4. Adhesives: Wet use
5. Appearance Grade: Architectural
6. Laminations: Provide outer tension laminations or proof load testing as required by ANSI/AITC A190.1.
7. Sealing: Shop seal all surfaces with 2 coats of clear penetrating sealer.

2.2 FABRICATION

A. Fabrication shall be in compliance with the above standards and references.
1. Fabrication shall be in accordance with best practices with adequate plant and equipment and under supervision of properly qualified personnel.

2. Laminations shall be machine finished to a smooth surface, but not sanded, and to a uniform thickness with a maximum allowable variation of 1/64 inch. Warp, twist, or other characteristics which will prevent intimate contact of adjacent glued faces or interfere with uniform bending to a required curvature when under clamping pressure shall not be permitted. Surfaces to be glued shall be clean and free from oil, dust and other foreign material which would be detrimental to satisfactory gluing.
3. Moisture content of lumber at time of gluing shall be not less than 7 percent nor more than 12 percent.
4. Slips, misses, and wane are not permitted.
5. Boring of holes in members shall be in strict conformance with the Drawings. Notching is prohibited except where specifically detailed.
6. Field cuts and holes in preservative treated members shall be preservative treated and sealed.

PART 3 - EXECUTION

3.1 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.

B. Verify that specified items may be installed in accordance with the approved design.

C. In the event of a discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.2 PROTECTION

A. Protect work and materials of this Section prior to and during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

3.3 HANDLING

A. Use equipment and methods that avoid scarring corners and faces or otherwise injuring members. Sharp instruments and unprotected wire rope, chain slings and the like shall not be permitted.

3.4 INSTALLATION

A. Glued Laminated members are to be erected and installed in accordance with the Drawings and manufacturer’s recommendations.

3.5 CLEANUP

A. Keep premises free from accumulated waste materials, rubbish and debris resulting from this work. Upon completion, remove tools, appliances, surplus materials, waste materials, rubbish, debris and accessory items used in or resulting from said Work, and legally dispose of off the site.

END OF SECTION – 06 18 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 06 40 23

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Interior standing and running trim.

1.2 RELATED SECTIONS

A. Architectural wood casework is specified in Section 06 41 00.

B. Flush wood doors are specified in Section 08 14 16.

1.3 SUBMITTALS

A. Shop Drawings: Show details of fabrication and installation, dimensioned plans, elevations, and sections.
   1. Shop drawings shall bear the Woodwork Institute (WI) Certified Compliance Grade Stamp.

B. Samples:
   1. Lumber with or for transparent finish, 50-square inches, for each species and cut, finished on one side and one edge.
   2. Veneer leaves representative of and selected from flitches to be used for transparent finished woodwork.
   3. Wood veneer panel products, with or for transparent finish, 8-1/2-inches by 11-inches for panels and 50-square inches for lumber, for each finish system and color, with one half of exposed face finished.
   4. Corner pieces of miter joints for standing trim.
   5. Reveal, edge, and corner extrusions.

C. Product certificates signed by woodwork manufacturer certifying that products comply with specified requirements.

D. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other specified information.

1.4 QUALITY ASSURANCE

A. WI Quality Standard: Comply with applicable requirements of "Manual of Millwork" published by Woodwork Institute (WI).
   1. Issue WI "Certificates of Compliance" certifying that items comply with WI requirements for specified grades.
   2. Issue WI "Certificate of Compliance" certifying that items are installed in accordance with WI requirements.

B. In the event of question as to compliance with the referenced standard of any item of work, the District’s Representative may require reinspection of questioned items as specified in "Reinspection Procedure" of Section 1, General Information of WI "Manual of Millwork".

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect woodwork during transit, delivery, storage, and handling to prevent damage, soilage, and deterioration.

B. Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet specified requirements.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Fabricated woodwork shall be left in a well ventilated warehouse for a minimum of 72-hours prior to delivery to the Project site.

1.8 INDOOR AIR QUALITY

A. Do not use wood products containing urea formaldehyde glues inside the shell of the building.

B. When machining plastic products, protect surrounding areas from dust.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of the WI "Manual of Millwork" for each type of woodwork and WI quality grade specified.

B. Lumber Standards: Comply with PS 20 for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.

C. Plywood Standards: Comply with PS 1 or APA PRP-108.
1. Plywood products shall contain no added urea-formaldehyde as a binder.

D. Particleboard: One of the following at Contractor’s option.
1. Particleboard complying with ANSI A208.1, Grade M-2, made with binder containing no urea-formaldehyde resin.
2. Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.

E. Medium Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.

F. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.

G. Solid Surfacing Material: Homogeneous solid sheets of filled plastic resin, color as approved by the District's Representative.

H. Furring, Blocking, Shims and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15-percent moisture content.

I. Screws: Material, type, size, and finish required for each use.

J. Nails: Material, type, size, and finish required for each use.

K. Anchors: Material, type, size, and finish required for each substrate for secure anchorage.

L. Glue: VOC-compliant glue recommended by manufacturer for general carpentry use.

M. Adhesives: VOC compliant adhesive as recommended by manufacturer for general carpentry use.

2.2 FABRICATION, GENERAL

A. Wood Moisture Content: Comply with requirements of referenced quality standards for moisture content of lumber in relation to relative humidity conditions existing at time of fabrication and in installation areas.

B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to a radius as follows:
   1. Corners and edges of solid wood members less than 1-inch in nominal thickness: 1/16-inch.
   2. Edges of rails and similar members more than 1-inch in nominal thickness: 1/8-inch.

C. Complete fabrication, including assembly and finishing before shipment to Project site to maximum extent possible. Disassemble components only as required for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Shop-cut openings to maximum extent possible. Locate openings accurately and use templates for roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges and cutouts.

PART 3 - EXECUTION – NOT USED

END OF SECTION – 06 40 23

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 06 41 00

ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Custom plastic laminate faced cabinetwork.

B. Plastic laminate countertops.

C. Solid Surface countertops.

D. Cabinet hardware.

1.2 PERFORMANCE CRITERIA

A. WI Quality Standard: Comply with applicable requirements of "Manual of Millwork" published by Woodwork Institute (WI).
   1. Before delivery to Project site, WI licensed fabricators/suppliers shall issue WI "Certificates of Compliance" certifying that items comply with WI requirements for specified grade.

1.3 SUBMITTALS

A. Samples:
   1. Plastic laminate colors for verification of initial selections.
   2. Solid Surface colors for verification of initial selections.
   3. Minimum three 12-inch x 12-inch square samples of wood veneers showing full range of grain and color characteristics to be expected in the finished work.
   4. Minimum three 12-inch long wood samples showing full range of grain and color characteristics to be expected in the finished work.

B. Shop Drawings: Show details of fabrication and installation, dimensioned plans, elevations, and sections. Each set of shop drawings shall comply with Woodwork Institute (WI) "Manual of Millwork" Section 1 and shall bear the WI Certified Compliance Label on the first page.

C. Certification: Prior to delivery to the jobsite, furnish a WI Certified Compliance Certificate certifying that products to be furnished for this Project will meet the requirements of the specified grades.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Check actual dimensions of other construction by accurate field measurements before fabrication, and show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.
   1. Verify locations of concealed framing, blocking, backing, reinforcements, and other items that support cabinetwork by accurate field measurements before being enclosed and record on shop drawings.

1.5 COORDINATION

A. Cabinets shall be left in a well ventilated warehouse for a minimum of 72-hours prior to delivery to the Project site.

1.6 INDOOR AIR QUALITY

A. Do not use wood products containing urea formaldehyde glues inside the shell of the building.

B. When machining plastic products, protect surrounding areas from dust.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Laminated-Plastic Sheets: Comply with requirements of NEMA LD3. Type GP 50, .050-inch thick, matte finish for horizontal surfaces, NEMA Type FR 32, .028-inch thick matte finish for vertical surfaces.
   1. Casework: Custom Grade
   2. Countertops: Premium Grade

B. Backing for Plastic Laminate: Medite Corporation "Medite II" or approved equal (no known equal) medium density fiber board, 3/4-inch thick, 48-pcf density. Fiber board shall have a recycled content of 92-percent.

C. Solid Surface Countertops: Through color, seamless nonporous surfacing. Formica, or equal, colors as shown on Drawings.

D. Subframe Lumber: No. 1 grade FSC-certified Douglas Fir or plain sawn Yellow Poplar.

E. Hardware: Furnish and install as required to provide a complete casework installation.
   1. Hinges: 120-degree opening, concealed hinge, passing 100,000-cycle test. Provide three hinges on doors over 48-inches high.
   2. Door and Drawer Pulls: Stainless steel wire pulls.
   3. Door & Drawer Locks: Provide on all Kitchen and Copy Room doors. Key as directed by the District's Representative.
   4. Drawer Guides: Full extension, minimum 100-pound capacity.
   5. Adjustable Shelf Standard: Recessed in cabinet sides. Provide with clips.
   6. Plastic Grommets: Provide at penetrations through countertops. Size and color as approved by the District's Representative. Provide minimum two grommets per work station. Coordinate location with District's Representative.

2.2 FABRICATION

A. Fabricate products in accordance with the approved Shop Drawings and specified WI Grade requirements. The architectural drawings indicate form and profile concept only. Fabrication and construction details shall comply with WI "Manual of Millwork" unless otherwise specified.

B. Fabricate laminated plastic casework in accordance with WI "Manual of Millwork" Section 15, Custom grade, Construction Style A Frameless, Construction Type I or II except where Type II construction is specifically detailed.

   1. Exposed portions shall be covered with a high pressure plastic laminate.
   2. Edge Banding: Laminated plastic.
   3. The following semi-exposed surfaces shall be covered with a high pressure plastic laminate:
      a. Interior surfaces of wall cases without doors or with glass doors.
      b. Adjustable shelves in cabinets without doors or with glass doors and where indicated.
      c. Open accessible base cabinets.
   4. Semi-exposed surfaces of cabinet tops and bottoms, cabinet ends, fixed and adjustable shelves, cabinet back, cabinet doors, and drawers shall be finished with a polyester laminate; exposed edges of semi-exposed surfaces shall be finished with extruded PVC or self-edged plastic laminate.
   5. Door and Drawer Front Style: Flush overlay.
   6. Door and Drawer Edge: Type A. Provide Type B door edge for stile and rail doors.

C. Fabricate wood casework in accordance with WI "Manual of Millwork" Section 14, Premium grade, Construction Style A, Construction Type I or II except where Type II construction is specifically detailed. Cabinets shall receive a transparent finish to match approved sample.
   1. The following semi-exposed surfaces shall be considered as exposed:
      a. Interior surfaces of wall cases without doors or with glass doors.
      b. Adjustable shelves in cabinets without doors or with glass doors and where indicated.
      c. Open accessible base cabinets.
   2. Other semi-exposed surfaces shall be finished with wood of similar species and grain as exposed surfaces; particleboard or medium density fiberboard will not be permitted on any semi-exposed surfaces.
   3. Door shall be Type I for flush doors and Type VI for stile and rail doors.

D. Laminated Plastic Countertops: Fabricate in accordance with WI "Manual of Millwork" Section 16, Premium grade.
   1. Countertop Edges: Self-edged with plastic laminate.

   2. Back Splash: Square butt joints or integral cove as approved.
   3. Top of Back Splash: Square with self edge.
   4. Back Splash Height: As approved.

E. Make cuts required to accommodate the work of other Sections in the shop where possible. Review other drawings and work to determine extent of items to be mounted in cabinetwork. Notify the District's Representative of discrepancies.

F. Shop-fabricate cabinets and countertops in whole units or partial units practical for handling and transporting. Assemble partial units in place so that each complete unit becomes a unified whole visually and structurally. Fabricate fillers and scribe strips of same materials and finishes as adjacent units.

G. Make cuts for hardware and equipment neat and true. Install hardware and fit securely.

H. Adjust drawers, doors, and movable shelves to operate easily and smoothly without binding.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cabinetwork in accordance with WI "Manual of Millwork" Premium Grade requirements.

B. Install products plumb and level.

C. Securely fasten cabinetwork to supporting substrate as indicated.

D. Anchor tops to base units and other supports as indicated. Seal space between backsplash and wall with sanitary sealant specified in Section 07 92 00. Install with no more than 1/8-inch in 8'-0" sag, bow, or other variation from straight line.

E. Fit tight and scribe to walls, ceilings, and other surfaces so no open joints occur.

F. Remove and replace materials damaged beyond repair or stained beyond cleaning.

3.2 ADJUSTMENT, CLEANING, AND PROTECTION

A. Repair damaged and defective cabinetwork where possible to eliminate defects; where not possible to properly repair, replace.

B. Clean, lubricate and make final adjustments to hardware for proper operation.

C. Clean cabinetwork on exposed and semi-exposed surfaces. Touch-up shop-applied finishes to restore damaged or soiled areas.

D. Protect cabinetwork to ensure work will be without damage at time of Substantial Completion. Cover completed cabinetwork with 4-mil polyethylene film protective enclosure, applied in a manner to permit easy removal.

3.3 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Division 01 including, but not limited to:

1. Separate the following categories for salvage or re-use on the site:
   a. Sheet materials larger than 2-sq. ft.
   b. Solid wood trim longer than 16-inches and multiple offcuts of any size larger than 12-inches.
2. Separate the following for recycling. Material shall be placed in source-separated or comingled recycling bins.
   a. Composite wood.
   b. Clean dimensional lumber.
3. Separate the following categories for disposal and place in designated areas for hazardous materials:
   a. Treated, stained, painted, or contaminated wood.

END OF SECTION – 06 41 00

SECTION 06 64 00

FIBER REINFORCED PANELS

PART 1 - GENERAL

1.1 SCOPE

A. Furnish labor, materials, equipment and services necessary for and reasonably incidental to furnishing and completely installing fiberglass reinforced panels.

1.2 QUALITY ASSURANCE

A. Applicator Qualifications: Work shall be by an applicator who has satisfactorily completed at least one project of comparable quality and scope within two years prior to bidding and is approved by Architect.

B. Reference Standards: Requirements of this standard restrict approval to flame spread no higher than 200. Class III.

1.3 SUBMITTALS

A. Submit product data and samples.

PART 2 - PRODUCTS

2.1 PANELS

A. Fiberglass reinforced panel, enhanced pebble texture, weight 0.7 lb/sq. ft., thickness 0.09", 4'-0" x 8'-0" panels, water absorption .16%, impact strength 10 ft.-lbs/in.

B. Acceptable Manufacturers:
1. Crane Composite Sequentia (800) 435-0080
2. Lasco Board (800) 626-1220
3. Marlite FRP (330) 343-6621

C. Color: 85 Embossed White

D. All associated trim and molding. Colors to match panel.

E. Or approved substitute.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Before starting installation, examine all surfaces to receive wall panels for any condition which will affect the final installation and notify the Architect in writing if such a condition exists. Start of work will indicate acceptance of the substrate as being satisfactory.

B. Follow manufacturer’s recommendations.

3.2 INSTALLATION

A. Apply wall panels with adhesive in accordance with manufacturers printed instructions. Install seams plumb at least 6" away from corners.

B. Remove switch plates, wall plates and surface mounted fixtures and cut panels evenly to edges of outlet boxes or support.

END OF SECTION – 06 64 00

SECTION 06 71 13

STRUCTURAL COMPOSITE LUMBER

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of Division 1 apply to all Work of this Section.

1.2 SCOPE

A. Provide all labor, materials, tools, appliances, facilities and equipment required for the fabrication, delivery and erection of all Structural Composite Lumber (SCL).
   1. All blocking, bridging, etc., for the installation of members.
   2. Clips, angles, straps, hangers, etc., incidental to installation of members.
   3. Nails, bolts, washers and other fasteners used for erecting and securing members.

1.3 RELATED WORK (See also Table of Contents)

A. Rough Carpentry: Section 06 10 00.

B. Glue-Laminated Construction: Section 06 18 00.

1.4 QUALITY ASSURANCE

A. General Qualifications of Manufacturer: The fabricator shall have been engaged in the continuous manufacturing of SCL members for a minimum of five years.

B. Standards and References: (Latest Edition unless specified otherwise)
   1. 2013 California Building Code (CBC), with State of California Amendments

C. Submittals: (Submit under provisions of Section 01 32 19).
   1. Show erection plans, sizes, types and location of SCL members. Drawings shall also indicate sizes and location of blocking, hangers, etc., with sufficient detailing to ensure correct installation.
   2. Product Data substantiating compliance with material properties shown on the Drawings.

D. Tests and Inspections:
   1. A testing program is required prior to start of construction. Testing program to be done in Compliance with the 2013 CBC requirements and in collaboration with Testing Laboratory, Design team, contractor, owner and submitted for review by the agency in charge of building enforcement. Requirements below are minimum requirements; additional requirements may be required in final testing program.
   2. Manufacturing facility shall be approved by an independent inspection agency approved by the International Accreditation Service, Inc. (IAS).
   3. All members shall bear a stamp indicating the grade, plant number, independent inspection agency, logo and ICC ES report number.

1.5 PRODUCT HANDLING

A. If members must be stored prior to erection, they shall be stored in a vertical position off the ground, covered and protected from weather.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Composite Lumber (SCL): SCL members shall be of the types and sizes indicated on Drawings and as specified here. Structural composite lumber shall have specific ICC approval, and shall meet all specified structural design properties. Proposed SCL members may be used only if equivalent, in the Architect's opinion, to the SCL specified.

B. Lumber
   1. Laminated Veneer Lumber (LVL): LVL shall be manufactured in accordance with the manufacturer's ICC-ES Report and have properties equal to or greater than as specified on the Drawings. Lumber species, thickness, etc. shall be such that the nailing capacity is equal to or better than that specified.
   2. Parallel Strand Lumber (PSL): PSL shall be manufactured in accordance with the manufacturer's ICC-ES Report and have properties equal to or greater than as specified on the Drawings. Lumber species, thickness, etc. shall be such that the nailing capacity is equal to or better than that specified.
   3. Laminated Strand Lumber (LSL): LSL shall be manufactured in accordance with the manufacturer's ICC-ES Report and have properties equal to or greater than as specified on the Drawings. Lumber species, thickness, etc. shall be such that the nailing capacity is equal to or better than that specified.
   4. Various SCL products shall only be used where specifically indicated on the Drawings. No substitutions shall be made without written approval.

C. Adhesive:
   1. According to manufacturers ICC ES Report.

D. Types:
   1. Sizes, properties and additional information as shown on the Drawings.

E. Accessories to be furnished and installed as indicated on the Drawings are as follows:
   1. Blocking, hangers, brackets, straps, ties, etc., shown on Drawings.
   2. Miscellaneous accessories incidental to erection and installation of members.

2.2 FABRICATION

A. Fabrication shall be in compliance with manufacturer's ICC ES Report.
   1. Fabrication shall be in accordance with best practices with adequate plant equipment and under supervision of properly qualified personnel.
   2. Moisture content of components at time of gluing shall comply with the manufacturer's ICC ES Report.

PART 3 - EXECUTION

3.1 INSPECTION

A. Prior to installation of the work of this Section, carefully inspect and verify that the installed work of all other trades is complete to the point where this installation may properly commence.

B. Verify that specified items may be installed in accordance with the approved design.

C. In the event of discrepancy, immediately notify Architect. Do not proceed in discrepant areas until discrepancies have been fully resolved.

3.2 PROTECTION

A. Protect work and materials of this Section during installation, and protect the installed work and materials of other trades.

B. In the event of damage, make all repairs and replacement necessary to the approval of the Architect at no additional cost to the Owner.

3.3 HANDLING

A. Use equipment and methods that avoid damages that may impair strength of SCL members. Sharp instruments and unprotected wire rope, chain slings and the like shall not be permitted.

3.4 INSTALLATION

A. SCL members are to be erected and installed in accordance with the Drawings and manufacturer's recommendations.

3.5 CLEANUP

A. Keep premises free from accumulated waste materials, rubbish and debris resulting from this Work. Upon completion, remove tools, appliances, surplus materials, waste materials, rubbish, debris and accessory items used in or resulting from said Work, and legally dispose of off the site.

END OF SECTION 06 71 13

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Exterior envelope insulation in walls and soffits.

1.2 RELATED SECTIONS

A. Roof board insulation directly under roof membrane is specified in Section 07 53 00.

B. Firestopping insulation is specified in Section 07 84 00.

1.3 SUBMITTALS

A. Product Data: Manufacturer’s specifications for each type of insulation required.

B. LEED Submittals:
1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

1.4 QUALITY ASSURANCE

A. Thermal Conductivity: Where insulation is indicated or specified by "R" value, provide thickness required to achieve indicated value. Use aged and settled values for thermal resistance factors (R-values), tested in accordance with ASTM C518 at 75-deg. F. and 50-percent relative humidity for at least 6-months.

B. Fire Ratings: Comply with fire-resistance and flammability ratings specified.

C. Insulation shall be certified by the manufacturer to comply with California standards for insulating materials.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Provide thermal insulation with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 20-percent of cost of materials used for the Project.

B. Available LEED Credits:
1. Credit MR 4.1 and MR 4.2 – Recycled Content.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect insulation from physical damage and from becoming wet or soiled. Comply with manufacturer's recommendations for handling, storage and protection during installation.

1.7 TESTING AND INSPECTIONS

A. Inspect insulation for proper installation. Correct defects such as voids, gaps or insulation compressed behind pipes before accepting work.

1.8 INDOOR AIR QUALITY

A. Protect ducts and HVAC system from loose insulation particulates.

B. Provide temporary ventilation of building areas where building insulation is being installed.

PART 2 - PRODUCTS

2.1 BATT AND BLANKET INSULATION

A. Foil-Faced Mineral/Glass Fiber Blanket/Batt Insulation:
1. Material: Thermal insulation produced by combining mineral-glass fibers with thermosetting resins to comply with ASTM C665, Type III, Class A, foil-scrim-kraft vapor retarder membrane on one face. Certainteed Sustainable Insulation (Greenguard Gold Certified), or equal.
2. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50 when tested in accordance with ASTM E84.
3. Thickness: As required for R-19 in walls and R-30 on underside of slabs where roof insulation is not used. Size batts to fill framing cavity.

B. Unfaced Formaldehyde-Free Thermal Batt/Blanket Insulation:
1. Material: Thermal fiberglass insulation made from resilient glass fibers bonded with a formaldehyde-free acrylic thermosetting binder, complying with ASTM C665, Type I.
2. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50 when tested in accordance with ASTM E84.
3. Thickness: As required for R-21 in walls and R-30 in soffits. Size batts to fill framing cavity.

2.2 MISCELLANEOUS MATERIALS

A. Mechanical Anchors: Miracle Adhesive Corp. "Stuck-Up", Stic-Klip Mfg. Co. "Stic-Klip" or approved equal. Provide protective covers or an approved unpointed clip for areas under 7'-0" above the floor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Comply with manufacturer's instructions for installation conditions.
2. Do not install insulation until building is sufficiently enclosed or protected against absorption of moisture by the insulation, and do not install insulation unless supporting framing and construction is in a thoroughly dry condition.
3. Install snugly between framing members with ends snugly fitted between units and against adjacent construction.
4. Carefully cut and fit insulation around pipes, conduit, and other obstructions and penetrations.
5. Where door, window and skylight frames occur in framing, cut additional strips of insulation and hand-pack as required to fill voids in and around such frames.
6. Use insulation free of ripped backs and edges.

B. Thermal Insulation:
1. Install with vapor barrier facing to building interior.
2. Install to completely fill typical and odd spaces in framing where required.
3. Tape joints and ruptures in vapor retarder to ensure airtight installation.

C. Horizontal Insulation:
1. Install insulation over insulation fasteners. Where required, install insulation fasteners prior to application of sprayed-on fireproofing.
2. Space fasteners and secure in a full bed of adhesive as recommended by manufacturer.
3. Lay out insulation for minimum of joints, and with no single pieces less than 24-inches wide nor less than 48-inches long, unless otherwise approved.
4. Offset intermediate end joints in adjacent panels not less than 48-inches.
5. Do not install insulation until clip adhesive is set.
6. Install insulation fully bearing against substrates, with tightly fitted joints.

7. Install fastener caps firmly against insulation face without compressing the material. Bend clip prongs flat against caps.

3.2 PROTECTION

A. Protect installed insulation and vapor barriers from harmful exposures and from physical damage.

3.3 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Division 01 Section 01 74 00 including, but not limited to:
   1. Plan and coordinate the insulation work to minimize the generation of off-cuts and waste. Remove insulation scraps to the maximum extent feasible.
   2. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION – 07 21 00

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 07 25 00

WATER RESISTIVE BARRIER SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the water-resistive barrier system concealed under exterior wall claddings that are protecting weather-exposed surfaces including the following:
   1. Water-resistive barriers, moisture-vapor permeable and impermeable.
   2. Self-adhered membrane.
   3. Self-adhered flashing.
   4. Accessories.

1.2 RELATED SECTIONS

A. Section 09 22 36 Cement Plaster Lathing and Lath Accessories

B. Section 09 24 00 Portland Cement Plastering

1.3 SUBMITTALS

A. Installer qualifications and experience.

B. Product Data: For each product specified.

C. Installation: Provide manufacturer's installation instructions regarding intended application means and methods of complying with specified requirements to achieve a watertight installation. If using other methods of application, certify that products and applications comply with specified requirements.

D. LEED Submittals:
   1. Product Data: For Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
   2. Product Data: For Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

E. Samples: For each product specified, submit four, 12 inch long samples.

F. Mock-ups: Representative materials and assemblies occurring at exterior walls, including conditions at field of wall, perimeters, soffits, intersections with heads/jambs, sills of windows. Doors and penetrations.

1.4 QUALITY ASSURANCE

A. Comply with CBC Section 1404.2.

B. Installer shall have 5 years of documented previous experience on at least 5 similar scope projects, using the specified or generically comparable materials.

C. Perform Work in conformance with product manufacturer's written instructions.

D. Follow recommendations of ASTM E2112 *Standard Practice for Installation of Exterior Windows and Doors*, and ASTM E 2266 *Standard Guide for Design and Construction of Low-Rise Frame Building Wall Systems to Resist Water Intrusion* for general guidance in assuring a watertight building enclosure.

E. Pre-installation Conference: Conduct conference at Project site in accordance with the requirements of the following:
   1. Notify participants including District's Representative, Contractor, subcontractors and District's waterproofing consultant at least 7 calendar days before conducting meeting.
   2. Review materials to be used and procedures to be followed in performing the Work.
   3. Review in detail job conditions, schedule, construction sequence, and quality of completed installation.
   4. Review installation of lathing, lath accessories, with special attention to detailing of control joints and expansion joints and acceptable repair techniques for shiners and abandoned fasteners.
   5. Record discussions of conference and any conflict, incompatibility, or inadequacy. Furnish a copy of record to each participant.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Provide water-resistive barrier with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 10-percent of cost of materials used for the Project. For Credit MR 4.1 and MR 4.2 – Recycled Content

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

B. Refer to Section 01 60 00 Product Requirements.

1.7 WARRANTY

A. Warrant sheathing paper to be free from defects in materials and workmanship for a period of 10-years from date of Substantial Completion. This warranty shall be in addition to and not a limitation of other rights the District may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER (Water-Vapor Permeable)

A. 2-layer minimum installation. The water resistance of each layer shall be not less than 1 hour per ASTM D779 and water-vapor transmission shall be not less than 75 g/sq. m. x 24 hr. per ASTM E96
   1. Option 1: 2 layers Building Paper at wood framed walls: Federal Specification UUB-790a, Grade D, 60 minute (water-vapor-permeable, kraft building paper). Fortifiber Corp.'s "Super Jumbo Tex,", asphalt-saturated kraft, permeable building paper, or equal.
   2. Option 2: 1 layer (inner) WrapShield SA, self-adhered vapor permeable sheet, with manufacturers prefabricated corners, tapes and accessories, self-adhered, Vaproshield LLC or equal, plus 1 layer (outer) of Option 1 Building Paper product.

2.2 SELF-ADHERED FLASHING

A. Self-adhered flashing (SAF1): SBS modified rubberized asphalt adhesive, 40-mil thickness, HDPE carrier sheet. Standard material.

1. Vycor V-40, 36 mil. of rubberized asphalt integrally bonded to 4 mil 0.1mm (.004 inch), high density cross laminated polyethylene film. Grace Construction Products or equal.

B. Self-adhered flashing (SAF2): Butyl adhesive, 30-mil thickness, HDPE carrier sheet. For use at high heat locations such as under sheet metal flashings exposed to the sun.
   1. Ultra Roofing Underlayment, butyl adhesive, Grace Construction Products or equal.
   2. Use manufacturer-approved butyl-based SAF when installing Wrapshield SA.

2.3 ACCESSORIES

A. Primer for use over fiberglass-mat faced wall sheathings: WB primer, Grace Construction Products or equal.
B. Sealant: Sealant compatible with adjacent self-adhered flashings, membranes and components:
   1. For use with HDPE carrier sheet self-adhered membranes and flashings. One part, neutral cure silicone sealant. Dow 758, Dow Corning or equal.
   2. For use with Henrys Blueskin, One-part, low-odor, moisture cure or equal. BES 925 sealant, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Review definition of weather-exposed surfaces from CBC Chapter 2502: Weather-Exposed Surfaces. Surfaces of walls, ceilings, floors, roofs, soffits and similar surfaces exposed to the weather except the following:
   1. Ceilings and roof soffits enclosed by walls, fascia, bulkheads or beams that extend a minimum of 12 inches below such ceiling or roof soffits.
   2. Walls or portions of walls beneath an unenclosed roof area, where located a horizontal distance from an open exterior opening equal to at least twice the height of the opening.
   3. Ceiling and roof soffits located a minimum horizontal distance of 10 feet from the outer edges of the ceiling or roof soffits.

B. Examine areas and substrates, with installer present, including wall assemblies, penetrations and other conditions affecting performance, and ceilings and soffits. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Inspect wall surfaces for plumb and planarity. Verify planarity of wall surface is within 1/4 inch over 10 feet or less, and within 1/8th inch over 4 feet or less. Reject non-conforming Work.

D. Surfaces to receive water-resistive barrier shall be free from projecting nails, wires, or other conditions that might damage paper.

E. Surfaces to be covered shall be dry, and shall have dried in fair weather not less than 3-days following wetting by rain.

F. Inspect sheathing installation. Verify continuous sheathing corners at wall openings, with no panel butt edges aligned at corners. Verify no excessive gaps occur between panel edges and panels fastening.

3.2 INSTALLING WATER-RESISITIVE BARRIER SYSTEM - GENERAL

A. Requirements for the water-resistive barrier system apply to exterior weather-exposed surfaces as defined. Non-vertical, weather-exposed building enclosure surfaces require specific materials, detailing and installation workmanship.

B. Apply 2 layers of water-resistive barrier under all weather-exposed wall cladding materials. Secure to substrate to maintain in place until covered by other materials. When complete, water-resistive barrier shall be reasonably flat, without excessive warps and bulges, and free from holes, cuts, tears, and other damage and defects.

C. Apply dry-lapped water-resistive barrier membranes horizontally, in accordance with manufacturer's written instructions, with 4 inch minimum horizontal overlap and 6 inch minimum (vertical) end laps, to vertical exterior wall surfaces only. At adjacent sheets courses, offset joints not less than 48 inches. At alternate sheet courses, offset joints not less than 24 inches.

D. Overlap water-resistive barrier system components over vertical flanges of sheet metal drainage flashings, horizontal expansion joints, door and window sill pan and head flashings, weep screeds, drainable cement plaster lath accessories, and all other appurtenances required for a complete, integrated drainable system.

E. Seal frames and perimeters of wall-opening assemblies such as window, door and louver assemblies, and wall penetrations such as pipes and conduits, to the water-resistive barrier system for a continuous, watertight condition to protect the building and wall assemblies from bulk water intrusion.

3.3 INSTALLING SELF-ADHERED MEMBRANE AND SELF-ADHERED FLASHING

A. General:
   1. Follow manufactures written instructions, provide compatible primers to substrates where required.
   2. Conceal water-resistive barrier system components under exterior wall claddings and finishes, do not leave them exposed to ultraviolet light.
   3. Provide self-adhered flashing under all sheet metal flashings, and install in a continuous watertight manner with the building water-resistant barrier membrane.
   4. Provide high heat-resistant type self-adhered flashings and self-adhered membrane under sheet metal flashings exposed to high heat conditions such as under sheet metal copings exposed to the sun.
   5. Apply self-adhered membranes and flashings, following manufacturer's written instructions, with 3 inch minimum overlaps.
   6. Handroll self-adhered membranes and flashings with a rolling tool and use required pressure to eliminate blisters and wrinkles, and to ensure well-adhered, watertight laps.
   7. Sequence the installation of horizontal self-adhered flashings and membranes to avoid reverse laps and to promote drainage.

B. At dry-lapped water-resistive barriers:
   1. Provide 12 inch wide minimum self-adhered flashing centered at internal and external wall corners, centered dimpled under wall expansion joints, and over window head flashing flanges.
   2. Provide 6 inch wide minimum self-adhered flashing centered under cement plaster control joints, either under or over the water-resistive barrier membrane, and over horizontal sheet metal drainage flashing flanges such as weep screeds, drip screeds and 2-piece drainable expansion joints.

3.4 CLEANING AND PROTECTION

A. Thoroughly inspect and repair defects in water-resistive barrier system components, from spinners and shiners (removed or abandoned fasteners that miss supports), unsealed holes from removed fasteners, scaffold tie-backs, tears, delaminations, and any other condition that would allow bulk water intrusion beyond the water-resistive barrier system into the building, before concealment with wall claddings.

END OF SECTION 07 25 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 07 26 23

BELOW-GRADE VAPOR RETARDERS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section describes the requirements for furnishing and installing vapor retarder under concrete slabs-on-grade.

B. Related Sections:
1. Cast-in-place concrete is specified in Section 03 30 00.

1.2 SUBMITTALS

A. Product Data: Include independent laboratory test results showing compliance with ASTM and ACI Standards. Include manufacturer's installation instructions for placement, seaming, and pipe boot installation.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Protect products against damage during field handling and installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vapor Barrier Sheeting: Stego Industries Stego Wrap Min. thickness 15 mil.

B. Sealing Material: Manufacturer's sealing tape or adhesive.

C. Pipe Boots: Manufacturer's pre-manufactured boots.

PART 3 - EXECUTION

3.1 INSPECTION

A. Below-grade and grading work and items penetrating vapor retarder shall be completed prior to start of installation.

3.2 INSTALLATION REQUIREMENTS

A. Vapor Retarder Sheeting:

1. Install in accordance with manufacturer's instructions and ASTM E1643.
2. Unroll with the longest dimension parallel with the direction of the pour.
3. Lap vapor retarder over footings and seal to foundation walls.
4. Overlap joints 6-inches and seal with pressure sensitive tape.
5. Seal penetrations, including pipes, with pipe boot.
6. Penetrations through vapor retarder sheeting except for reinforcing steel and permanent utilities are not permitted.
7. Repair damaged areas by cutting patches of vapor retarder sheeting, overlapping damaged area 6-inches and taping all four sides with pressure sensitive tape.

END OF SECTION – 07 26 23

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 07 42 13

METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes complete system of concealed-fastener, lap-seam metal panels in the following applications:
   1. Metal wall panels.

B. Related Requirements:
   1. Section 05 58 00: Metal Fabrications.
   2. Section 07 21 00: Thermal Insulation.
   3. Section 07 25 00: Water Resistive Barrier
   4. Section 07 92 00: Joint Sealants.

1.2 REFERENCES

A. Reference Standards:
   1. ASCE 7: Minimum Design Loads for Buildings and Other Structures.
   2. ASTM A653: Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process.
   3. ASTM A792: Steel Sheet, 55 % Aluminum Zinc Alloy Coated by the Hot Dip Process.
   4. ASTM C1371: Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
   5. ASTM C1549: Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
   6. ASTM D523: Specular Gloss.
   7. ASTM E283: Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
   8. ASTM E331: Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
   9. ASTM E1592: Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
   10. ASTM E1918: Measuring Solar Reflectance of Horizontal and Low Sloped Surfaces in the Field.
   11. ASTM E1980: Calculating Solar Reflectance Index of Horizontal and Low Sloped Opaque Surfaces.
   12. CRRC-1 Method #1: Measuring Solar Reflectance of a Flat, Opaque, and Heterogeneous Surface Using a Portable Solar Reflectometer.
   13. SMACNA Architectural Sheet Metal Manual.

1.3 SUBMITTALS

A. Product Data.

B. Shop Drawings:
   1. Indicate thickness and dimensions of parts, fastenings and anchoring methods, details and locations of joints, transitions and other provisions necessary for thermal expansion and contraction.
   2. Indicate locations of field- and factory-applied sealant.

C. Samples:
   1. Submit two samples, 12 inches long by full panel width, showing proposed metal thickness and seam profile.
   2. Submit standard color samples of metal for Architect's selection.

D. Installer Qualifications: Submit list of completed projects, with names and contact information for architects and contractors.

E. Test Reports: Indicating compliance of products with project requirements.

F. LEED Submittals: LEED Credit MR 4 – Recycled Content: Product data indicating percentage by weight of post-consumer and post-industrial recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

G. Warranty Documentation.

H. Insurance Documentation.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Ten years' experience, minimum, in factory fabrication of metal panels.
   2. Manufacturer shall carry $2,000,000 liability insurance, minimum, for metal panel system.

B. Installer Qualifications:
   1. Three years' experience, minimum, in application of metal roof or wall panels.
   2. Five satisfactory projects with metal panel work of similar scope and complexity to Work of this Project.

C. Product Testing Agency Qualifications: Agency compliant with ISO/IEC Standard 17025, or an accredited independent agency recognized by the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement or ANSI.

D. Mock-Ups:
   1. Visual Mock-Up: Construct mock-up, 10 by 10 feet or larger as required to show at least two pattern repeats.
   2. Performance Mock-Up: Construct metal panel system as required for Performance Mock-Up specified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements:
   1. Keep panels and accessory items dry.
   2. Protect against damage and discoloration.
   3. Handle panels with non-marring slings.
   4. Support panels to prevent permanent deformation.
   5. Store panels above ground, with one end elevated for drainage.
   6. Protect panels against standing water and condensation between adjacent surfaces.
   7. If panels become wet, immediately separate sheets, wipe dry with clean cloth, and keep sheets separate for air-drying.
   8. Painted panels shall be shipped with protective plastic sheeting or a strippable film coating between panels. Remove strippable film coating prior to installation. Do not allow strippable film coating to remain on panels in extreme heat, cold, or direct sunlight or other UV source.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer’s standard 25-year performance warranty, stating the following:
   1. Architectural fluorocarbon finish:
      a. Will be free of fading or color change in excess of 5 Hunter delta-E units as determined by ASTM D2244-02.
      b. Will not chalk in excess of numerical rating of 8 when measured in accordance with standard procedures specified in ASTM D4214-98 method D659.
      c. Will not peel, crack, chip, or delaminae.
   2. Metal substrate will not rupture, fail structurally, or perforate.

B. Installer's Warranty: Warrant panels, flashings, sealants, fasteners and accessories against defective materials and/or workmanship, covering repairs required to maintain wall panels watertight and weatherproof with normal usage for two years following Project Substantial Completion date.
   1. Furnish written warranty, signed by installer.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

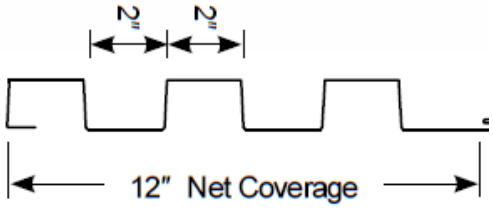
A. Products: Provide the following:
   1. AEP Span, a Division of ASC Profiles, LLC.; Flex Series.

B. Performance Criteria
   1. Wind Uplift: ASCE 7
      a. Panel system shall be ASTM E1592 tested under the supervision of an ANSI or ISO/IEC accredited laboratory and the laboratory shall issue the test report. Test data based on ASTM E330 is not acceptable.
      b. Deflection Limits: Withstand wind loads with deflections no greater than 1/180 of the span.
   2. Air Infiltration: 0.01 cfm/lf, maximum at a static difference of 6.24 psf when tested with sidelap sealant per ASTM E283.
   3. Water Penetration Under Static Pressure: No leakage at 20 psf when tested with sidelap sealant per ASTM E331.
   4. Thermal Movements: Accommodate thermal movement without buckling, joint opening, failure of connections, or other detrimental effects, through the following temperature changes:
      a. 120 degrees F, ambient.
      b. 180 degrees F, surface.

2.2 PANELS

A. Panel: AEP Span, a Division of ASC Profiles, LLC; Flex Series
   1. Material: Steel conforming to ASTM A792.
      a. 24 Gauge: Yield strength 50,000 psi; with aluminum-zinc alloy coating conforming to ASTM A792, Class AZ50.
      b. Thickness and yield strength as required for performance indicated; with aluminum-zinc alloy coating conforming to ASTM A792, Class AZ50 or with zinc coating conforming to ASTM A653, Class G 90.

2. Profile and Pattern:
   a. 2” consistent rib spacing (2” up / 2” down) - 1.2FX10-12 (1 ¼” rib height)



   b. Panel to substrate attachment: Direct Fastened

3. Finishes:
   a. Exterior Panel Finish: Provide primer and finish coat on exposed faces; provide primer on concealed faces of panels.
      1) DuraTech® 5000: Polyvinylidine Fluoride, full 70 percent Kynar 500/Hylar 5000, consisting of a baked-on 0.15-0.20 mil corrosion resistant primer and a baked-on 0.70-0.80 mil finish coat with a specular gloss of 8 to 15 when tested in accordance with ASTM D523 at 60 degrees.

B. Manufacturing Characteristics: Provide panels complying with provisions of Buy American Act 41 U.S. C 10a - 10d.

2.3 FRAMING AND SUBSTRATES

A. Sheathing: See Section 06 16 43 "Sheathing".

B. Weather Barrier: See Section 07 25 00 "Weather Barriers".

2.4 ACCESSORIES

A. Clip: Panel clip with pre-drilled holes attachment holes at one end and panel hook at other end, sized to fit panels.

B. Product: AEP Span; Flex Series Flush Mount.
   1. Material: 18 gauge (.0438 Min.), 40ksi yield min., G90 galvanized, material in conformance with ASTM A-653 Class G90.
   2. Panel clips to be of proper design to resist uplift forces and reduce permanent deflection of panel assembly under design loads. Panel system manufacturer to provide proof that this has been addressed through use of clip strengthening ribs, short clip reach, or similar.

C. Trims and Flashings: Material, metal thickness, and finish to match panels. Profiles indicated in Drawings.

D. Panel Penetration Flashings: As recommended by panel manufacturer.

E. Fasteners: Per manufacturer recommendation.

F. Profile Closures: Polyethylene foam, die-cut or formed to panel configuration.

G. Sealant for Field Application: See Section 07 92 00 "Joint Sealants".

H. Insulation: See Section 07 21 00 "Thermal Insulation".

2.5 FABRICATION

A. Fabrication, General:

1. Unless otherwise shown on Drawings or specified herein, fabricate panels in continuous lengths and fabricate flashings and accessories in longest practical lengths.
2. Panels shall be factory correctively-leveled.

B. Fabrication Tolerances:
1. Flat metal surfaces will display waviness commonly referred to as “oil canning”. This is caused by steel mill tolerances and is a characteristic, not a defect, of panels manufactured from light gauge metal. Panels are factory correctively-leveled to minimize the occurrence of “oil canning”. As such, “oil canning” will not be accepted as cause for rejection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: With Installer present.
1. Examine conditions and substrates on which metal panels are to be installed. Structural support or substrate shall be flat and plumb to avoid panel stresses and distortion.
2. Verify that weather barrier work is complete and inspected.
3. Prior to starting work, correct defects.

B. Field Measurements:
1. Coordinate field measurements and fabrication schedule with construction progress.
2. Field measure prior to fabrication. Show recorded dimensions on shop drawings, including locations of shop-fabricated openings.
3. If field measurements differ from drawing dimensions, notify Architect prior to fabrication.

C. Substrate Tolerances: Deviations from flat plane shall not exceed the following.
1. 1/4 inch in 20 feet vertically or horizontally.

3.2 PREPARATION

A. Protection:
1. Treat contacting surfaces of dissimilar materials to prevent electrolytic corrosion.
2. Where panels or trim may come in contact with dissimilar materials or treated lumber, fabricate transitions to facilitate drainage and minimize possibility of galvanic corrosion.
3. At points of contact with dissimilar metal or treated lumber, coat panel or trim with protective paint or separate materials with a weatherproof underlayment.
4. Direct contact or run-off from CCA, ACQ, AC, or other treated lumber (outdoor wood) or fire retardant impregnated or treated wood shakes or siding can cause panels and trim to fail prematurely. Avoid contact with these materials.

3.3 INSTALLATION

A. Substrate and Weather Barrier: Install according to approved shop drawings and metal panel manufacturer's recommendations.

B. Panels and Flashing:
1. Install according to approved shop drawings.
2. Comply with methods and recommendations of SMACNA Architectural Sheet Metal Manual for flashing configurations required.
3. Overlap flashing at least 6 inches.
4. Discrepancies between job site conditions and shop drawings shall be brought to the attention of the Architect for resolution.
5. Cutting and Fitting:
   a. Cut panels neat, square, and true with shearing action cutters. Torch or power saw cutting is prohibited.

b. Openings 6 inches and larger: Shop fabricate and reinforce to maintain original load capacity.
c. Openings less than 6 inches: Field cutting is acceptable.

C. Accessories: Install trims, panel closures, flashings according to Drawings and manufacturer's recommended details.

D. Sealant Installation: Apply according to approved shop drawings and SMACNA Architectural Sheet Metal Manual recommendations.

3.4 CLEANING

A. Repairs:
1. Touch up paint is not required for panels with scratches that do not expose metal.
2. Panels or flashings with finish damage exposing metal or with substrate damage shall be replaced.

B. Cleaning and Waste Management: See Division 01 Section "Construction Waste Management and Disposal" for recycling requirements. At completion of each day's work and at work completion, sweep panels, flashings, and gutters clean. Do not allow fasteners, cuttings, filings, or scraps to accumulate.

END OF SECTION - 07 42 13

SECTION 07 53 00

THERMOPLASTIC MEMBRANE ROOFING AND ROOF INSULATION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Mechanically fastened PVC membrane roofing system.

B. Related Sections:
1. Sheet metal flashing and trim is specified in Section 07 62 00.

C. The work includes but is not limited to the installation of:
1. Substrate Preparation
2. Roof Drains
3. Vapor Retarder
4. Wood Blocking
5. Insulation
6. Separation Layers
7. Roof Membrane
8. Fasteners
9. Adhesive for Flashings
10. Roof Membrane Flashings
11. Metal Flashings
12. Sealants

1.2 SUBMITTALS

A. Product Data: Copies of manufacturer's printed product data and specifications. Include data substantiating that materials comply with specified requirements.

B. Shop Drawings: Show roof configuration and sheet layout at 1/8-inch = 1’-0” minimum, seam locations, details at perimeter, penetrations at mechanical equipment, plumbing and electrical penetrations, and other conditions as required, drawn at 3” = 1’-0” minimum. Indicate adjacent conditions.

C. Mechanical attachment calculations: Provide calculations for all attachment systems that meet wind load criteria as stated on Drawings. Comply with requirements for FM Classifications required in this specification.

D. Pre-Roofing Conference: Copies of pre-roofing conference records.

E. Certification that materials comply with local VOC limitations.

F. Certification that materials are compatible with sealants and waterproof flashings at perimeter conditions.

G. LEED Submittals:
1. Credit SS 7.2: For roof panels, indicating that panels comply with Solar Reflectance Index requirement.

1.3 QUALITY ASSURANCE

A. Manufacturer: Obtain primary materials from a single manufacturer. Provide secondary materials as recommended by manufacturer of primary materials.

B. Installer: Not less than 5-years’ experience in installation of roofing systems similar to those required for this Project, acceptable to or licensed by manufacturer of roofing materials.

C. Pre-Roofing Conference: Prior to installation of roofing and associated work, meet at Project site with installer, roofing materials manufacturer, installers of related work and others concerned with roofing performance. Record discussions and agreements and furnish copy to each participant. Provide at least 72-hours advance notice to participants prior to convening pre-roofing conference.

D. Labels and Approvals: Provide labeled materials that have been tested and listed by Underwriters' Laboratories (UL) in "Building Materials Directory" or by other nationally recognized testing laboratory for application indicated, with Class A rated materials/system for roof slopes indicated.

E. Comply with Factory Mutual I-60 Windstorm Classification for Class 1 Construction.

1.4 ENVIRONMENTAL QUALITY ASSURANCE

A. Energy Performance: Provide roofing system with Solar Reflectance Index (SRI) not less than 78 for roofs with slopes of 2:12 or less; 29 for roofs with slopes steeper than 2:12; when calculated according to ASTM D1980 based on testing identical products by a qualified testing agency.
1. SRI shall be calculated in accordance with LEED Credit SS 7.2 – Heat Island Effect.

B. Available LEED Credits:
1. Credit SS 7.2 – Heat Island Effect, Roof.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the jobsite in their original, tightly-sealed containers or unopened packages.

B. Materials shall be clearly labeled with the manufacturer's name and product identification.

C. Protect materials from damage during transit, handling, storage, and installation. Place materials on pallets and protect from moisture.

D. Store materials in a dry area, protected from the elements. Store membrane rolls flat on pallets.

E. Store adhesive shall be stored at temperatures above 40-deg. F.

F. Store flammable materials in a cool, dry area away from sparks and open flames. Follow precautions outlined by material manufacturer/supplier.

1.6 JOB CONDITIONS

A. Only as much new roofing as can be made weathertight each day shall be installed each day. This includes all flashing work.

B. Substrates to receive new insulation, membrane or flashing shall be thoroughly dry. Should surface moisture occur, provide adequate equipment to dry the substrate.

C. Prior to and during application, remove dirt, debris and dust from surfaces to be roofed for both new and reroofing substrates.

D. Take precautions to prevent wind blow-off or wind damage during the course of the roofing application.

E. Verify and ensure that roof drain lines are unblocked before starting work.

F. Install temporary waterstops at the end of each day's work or if inclement weather conditions dictate. Remove temporary waterstops at the start of the next day's work and properly dispose of.

G. Do not install the roofing membrane in direct contact with any product containing asphalt, coal tar pitch, creosote or penta-based materials.

H. Do not allow waste products containing petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc. or direct steam venting to come into direct contact with the roofing membrane.

I. Follow safety regulations as recommended by OSHA.

J. Schedule and execute work without exposing interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against risks. Arrange work sequences to avoid use of newly constructed roofing for storage, walking surfaces and equipment movement. Provide necessary protection and barriers to segregate the work areas and prevent damage to adjacent areas. If excessive foot traffic over newly installed membrane is necessary, provide plywood or polyester felt protection to prevent damage.

K. Report unusual or concealed conditions discovered during the course of the work to the Dist's Representative in writing. Stop work until the District's Representative has responded with a solution to the problems.

L. When a system is specified to meet an Underwriters Laboratories, Inc. rating, materials used in the system must be UL labeled and approved for that particular system.

M. Comply with the requirements of local building codes and requirements.

N. Do not use products near fire or flame.

O. Avoid breathing vapors of solvent, sealant and adhesives. Use with adequate ventilation. Avoid prolonged contact of solvents, sealants and adhesives with skin.

P. Do not use open flames to expedite drying of surfaces, sealants, or adhesives.

Q. Consult Material Safety Data Sheets and container labels for specific safety instructions.

1.7 WARRANTY

A. Furnish written warranties from the roofing system manufacturer covering labor and materials for 20-years from date of Substantial Completion (20-year NDL). The warranties shall include no disclaimer for failure or leakage caused by structural movement within the existing roof deck.

B. The terms of the warranty shall provide for the removal, replacement, repair, and making good, without cost to the District, of defects due to imperfect materials and workmanship.

C. All repairs required under the warranty shall be made within 3-days after receiving notice of the need for repairs from the District, weather permitting.

PART 2 - PRODUCTS

2.1 MECHANICALLY FASTENED SINGLE PLY SYSTEM

A. Manufacturers:
1. Sika Sarnafil
2. Johns Manville
3. Carlisle SynTec
4. or equal.

B. Membrane: Polyvinyl-chloride (PVC), Sarnafil S327 bareback, or equal.
1. Membrane shall have a continuous polyester fiber scrim reinforcing.
2. Membrane Thickness: 80-mils.
3. Color: White, complying with specified energy performance requirements.

2.2 MISCELLANEOUS MATERIALS

A. Sheet Seaming System: Manufacturer's standard materials for sealing lapped joints, including edge sealer to cover exposed spliced edges as recommended.

B. Attachment Systems: Manufacturer’s plates, stops, bars, and other fasteners as required and recommended in Manufacturer’s literature, installation instructions, and warranty requirements.

C. Walkway Protection: Manufacturer’s standard system compatible with roof membrane.

D. Slip Sheet: Type recommended by manufacturer for protection of sheet from incompatible substrates.

E. Membrane Adhesive: Type recommended by manufacturer of sheet membrane for particular substrate and Project conditions, formulated to withstand minimum 60-psf uplift force.
1. Provide adhesives with a maximum VOC content of 250-g/L.

F. Sealant: Type recommended by manufacturer of roof membrane.
1. Provide sealant with a maximum VOC content of 300-g/L.

G. Trowelable Mastic and Pitch Pocket Sealant: Type recommended by manufacturer of roof membrane.
1. Provide mastic and sealant with a maximum VOC content of 450-g/L.

H. Mechanical fasteners for securing of insulation, roofing and flashing materials as specified. Required fastener type determined by type of substrate and requisite attachment. Drill•Tec™ fasteners, by BMCA.

I. Miscellaneous Accessories: As required and recommended by Manufacturer.

J. Roof Board Insulation:
1. 25 psi Compression Resistance in accordance with ASTM D1621.
2. Polyisocyanurate rigid panels as required by Roofing Manufacturer:
a. Non-tapered: 4 inch thickness, min. R-25, applied as 2 layers of 2 inch panels, overlapping joints.
b. Tapered: Average 4” thickness, max thickness 2” per layer.

K. Underlayment at adhered membrane: Georgia Pacific DensGlass Prime, 1/4” thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

3.2 PRE-CONSTRUCTION CONFERENCE

A. The Applicator, Owner's Representative/Designer and Manufacturer(s) shall attend a pre-construction conference.

B. The meeting shall discuss all aspects of the project including but not limited to:
1. Safety
2. Set up
3. Construction schedule
4. Contract conditions
5. Coordination of the work

3.3 SUBSTRATE CONDITION

A. Applicator shall be responsible for acceptance or provision of proper substrate to receive new roofing materials.

B. Applicator shall verify that the work done under related sections meets the following conditions:
   1. Roof drains and/or scuppers have been installed properly.
   2. Roof curbs, nailers, equipment supports, vents and other roof penetrations are properly secured and prepared to receive new roofing materials.
   3. All surfaces are smooth and free of dirt, debris and incompatible materials.
   4. All roof surfaces shall be free of water, ice and snow.

3.4 WOOD NAILER INSTALLATION

A. Install continuous wood nailers at the perimeter of the entire roof and around roof projections and penetrations as shown on the Detail Drawings.

B. Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Nailer attachment shall also meet the requirements of the current Factory Mutual Loss Prevention Data Sheet 1-49.

C. Thickness shall be as required to match substrate and/or insulation height to allow a smooth transition.

D. Any existing nailer woodwork which is to remain shall be firmly anchored in place to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons/lineal meter) in any direction and shall be free of rot, excess moisture or deterioration. Only woodwork shown to be reused in Detail Drawings shall be left in place. All other nailer woodwork shall be removed.

3.5 INSULATION INSTALLATION

A. General Criteria:
   1. Insulation shall be mechanically attached according to insulation manufacturer's instructions.
   2. Insulation shall be neatly cut to fit around penetrations and projections.
   3. Install tapered insulation in accordance with insulation manufacturer's shop drawings.
   4. Install tapered insulation around drains creating a drain sump.
   5. Do not install more insulation board than can be covered with membrane by the end of the day or the onset of inclement weather.
   6. Use at least 2 layers of insulation when the total insulation thickness exceeds 2-1/2 inches (64 mm). Stagger joints at least 12 inches (0.3 m) between layers.
   7. Mechanical Attachment
      a. Insulation shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to the insulation manufacturer's, FM's and recommendations for fastening rates and patterns. The quantity and locations of the fasteners and plates shall also cause the insulation boards to rest evenly on the roof deck/substrate so that there are no significant and avoidable air spaces between the boards and the substrate. Each insulation board shall be installed tightly against the adjacent boards on all sides.
      b. Fasteners are to be installed consistently in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by the fastener manufacturer.

c. Use fastener tools with a depth locator and torque-limiting attachment as recommended or supplied by fastener manufacturer to ensure proper installation.

B. Adhesives: Install per manufacturer's written requirements. Use manufacturer's recommended adhesive for job conditions.

3.6 DENSDECK INSTALLATION

A. Adhere to insulation in accordance with manufacturer's written installation instructions and recommendations.

3.7 INSTALLATION OF MECHANICALLY FASTENED MEMBRANE

A. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be mechanically fastened immediately after it is rolled out, followed by welding to adjacent sheets.

B. Overlap roof membrane a minimum of 5" (25 cm) for side laps and 3" (15 cm) for end laps.

C. Install membrane so that the side laps run across the roof slope lapped towards drainage points.

D. All exposed sheet corners shall be rounded a minimum of 1".

E. Use full width rolls in the field of roof and half width rolls in the perimeter and corner region of the roof and mechanically fastened in the side lap area to the roof deck.

F. The membrane shall be mechanically fastened in the side lap area to the roof deck with appropriate Drill-Tec™ fasteners and plates as required by roof system specification and/or Factory Mutual classification requirements.

G. The metal plates must be placed within ¼" to ½" of the membrane edge. Plates shall not be placed less than ¼" from the membrane edge.

H. In the corner regions, additional fasteners shall be installed through the perimeter membrane to form a grid pattern, with an 8" (40.5 cm) wide PVC reinforced membrane flashing-strip welded over the additional fasteners. Corners include both outside and inside corners that measure 75 - 105 angle degrees.

I. Membrane attachment to the roof deck is required at locations of deck angle changes in excess of five (5) angle degrees (1" in 12").

J. Supplemental membrane attachment is required at the base of all walls and curbs, and where the angle of the substrate changes by more than ten (10) degrees (1" in 12"). Roofing membrane shall be secured to the structural deck with screws and plates of the same type

K. and spacing used for in-lap attachment. The screws and plates must be installed no less than ½" from the membrane edge. Alternatively, the roofing membrane may be turned up the vertical plane a minimum of 3" and secured with screws and termination bar Fastener spacing is the same as is used for in-lap attachment. The termination bar must be installed within 1-1/2" to 2" of the plane of the roof membrane, with a minimum of 1" of membrane extending above the termination bar.

L. Supplemental membrane attachment to the structural deck is required at all penetrations. Roofing membrane shall be secured to the deck with appropriate Drill-Tec™ screws and plates.

M. Fasteners must be installed to achieve the proper embedment depth. Install fasteners without lean or tilt. Install fasteners so that the plate or termination bar is drawn down tightly to the membrane surface.

N. Properly installed fasteners will not allow the plate or termination bar to move (underdriving), but will not cause wrinkling of the membrane (overdriving).

3.8 HOT-AIR WELDING OF SEAM OVERLAPS

A. General
1. All seams shall be hot-air welded. Seam overlaps should be 3 inches (75 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.
2. Welding equipment shall be provided by or approved by Roofing Manufacturer. All mechanics intending to use the equipment shall have successfully completed a training course provided by a Manufacturer's Technical Representative prior to welding.
3. All membrane to be welded shall be clean and dry.

B. Hand-Welding
1. Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.
   a. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
   b. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and rolled lightly. For straight seams, the 1-1/2 inch (40 mm) wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch (20 mm) wide nozzle shall be used.

C. Machine Welding
1. Machine welded seams are achieved by the use of Roofing Manufacturer's automatic welding equipment. When using this equipment, manufacturer's instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated simultaneously off the generator.
2. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

D. Quality Control of Welded Seams
1. The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator at locations as directed by the Owner's Representative or Roofing Manufacturer's representative. One inch (25 mm) wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

3.9 MEMBRANE FLASHINGS

A. All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Roofing Manufacturer. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

B. Adhesive for Membrane Flashings
   1. Over the properly installed and prepared flashing substrate, adhesive shall be applied according to instructions found on the Product Data Sheet. The adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
   2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.

C. Install stops and bars according to the Detail Drawings with approved fasteners into the structural deck at the base of parapets, walls and curbs. Stops are required at the base of all tapered edge strips and at transitions, peaks, and valleys according to Roofing Manufacturer’s standard details.

D. All flashings shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Owner's Representative and Roofing Manufacturer’s Technical Department.

E. All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the membrane.

F. All flashing membranes shall be mechanically fastened along the counter-flashed top edge with Stops at 6-8 inches (0.15-0.20 m) on center.

G. Sarnafil flashings shall be terminated according to Roofing Manufacturer’s recommended details.

H. All flashings that exceed 30 inches (0.75 m) in height shall receive additional securement.

3.10 METAL FLASHINGS

A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:
   1. Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).
   2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - latest issue.

B. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.

C. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.

D. Metal joints shall be watertight.

E. Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1 inch (25 mm).

F. Airtight and continuous metal hook strips are required behind metal fascias. Hook strips are to be fastened 12 inches (0.3 m) on center into the wood nailer or masonry wall.

G. Counter flashings shall overlap base flashings at least 4 inches (100 mm).

H. Hook strips shall extend past wood nailers over wall surfaces by 1-1/2 inch (38 mm) minimum and shall be securely sealed from air entry.

3.11 METAL BASE FLASHINGS/EDGE METAL

A. All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Roofing Manufacturer. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

B. Clad Metal flashings shall be formed and installed per the Detail Drawings.
   1. All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4 inches (100 mm) on center staggered. Fasteners shall penetrate the nailer a minimum of 1 inch (25 mm).
   2. Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

C. Adjacent sheets of Clad Metal Flashings shall be spaced ¼ inch (6 mm) apart. The joint shall be covered with 2 inch (50 mm) wide aluminum tape. A 4 inch minimum (100 mm) wide strip of flashing membrane shall be hot-air welded over the joint. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

3.12 EDGE-TITE METAL

A. Weld one side of a strip of membrane along the perimeter edge to the top of the field membrane. Position the membrane over the roof edge and down outside face of wall covering wood nailer(s) completely, allowing 1/2 inch (13 mm) excess membrane. Hot-air weld all seams making sure there are no voids in welds.

B. Apply a 3/8 inch (10 mm) bead of sealant to the intersection of the right angle of the clean base rail. Install base rail from right to left as seen from rooftop, lapping joints 1 inch (25 mm).

C. Fasten base rail into the side of the nailer 12 inches (0.3 m) on center using #12 x 1-5/8 inch corrosion-resistant fasteners provided with Edge-Tite. Field cut sections as necessary. A second row of fastening may be required based upon site conditions. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

D. Position spring clips at 6 foot (1.8 m) centers on base rail. Locate spring clips at fascia cover laps and at mid-span of fascia cover.

E. Fascia covers are installed from right to left as seen from rooftop. Position fascia cover on top of base rail and overlap preceding panel by 1 inch (25 mm) at notches provided. Snap covers into place. Field cut where necessary. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

3.13 EDGE-TITE SLOPE

A. Weld one side of a strip of membrane along the perimeter edge to the top of the field membrane. Position the membrane cover strip over the roof edge and down outside face of wall covering wood nailer(s) completely, allowing 1/2 inch (13 mm) excess membrane. Hot-air weld all seams making sure there are no voids in welds.

B. Fasten base rail into the side of the nailer at 12 inches (0.3 m) on center using #12 x 1-5/8 inch corrosion-resistant fasteners provided. Field cut sections as necessary. A second row of fastening may be required based upon site conditions. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

C. Fascia covers are installed from right to left as seen from rooftop. Position fascia cover on top of base rail and overlap preceding panel by 1 inch (25 mm) at notches provided. Snap covers into place. Field cut where necessary. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

D. Apply a liberal bead of sealant to the sealant shelf located at the top of the flashing.

3.14 ANCHOR-TITE METAL

A. Weld one side of a strip of membrane along the perimeter edge to the top of the field membrane. Position the membrane cover strip over the roof edge and down outside face of wall covering wood nailer(s) completely, allowing 1/2 inch (13 mm) excess membrane. Hot-air weld all seams making sure there are no voids in welds.

B. Apply a 3/8 inch (10 mm) bead of sealant to the intersection of the right angle of the clean base rail. Install base rail from right to left as seen from rooftop, lapping joints 1 inch (25 mm).

C. Fasten base rail into the side of the nailer at 12 inches (0.3 m) on center using #12 x 1-5/8 inch corrosion-resistant fasteners provided with Anchor-Tite. Field cut sections as necessary. A second row of fastening may be required based upon site conditions. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

D. Fascia covers are installed from right to left as seen from rooftop. Position fascia cover on top of base rail and overlap preceding panel by 1 inch (25 mm) at notches provided. Snap covers into place. Field cut where necessary. Exercise caution at perimeter of roof. Workers shall follow OSHA safety procedures.

3.15 TEMPORARY CUT-OFF

A. All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary waterstops shall be constructed to provide a 100% watertight seal. The stagger of the insulation joints shall be made even by installing partial panels of insulation. The new membrane shall be carried into the waterstop. The waterstop shall be sealed to the deck and/or substrate so that water will not be allowed to travel under the new or existing roofing. The edge of the membrane shall be sealed in a continuous heavy application of sealant as described in Section 2.10. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. shall be removed from the work area and properly disposed of offsite. None of these materials shall be used in the new work.

B. If inclement weather occurs while a temporary waterstop is in place, the Applicator shall provide the labor necessary to monitor the situation to maintain a watertight condition.

C. If any water is allowed to enter under the newly-completed roofing, the affected area shall be removed and replaced at the Applicator's expense.

3.16 COMPLETION

A. Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of Roofing Manufacturer shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and Roofing Manufacturer prior to demobilization.

B. All Warranties referenced in this Specification shall have been submitted and have been accepted at time of contract award.

3.17 DETAILS

A. Refer to the Roofing Manufacturer's Typical System Details section for additional details.

B. General: Comply with manufacturer's instructions, except where more stringent requirements are indicated or specified.
   1. Install PVC roofing system according to all current application requirements in addition to those listed in this section.
   2. Start the application of membrane plies at the low point of the roof or at the drains, so that the flow of water is over or parallel to, but never against the laps.

C. Wood Nailers: Install at perimeters, base flashings and around penetrations as recommended by membrane manufacturer. Anchor with fasteners to resist a 75-pound force in any direction, minimum 4 fasteners per piece. Allow 1/4- to 1/2-inch space between butting ends.

D. Walkway Protection: Install units at locations indicated for access to roof mounted equipment. Place protection boards over an additional layer of roof membrane material, loosely applied, for additional protection.

3.18 PROTECTION OF ROOFING

A. Upon completion, institute appropriate procedures for protection of roofing during remainder of construction period. At end of construction period, or at time when remaining construction will not affect or endanger roofing, make a final inspection of roofing and prepare a written report to District, describing nature and extent of deterioration or damage found.

B. Repair or replace deteriorated or defective work found at time of final inspection to a condition free of damage and deterioration at time of Substantial Completion and in accordance with requirements of specified warranty.

END OF SECTION – 07 53 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Formed gutters, downspouts, counterflashing, copings, and miscellaneous shop and field formed roofing and other flashing needed for watertight assemblies.

1.2 RELATED SECTIONS

A. SECTION 07 25 00 Water Resistive Barrier System.

B. SECTION 07 53 00 Thermoplastic Membrane Roofing – Plastic and plastic coated flashing as part of the roofing system.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

B. Shop Drawings: Show layout, profiles, method of joining, and anchorage details.

C. LEED Submittals:
1. Credit MR 2.1 and 2.2: Waste management plan as specified in Division 1.
2. Credit MR 4.1 and MR 4.1: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

1.4 QUALITY ASSURANCE

A. Comply with ESUHSD Standards & Design Guide.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Galvanized steel flashing shall have a recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 20-percent of cost of materials used for the Project.

B. Applicable LEED Credits:
1. Credit MR 2.1 and MR 2.2 – Construction Waste Management.
2. Credit MR 4.1 and MR 4.2 – Recycled Content.

1.6 PROJECT CONDITIONS

A. Coordinate work of this Section with interfacing and adjoining work for proper sequencing of each installation.

PART 2 - PRODUCTS

2.1 METALS

A. Galvanized Steel: ASTM A653, G90, commercial or lock-forming quality, hot-dip galvanized steel sheet with 0.20-percent copper, mill phosphatized for painting; not less than 22-gauge; 18-gauge at roof locations accessible to students or building occupants.

B. Stainless Steel: Type 304, 0.028 inch thickness, soft temper, smooth patterned finish.

2.2 REGLETS

A. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.

B. Surface Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other weatherproofing washers, and with channel for sealant at top edge.

C. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

D. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.

E. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.

F. Counterflashing Wind-Restraint Clip: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.

2.3 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Solder: ASTM B32, Grade Sn50, used with rosin flux.

B. Fasteners: Same metal as flashing and sheet metal or other non-corrosive metal recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.

C. Asphalt Mastic: SSPC - Paint 12, solvent type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.

D. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.

E. Epoxy Seam Sealer: 2-part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.

F. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, non-corrosive, size and gauge required for performance.

G. Roofing Cement: ASTM D4586, Type I, asbestos free, asphalt based.

2.4 FABRICATION

A. General Sheet Metal Fabrication Standard: Fabricate to comply with recommendations of SMACNA "Architectural Sheet Metal Manual" that apply to design, dimensions, and metal.

B. Fabricate to fit substrates and to provide waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

E. Expansion Provisions: Space movement joints at maximum of 10-feet with no joints within 24-inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with mastic sealant concealed within joints.

F. Sealed Joints: Form non-expansion, but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

G. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to view.

I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, non-corrosive metal recommended by sheet metal manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual."
2. Anchor units securely in place, allowing for thermal expansion.
3. Conceal fasteners where possible.
4. Set units true to line and level as indicated.
5. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

B. Install exposed sheet metal work free of excessive oil canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back for form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistance performance.

C. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2-inches, except where pre-tinned surface would be exposed to view in the finished work.
1. Do not solder coil-coated galvanized steel.
2. Do not used torches for soldering.

D. Sealed Joints: Form non-expansion, but movable joints to accommodate elastomeric sealant. Comply with SMACNA standards.

E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

F. Separations: Separate metal from non-compatible metal or corrosive substrates by coating concealed substrates, with roofing cement.

G. Bed flanges in a thick coat of roofing cement where required for waterproof performance.

H. Install reglets to receive counterflashing.

I. Counterflashing: Coordinate installation with installation of assemblies to be protected by counterflashing. Install in reglets or receivers. Secure in a waterproof manner by means of snap-in installation and sealant, lead wedges and sealant, interlocking folded seams, or blind rivets and sealant. Lap joints a minimum of 2-inches and bed with sealant.

J. Roof-Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA "Architectural Sheet Metal Manual" to drain roof. Coordinate roof drain flashing with roof drainage system installation.

K. Equipment Support Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.

L. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof.
1. Seal and clamp flashing to pipes penetrating roof, other than flashing on vent piping.

3.2 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

B. Protection: Protect flashing and sheet metal work during construction to ensure that work will be without damage or deterioration other than normal weathering at time of final completion.

3.3 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Division 01 Section 01 74 00 including, but not limited to:
1. Scrap metal shall be collected for recycling.

END OF SECTION – 07 62 00

SECTION 07 72 33

ROOF HATCHES

(BILCO TYPE E-50TB)

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provide factory-fabricated roof hatches for ladder access.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years experience manufacturing similar products.

B. Installer: A minimum of 2 years experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.5 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Manufacturer: Type E-50TB Roof Hatch by The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-933-8478, Web: www.bilco.com.

2.2 ROOF HATCH

A. Furnish and install where indicated on plans metal roof hatch Type E-50TB, size width: 36" (914mm) x length: 36" (914mm). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.

B. Performance characteristics:
1. Cover and curb shall be thermally broken to prevent heat transfer between interior and exterior surfaces.
2. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m^2) with a maximum deflection of 1/150th of the span or 20 psf (97kg/m^2) wind uplift.
3. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
4. Operation of the cover shall not be affected by temperature.
5. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.

C. Cover: Shall be 11 gauge (2.3mm) aluminum with a 5” (127mm) beaded flange with formed reinforcing members. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. Cover shall have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

D. Cover insulation: Shall be 3” (75mm) thick polyisocyanurate with an R-value = 18 (U=0.315 W/m^2K), fully covered and protected by an 18 gauge (1mm) aluminum liner.

E. Curb: Shall be 12” (305mm) in height and of 11 gauge (2.3mm) aluminum. Interior and exterior surfaces shall be thermally broken to minimize heat transfer and to resist condensation. The curb shall be formed with a 5-1/2” (140mm) flange with 7/16” (11mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6” (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.

F. Curb insulation: Shall be 3” (75mm) thick polyisocyanurate with an R-value = 18 (U=0.315 W/m^2K).

G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.

H. Hardware
1. Heavy stainless steel pintle hinges shall be provided
2. Cover shall be equipped with a spring latch with interior and exterior turn handles
3. Roof hatch shall be equipped with interior and exterior padlock hasps.
4. The latch strike shall be a stamped component bolted to the curb assembly.
5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1” (25mm) diameter red vinyl grip handle to permit easy release for closing.
6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

I. Finishes: Factory finish shall be mill finish aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.

1. Test units for proper function and adjust until proper operation is achieved.
2. Repair finishes damaged during installation.
3. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION - 07 72 33

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 07 84 00

FIRESTOPPING

PART 1 - PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section describes the requirements for furnishing and installing firestopping.

B. Related Sections:
1. Joint sealants are specified in Section 07 92 00.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

A. General: Provide firestopping systems capable of closing or filling through-penetrations created by the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or by the deflection of sheet metal due to thermal expansion.

B. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

C. For firestopping exposed to view, provide products when flame-spread values of less than 25 and smoke-developed values of less than 450, when tested in accordance with ASTM E84.

1.3 SUBMITTALS

A. Product Data: Manufacturer's descriptive, technical data and illustrations. Include manufacturer's installation instructions.

B. Certification:
1. Manufacturer's certification that products comply with local regulations controlling use of volatile organic compounds (VOC's) and are nontoxic to building occupants.
2. Manufacturer's certification that firestopping materials comply with ASTM E814 and UL 147.

C. UL Design Numbers: Furnish UL Design No. from the "Fire Resistance Directory - Volume II" for each required penetration type and configuration. Indicate which materials will be used in firestopping the penetration.

D. LEED Submittals:
1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

2. Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.

1.4 QUALITY ASSURANCE

A. Firestopping materials and systems shall be listed and labeled in accordance with requirements of Underwriters Laboratories, Inc. (UL) Building Materials Directory.

B. Firestopping materials shall conform to California Building Code (CBC) for fire resistance standards and requirements for penetrations in walls, partitions, and floor/ceiling and floor/roof assemblies.

C. Firestopping materials shall comply with ASTM E814 and UL 1479.

D. Firestopping sealants shall comply with ASTM C719 and ASTM C920.

E. Form materials to remain in place in the completed work and sealant used for firestopping work shall be UL listed and labeled.

F. Firestopping materials shall be rated as required when tested in accordance with ASTM E119.

G. Firestopping materials shall be asbestos free and shall not incorporate nor require the use of hazardous solvents.

H. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surface.

I. Installer shall have a minimum of 5-years experience installing UL listed firestop systems in similar type construction.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Recycled Content:
1. Provide glass fiber firestopping insulation with recycled content so post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25-percent.
2. Provide mineral fiber firestopping insulation with recycled content so post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 50-percent.
3. 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, Subpart D (EPA Method 24).
4. Architectural Sealants: Not more than 250 g/L.
5. Sealant Primers for Nonporous Substrates: Not more than 250 g/L.
6. Sealant Primers for Porous Substrates: Not more than 775 g/L.

B. Available LEED Credits:
1. Credit MR 4.1 and MR 4.2 – Recycled Content.
2. Credit EQ 4.1 – Low-Emitting Materials, Adhesives & Sealants.

1.6 JOB CONDITIONS

A. Follow manufacturer's instructions for temperature, ventilation, and other conditions for mixing and installing foam seals.

B. Observe and follow manufacturer's precautions when using materials considered toxic and hazardous.

C. Maintain current copy of UL "Fire Resistance Directory" on Project site.

D. Installation of firestopping shall precede finishing of gypsum board.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in the manufacturer's unopened containers and packages with manufacturer's name, labels, product identification, lot numbers, and mixing and installation instructions, as applicable.

B. Store materials in unopened containers and packages, and under conditions recommended by manufacturer.

C. Store and handle firestopping materials in accordance with manufacturer's Material Safety Data Sheets.

1.8 PROJECT CONDITIONS

A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilation: Ventilate firestopping in accordance with manufacturers' instructions by natural means or forced air circulation.

1.9 SEQUENCING AND SCHEDULING

A. Perform work of this and other Sections in proper sequence to prevent damage to the firestopping materials and to ensure that their installation will occur prior to enclosing or concealing work.

B. Do not cover firestopping materials until they have been properly inspected and accepted by the authority having jurisdiction.

PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the penetrating items.

B. Accessories: Provide components of each firestopping system required to install fill materials. Use only components specified by firestopping manufacturer and which are approved by UL for the designated fire-resistance-rated system.

C. Manufacturers or systems not listed in UL "Fire Resistance Directory" but who can furnish certification of UL approval may be used in the work.

2.2 THROUGH-PENETRATION FIRESTOPPING MATERIALS

A. General: Manufacturer and material type shall be as required by the UL Design No. for each penetration to receive firestopping.

B. Provide mortar, sealants and caulk, putty, wrap strips, pillows, bags, and other types required for UL Design No. for each penetration to receive firestopping.

2.3 MINERAL FIBER FIRESTOPPING MATERIALS

A. Material: Semi-rigid mineral fiber insulation, minimum 4-pcf density.

B. Support Clips: Manufacturer's standard impaling clips or custom designed to suit installation conditions, fabricated from galvanized sheet steel.

2.4 FIRESTOPPING AT ELECTRICAL BOXES AND UTILITY OUTLETS

A. Utility penetrations in walls, ceilings, or floors requiring protected openings shall be firestopped and sealed with an approved material securely installed, capable of maintaining its integrity when subjected to test temperatures specified in ASTM E814.

B. Steel electrical outlet boxes on opposite sides of walls requiring protected openings shall be separated by a horizontal distance of 24-inches.

C. Steel electrical outlet boxes which occur in combination with outlet boxes of any size such that the aggregate area of unprotected outlet boxes exceeds 100-square inches in any 100-square feet of wall area shall be protected by an approved material or detail to decrease the aggregate area of unprotected utility boxes to less than 100-square inches in any 100-square feet of wall.

D. Utility and electrical outlets or boxes shall be securely fastened to the stud or framing of the wall or ceiling assembly. The opening in the gypsum board shall be cut so that the clearance between the box and the gypsum board does not exceed 1/8-inch.
   1. Fill the 1/8-inch gap with an approved fire-rated sealant.

2.5 FIRESTOPPING AT METAL DECK FLUTES

A. Steel Deck Insert: One-piece fire-retardant plug for steel deck flutes.

B. Fire-Rated Sealant: Grace Construction Products “FS-3000”, Hilti “CP-672 Speedspray”, 3M “Firedam Spray”, Tremco “Tremstop Acrylic” or equal.

C. Mineral Wood: Minimum 4-pcf density.

2.6 MIXING

A. For those products requiring mixing prior to application, comply with manufacturer's instructions.

2.7 ESCUTCHEONS

A. Provide brushed stainless steel escutcheon plates at pipes and conduit exposed to view. Size to suit penetration.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect openings and voids to be sealed to determine if conditions are satisfactory for the proper installation of firestopping. Do not commence work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer.
   1. Remove foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
   2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping.
   3. Remove laitance and form release agents from concrete.

B. Priming: Prime substrates where recommended by manufacturer using manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of the work. Remove tape as soon as possible.

3.3 EXTENT OF FIRESTOPPING WORK

A. General: Provide solid continuous firestopping wherever the penetration or addition of a construction element through or adjacent to a fire-rated floor, wall or partition, or roof creates a discontinuity of such a rated separation. Application limited in size and configuration to tested systems. Do not install insulation types specified in other Sections in lieu of specified firestopping materials.

B. Interior Walls and Partitions: Where top edge of a fire-rated wall or partition abuts a fluted-type metal deck, provide mineral fiber and fire-rated sealant to fill flute spaces for the full depth or width of the wall or partition.

C. Penetrations:

1. Penetrations include conduit, cable, wire, pipe, duct, and other elements which pass through one or both outer surfaces of a fire-rated floor, roof, wall, or partition.
2. Verify that annular space around sprinkler pipes through fire-rated walls and floors is provided as required by NFPA 13.

D. Fire Rated Partitions:
1. Gaps exceeding 1/2-inch at smoke rated and fire-rated partitions shall be firestopped with a firestop sealant as listed in UL "Fire Resistance Directory" and as specified. Apply minimum 3/8-inch bead at intersection of finish material and adjacent surface, both sides and along entire perimeter.
2. Intersections at fire-rated partitions and steel deck type floor-ceiling or roof-ceiling assemblies shall be firestopped as required.

E. Provide firestopping to fill miscellaneous voids or openings at fire-rated construction as specified.

3.4 INSTALLATION

A. Do not install firestopping until building is sufficiently enclosed or protected against adverse weather conditions, and supporting framing and surrounding construction is in a dry condition.

B. Prepare and install firestopping in accordance with manufacturer's instructions.

C. Mineral Fiber:
1. Provide in thickness for compressing into voids for a tight friction fit when installed.
2. Provide in width sufficient to fill the depth of the void space using single width pieces.
3. Install with ends tight against terminal end construction, and with intermediate joints well compressed together and tight.
4. For vertical void spaces, provide support clips near each end, spaced not over 24-inches on center.

D. Foam:
1. Provide form materials to retain foam when placed.
2. Prime contact surfaces as recommended by foam manufacturer.
3. Inject foam into void spaces so foam develops full and complete contact with adjoining surfaces, and the space is free from air pockets.
4. Cure foam 24-hours, remove form materials not required to remain, and inspect.
5. Provide additional foam or sealant to fill insufficient depth and remaining voids.

E. Sealants:
1. Prepare penetrations in vertical and horizontal surfaces as required to receive finish products.
2. Install damming materials as required.
3. Apply caulk or putty in accordance with manufacturer's recommendations.

F. Steel Deck Plugs: Provide at steel deck flutes at all full-height sound-rated partitions unless otherwise indicated.

G. Finish surfaces of exposed to view firestopping to a uniform and level condition.

H. Firestopping shall not extend past edges of cover plates, escutcheons, etc. or where it will be exposed to view in the final assembly.

I. Install escutcheon plates at pipes and conduits exposed to view.

3.5 FIELD QUALITY CONTROL

A. Identify firestop systems after installation. Identify the firestop system that has been installed and include the appropriate UL Design Number.

3.6 CLEANING

A. Remove spilled and excess materials without damaging adjacent surfaces.

B. Leave finished work in neat, clean condition with no evidence of spill-overs or damage to adjacent surfaces.

3.7 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Division 01 Section 01 74 00 including, but not limited to:
   1. Close and seal tightly all partly used sealant containers and store protected in well ventilated fire-safe area at moderate temperatures.

   2. Place used sealant tubes and containers in areas designated for hazardous materials.

END OF SECTION – 07 84 00

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Interior and exterior joint sealants

B. Acoustic sealants

1.2 PERFORMANCE CRITERIA

A. Environmental quality assurance:
   1. Do not use products containing Methylene Chloride or Chlorinated Hydrocarbons.
   2. Do not use products containing bactericides and fungicides that are classified as Phenol mercury acetates, phenol phenates, or phenol formaldehyde.
   3. Do not use products containing aromatic and aliphatic solvents.
   4. Do not use products containing Styrene Butadiene.
   5. Do not exceed VOC limits set for compliance by LEED.

B. Exterior Sealants: Furnish a written warranty against leaks or other defects of materials and workmanship for a period of 10-years.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide custom color exposed joint sealants as specified, to match adjacent surfaces, or as selected and approved by District's Representative.

B. ELASTOMERIC JOINT SEALANTS
   1. Exterior Building Sealant: Either one-part silicone complying with ASTM C920, Type S, Grade NS, Class 50, Use NT, M, G, A, and O or multi-component (Dow Corning 795, or equal), or polyurethane complying with ASTM C920, Type M, Grade NS, Class 25, Use NT, M, A, and O.
   2. Sanitary Sealant: One-part mildew-resistant silicone; ASTM C920 Type S; Grade NS; Class 25; Uses NT, G, A and O; formulated with fungicide for sealing interior joints with nonporous substrates around ceramic tile, showers, sinks and plumbing fixtures.
   3. Horizontal Joint Sealant: Two-part pourable urethane; ASTM C920, Type M; Grade P; Class 25; Uses T, M, A and O. Horizontal joint sealant shall have a minimum Shore A hardness of 30.

C. ACOUSTICAL JOINT SEALANTS
   1. Acoustical Sealant for Concealed Joints: Non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.
   2. Acoustical Sealant for Exposed Joints: Non-oxidizing, skinnable, paintable, gunnable sealant recommended for sealing interior exposed joints to reduce transmission of airborne sound.

D. LATEX JOINT SEALANTS
   1. Interior Building Sealant: Acrylic-emulsion; one-part, nonsag, mildew-resistant, complying with ASTM C834, formulated to be paintable.

E. JOINT FILLERS FOR CONCRETE PAVING
   1. Joint Filler: Preformed cork strips complying with ASTM D1752 for Type II or preformed sponge rubber strips complying with ASTM D1752 for Type I.

F. JOINT SEALANT FOR SHEET METAL BUTT JOINTS (COPING)
   1. Dow Corning 123, or equal.

G. JOINT SEALANT BACKING
   1. Provide sealant backings which are non-staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved by sealant manufacturer.
   2. Plastic Foam Joint-Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of plastic foam, of size, shape and density to control sealant depth.
   3. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer. Provide self-adhesive tape where applicable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with joint sealant manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply. Provide temporary ventilation during installation of interior joint sealants.

B. Sealant Installation Standard: Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications and conditions indicated.

END OF SECTION – 07 92 00

SECTION 07 95 00

EXPANSION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Architectural joint systems for building interiors.
   2. Architectural joint systems for building exteriors.
   3. Architectural joint system for open-air structures.

B. Related Sections include the following:
   1. Division 03 Section “Cast-in-Place Concrete” for cast-in architectural-joint-system frames furnished, but not installed, in this section.
   2. Division 07 Section “Sheet Metal Flashing and Trim” for sheet metal wall joint systems.
   3. Division 07 Section “Joint System” for liquid-applied joint sealants in fire-resistive building joints.

1.3 DEFINITIONS

A. Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.

B. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its function capabilities.

C. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint.

D. Normal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed.

1.4 SUBMITTALS

A. Shop Drawings: Provide the following for each joint system specified and obtain approval prior to fabrication and shipment of materials to the job site:
   1. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splicers, blockout requirements, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

B. Product Data: Submit copies of manufacturer’s latest published literature for materials specified herein for approval, and obtain approval before materials are fabricated and delivered to the site. Data to clearly indicate movement capability of cover assemblies and suitability of material used in exterior seal for UV exposure.

C. Samples for Initial Selection: For each type of joint system indicated.
   1. Include manufacturer’s color charts showing the standard range of colors and finishes available for each exposed metal and elastomeric seal material.

D. Certificates – Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements indicated.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Approved by manufacturer.

B. Source Limitations: Obtain all architectural joint systems through once source from a single manufacturer.

C. Product Options: Drawings indicate size, profile, and dimensional requirements of architectural joint systems and are based on the specific systems indicated. Refer to Division 01 Section "Product Requirements".
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Loading Characteristics: Standard loading refers to covers that are capable of withstanding up to 500 lbs. point loads. Heavy duty refers to covers that are capable of withstanding up to 2000 lbs. point loads.

E. Fire-Test-Response Characteristics: Where indicated, provide architectural joint system and fire-barrier assemblies identical to those of assemblies tested for fire resistance per UL 2079 and/or ASTM E 1966 by testing and inspecting agency acceptable to authorities having jurisdiction. Fire rating not less than the rating of adjacent construction.

F. Manufacturer to provide 5 year warranty for all joint covers.

1.6 COORDINATION

A. Coordinate installation of exterior wall joint systems with roof expansion assemblies to ensure that wall transitions are watertight.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum: ASTM B 221, Alloy 6005A-T61, 6063-T5, 6061-T5, 6105-T5, 6105-T5 for extrusions; ASTM B209, Alloy 6061-T6, 303-H14, 505-H34 for sheet and plate.
   1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
   2. Mill Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
   3. Class II, Clear Anodic Finish: AA=M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
   4. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
   5. High-Performance Organic Finish (Two-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.

B. Stainless Steel: ASTM A666, Type 304 for plates, sheet, and strips.
   1. Finish: No.4, directional satin.
      a. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
      b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surface chemically clean.

C. Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.

D. Compression Seals: ASTM D2000; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.

E. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to meet performance criteria for required rating period.

F. Moisture Barrier: 7-ply laminate reinforced Polyethylene.

G. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers and other accessories compatible with material in contact, as indicated or required for complete installations.

2.2 ARCHITECTURAL JOINT SYSTEMS, GENERAL

A. General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.

B. Design architectural joint systems for the following size and movement characteristics:
   1. Normal Joint Width: As indicated on Drawings
   2. Maximum Joint Width: As indicated on Drawings
   3. Minimum Joint Width: As indicated on Drawings

2.3 ARCHITECTURAL JOINT SYSTEMS FOR BUILDING INTERIORS

A. Construction Specialties, Inc., 6696 Route 405 Highway, Muncy, PA, shall manufacture expansion joint cover assemblies specified herein and indicated on the drawings. Other manufacturers may be accepted as substitutions only if the manufacturer can demonstrate product compliance with the requirements of the contract documents. Substitution requires must be reviewed prior to bid and must include the following information:
   1. Details.
   2. ASTM E1399 Test Reports.
   3. Mock-ups.
   4. Reference list of projects with similar products as those specified herein.
   5. Sample of written 5 year warranty.

B. Wall-to-Wall Joint Systems:
   1. Basis-of-Design Product: Construction Specialties, Inc. model SFW
   2. Type: Vertical cover plate.
      a. Exposed Metal: Aluminum.
         1) Finish: Class II, clear anodic.
   3. Fire-Resistance Rating: Provide joint system and fire-barrier assembly with a rating not less than that of adjacent construction.
   4. Moisture Barrier: Manufacturer's standard.

C. Wall Corner Joint Systems:
   1. Basis-of-Design Product: Construction Specialties, Inc. model SCW
   2. Type: Vertical cover plate.

a. Exposed Metal: Aluminum.
1) Finish: Class II, clear anodic.
3. Fire-Resistance Rating: Provide joint system and fire-barrier assembly with a rating not less than that of adjacent construction.
4. Moisture Barrier: Manufacturer's standard.

2.4 ARCHITECTRUAL JOINT SYSTEMS FOR BUILDING EXTERIORS

A. Construction Specialties, Inc. P.O. Box 380 Muncy, PA, shall manufacture expansion joint cover assemblies specified herein and indicated on the drawings. Other manufacturers may be accepted as substitutions only if the manufacturer can demonstrate product compliance with the requirements of the contract documents. Substitution requests must be reviewed prior to bid and must include the following information.
1. Details.
2. ASTM E1399 Test Reports.
3. Mock-ups.
4. Reference list of projects with similar products as those specified herein.
5. Sample of written 5 year warranty.

2.5 ARCHITECTURAL JOINT SYSTEMS FOR OPEN-AIR STRUCTURES

A. Construction Specialties, Inc. P.O. Box 380 Muncy, PA, shall manufacture expansion joint cover assemblies specified herein and indicated on the drawings. Other manufacturers may be accepted as substitutions only if the manufacturer can demonstrate product compliance with the requirements of the contract documents. Substitution requests must be reviewed prior to bid and must include the following information.
1. Details.
2. ASTM E1399 Test Reports.
3. Mock-ups.
4. Reference list of projects with similar products as those specified herein.
5. Sample of written 5 year warranty.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work; Noticeable cariations in same piece are not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces and blockouts where architectural joint systems will be installed for installation tolerances and other conditions affecting performance of work.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrate according to architectural joint system manufacturer's written instructions.

B. Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.

C. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling and fitting required to install joint systems.
1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.
3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
4. Locate in continuous contact with adjacent surfaces.
5. Standard-Duty Systems: Shim to level where required. Support underside of frames continuously to prevent vertical deflection when in service.
6. Heavy-Duty Systems: Repair or grout blockout as required for continuous frame support and to bring frame to proper level. Shimming is not allowed.
7. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
1. Provide in continuous lengths for straight sections.
2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer before installing compression seals.

E. Terminate exposed ends of joint assemblies with field or factory-fabricated termination devices.

F. Fire-Resistance-Rated Assemblies: Coordinate installation of architectural joint assembly materials and associated work so complete assemblies comply with assembly performance requirements.
1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

G. Water Barrier: Provide water barrier at exterior joints and where called for on Drawings. Provide drainage fittings where indicated.

3.4 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION – 07 95 00

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Hollow metal doors and hollow metal door frames.

1.2 RELATED SECTIONS

A. Door hardware is specified in Section 08 71 00.

1.3 SUBMITTALS

A. Product Data: Furnish for each type of door and frame, including details of construction, materials, dimensions, hardware preparation, core, label compliance, profiles, and finishes.

B. Shop Drawings: Include details of each frame type, elevations of door types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

C. Door Schedule: Furnish complete schedule of doors and frames using same reference numbers for details and openings as those on the drawings.

1.4 QUALITY ASSURANCE

A. Steel doors and frames shall comply with ANSI A250.8 "Recommended Specifications Standard Steel Doors and Frames" and the specified requirements.

B. Fire-Rated Door Assemblies: Units shall comply with CBC, and be identical to door and frame assemblies whose fire resistance characteristics have been determined in accordance with NFPA 252 and are labeled and listed by UL, Factory Mutual, Warnock Hersey, or other testing and inspecting organization acceptable to authorities having jurisdiction.

C. Steel doors and frames shall comply with positive pressure test requirements of UL 10C and shall be labeled accordingly by the door and frame manufacturer in a manner approved by authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage.

B. Inspect doors and frames upon delivery for damage. Minor damage may be repaired provided finish items are equal to new work and acceptable to District’s Representative; otherwise remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch high wood blocking. Avoid use of non-vented plastic or canvas shelters that could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4-inch space between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A569.

B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A366, commercial quality or ASTM A620, drawing quality.

C. Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A526, commercial quality, or ASTM A642, drawing quality, hot dipped galvanized in accordance with ASTM A653, A60 or G90 coating designation, mill phosphatized.

D. Supports and Anchors: Fabricate of not less than 16-gauge, galvanized where used with galvanized frames.

E. Inserts, Bolts and Fasteners: Manufacturer's standard units. Where items are built into exterior walls, hot-dip galvanize in accordance with ASTM A153, Class C or D as applicable.

F. Shop Applied Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.

G. Grout: Masonry grout having a 4-inch maximum slump consistency.

2.2 DOORS

A. Provide metal doors of ANSI A250.8 grades and models specified.
   1. Exterior Flush Doors: Level 3, extra heavy duty, Model 2, minimum 16-gauge galvanized steel faces.

B. Internal Construction: Unitized steel grid or vertical steel stiffeners with internal sound deadener on inside of face sheets, in accordance with ANSI A250.8 requirements. Exterior doors shall have a polyurethane or polystyrene core.

C. Clearance: Not more than 1/8-inch at jambs and heads. Not more than 3/8-inch at bottom. Threshold clearances as indicated.
   1. Fire Doors: Provide clearances according to their listing except where more stringent requirements are specified.

D. Edges:
   1. General: Beveled latch stile for single doors, and meeting stile for pair doors; square elsewhere.
   2. Stile Edges: No seams are allowed on vertical stile edges.
   3. Top and Bottom Edges: Reinforced with 16-gauge steel channels; both edges flush and made watertight for exterior doors, top edge flush for interior doors. Provide holes in bottom channel of doors for escape of trapped moisture.

2.3 DOOR FRAMES

A. One-Piece Welded Frames: Fabricate frames with mitered or coped and continuously welded corners in accordance with ANSI A250.8 Extra Heavy Duty requirements.
   1. Exterior Frames and Interior Frames 4-feet or Wider: 14-gauge.
   2. Interior Frames Less than 4-feet Wide: 16-gauge.

B. Glazing Beads: Provide frame glazing beads in interior glazed openings and other locations where fixed glass is indicated. Prepare frames for the type of glazing beads required to receive the glass and gaskets indicated. Miter or butt join beads at corners. Glazing beads shall be screw-on type to receive countersunk flat head machine screws.

C. Anchors:
   1. Provide a jamb anchor for each 2'-6" of door or window height or fraction thereof.

2. Fabricate from minimum 16-gauge sheet steel.
3. Vary anchor types to provide positive fastening to adjacent construction.
4. Secure a metal clip angle at bottom of each jamb member for anchoring to floor, with a minimum of two fasteners.
5. Items to be built into exterior walls shall be hot-dip galvanized after fabrication in accordance with ASTM A153, Class B.

D. Door Silencers: Except on weatherstripped or gasketed frames, drill stops to receive 3-silencers on strike jambs of single-swing frames and 2-silencers in heads of double-swing frames.

E. Plaster Guards: Provide 26-gauge steel plaster guards or mortar boxes at back of hardware cutouts.

2.4 FABRICATION

A. Fabricate steel doors and frames to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at Project site. Comply with ANSI A250.8 requirements.

B. Fabricate exposed faces of doors, including stiles and rails of non-flush units, from cold-rolled steel.

C. Tolerances: Comply with SDI-117, "Manufacturing Tolerances Standard Steel Doors and Frames" unless otherwise indicated or specified.

D. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel.

E. Fabricate exterior doors and frames from galvanized sheet steel in accordance with SDI-112. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 16-gauge inverted steel channels with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.

F. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat heads for exposed screws and bolts.

G. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware in accordance with final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A250.6 for door frame preparation for hardware, except for the following changes:
1. Hinges: Steel plate 3/16-inch thick x 1-1/2-inches wide x 6-inches longer than hinge; secured by not less than 6 spot welds.
2. Surface-Applied Closers: 12-gauge steel sheet; secured with not less than 6 spot welds.

H. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping of surface-applied hardware may be done at Project site.

I. Locate hardware as indicated on final shop drawings and in accordance with Door Hardware Institute (DHI) "Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames".

J. Shop Painting: Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
1. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
2. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive paint finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install steel doors, frames, and accessories in accordance with the manufacturer's instructions, the requirements of ANSI/SDI, and final reviewed Shop Drawings.

B. Placing Frames: Comply with provisions of ANSI A250.8 and SDI-112 unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
   1. Except for frames located in concrete, place frames before constructing enclosing walls or ceilings.
   2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
   3. In stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. Attach wall anchors to studs with screws.
   4. Install fire-rated frames according to their listings.
   5. Install head anchors at mid span for openings exceeding 48-inches.

C. Door Installation: Fit hollow metal doors accurately in frames, within specified clearances.
   1. Fire-Rated Doors: Install with clearances specified in their listings and as specified

3.2 ADJUST AND CLEAN

A. Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.
   1. Remove rust before touch-up is applied.
   2. Touch-up shall not be obvious.

B. Repair damaged galvanizing with a galvanizing repair paint.

C. When complete, exposed surfaces and edges shall be clean, straight, and free from dents, scratches, and other damage and defects.

D. Doors and finish hardware shall operate smoothly, quietly, and free from bind.

END OF SECTION – 08 11 13

SECTION 08 12 16

ALUMINUM FRAMES

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: Kawneer Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.
   1. Types of Kawneer Aluminum Storefront Systems include:
      a. InFrame™ Interior Framing System – 2” x 6” (50.8 x 152.4) nominal dimension; Non-Thermal; Center Glazed, Screw Spline, Punched Opening Fabrication.

B. Related Sections:
   1. 07 92 00 – JOINT SEALANTS
   2. 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
   3. 08 80 00 – GLAZING
   4. 12 26 00 – SOLAR TUBES

1.3 DEFINITIONS

A. Definitions: For fenestration industry standard terminology and definitions refer to American Architectural Manufacturers Association (AAMA) – AAMA Glossary (AAMA AG)

1.4 PERFORMANCE REQUIREMENTS

A. Storefront System Performance Requirements: Interior framing system.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, hardware, finishes, and installation instructions for each type of aluminum frames indicated.

B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances and installation details.

C. Samples for Initial Selection: For units with factory-applied color finishes including samples of hardware and accessories involving color selection.

D. Samples for Verification: For aluminum frames and components required.

E. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum frames, made from 12" (304.8 mm) lengths of full-size components and showing details of the following:
   1. Joinery, including concealed welds.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.
   5. Flashing and drainage.

F. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications: A manufacturer capable of providing aluminum frames that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.

C. Source Limitations: Obtain aluminum frames through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum frames and are based on the specific system indicated. Refer to Division 01 Section “Product Requirements”. Do not modify size and dimensional requirements.
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup for type(s) of storefront elevation(s) indicated, in location(s) shown on Drawings.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section “Project Management and Coordination”.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of aluminum frame openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

1.8 WARRANTY

A. Manufacturer’s Warranty: Submit, for Owner’s acceptance, manufacturer’s standard warranty.

B. Warranty Period: One (1) year from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-design Product:
1. Kawneer Company Inc.
2. InFrame™ Interior Framing System (Non-Thermal)
3. System Dimensions: 2" x 6" (50.8 x 152.4) nominal dimension
4. Glass: Center Plane

B. Substitutions: Refer to Substitutions Section for procedures and submission requirements.
   1. Pre-Contract (Bidding Period) Substitutions: Submit written requests ten (10) days prior to bid date.
   2. Post-Contract (Construction Period) Substitutions: Submit written request in order to avoid storefront installation and construction delays.
   3. Product Literature and Drawings: Submit product literature and drawings modified to suit specific project requirements and job conditions.
   4. Certificates: Submit certificate(s) certifying substitute manufacturer (1) attesting to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacturer and fabrication of aluminum storefront for a period of not less than ten (10) years. (Company Name)
   5. Samples: Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

C. Substitution Acceptance: Acceptance will be in written form, either as an addendum or modification, and documented by a formal change order signed by the Owner and Contractor.

2.2 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.8 mm) wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

B. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

D. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

F. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 STOREFRONT FRAMING SYSTEM

A. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.

C. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action

D. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

E. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

2.4 GLAZING SYSTEM

A. Glazing: As specified in Division 08 Section “Glazing”.

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
1. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, Weatherseal-sealant, and aluminum-framed-system manufacturers for this use.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: As specified in Division 08 41 13 Section “Aluminum-Framed Entrances and Storefronts”.

2.6 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section “Joint Sealants”.

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil (.0762 mm) thickness per coat.

2.7 FABRICATION

A. Extrude aluminum shapes before finishing.

B. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fit joints; make joints flush, hairline and weatherproof.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

D. Storefront Framing: Fabricate components for assembly using manufacturer's standard installation instructions.
   1. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes:

B. Factory Finishing
   1. Kawneer Permanodic™ AA-M10C21A44, AAMA 611, Architectural Class I Color Anodic Coating (Color #18 Champagne).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight aluminum frame installation.
   1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
   2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.
   3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
   4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum framed storefront system, accessories, and other components.

B. Install aluminum framed storefront system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Upon Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.4 ADJUSTING, CLEANING AND PROTECTION

A. Clean aluminum surfaces immediately after installing aluminum framed storefronts. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION – 08 12 16

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Solid core paint grade doors.
2. Fire-resistant composite core doors.
3. Sizing by manufacturer.
4. Machining by manufacturer.

B. Related Sections:
1. Section 088000 "Glazing" for glass view panels in flush wood doors for field installation.
2. Section 099100 "Painting" for field finishing doors.

1.2 SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction**,** and trim for openings.

B. LEED Submittals:
1. Product Data: for Credit MR-4. For products having recycled content, provide documentation indicating percentage by weight of post-consumer and pre-consumer/post-industrial recycled content.
2. Provide statement indicating cost for each material having recycled content.
3. Provide third party certification for recycled content.
4. Product Data for Credit MR 5: For products and materials that comply with requirements for regional materials, documents indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material that contributes towards this credit. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
5. Certificates: Provide certificates of chain-of-custody by manufacturers, supplier, and distributors certifying that the products specified to be made from certified wood were made from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2 Principals and Criteria. Include evidence that mill and distributor is certified for chain-of-custody by an FSC-accredited certification body. Include certification number. Wood products with FSC certification shall have material cost separated from other wood products. Installers of wood products are not required to have chain-of-custody certification.
6. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no added urea formaldehyde.
7. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
   a. Dimensions and locations of blocking.
   b. Dimensions and locations of mortises and holes for hardware.
   c. Dimensions and locations of cutouts.
   d. Undercuts.
   e. Fire-protection ratings for fire-rated doors.
8. Samples for Verification:
   a. Provide construction samples of doors, approximately 5 by 5 inches, with door faces and vertical edges representing actual construction to be used.
9. Sample Warranty

1.3 QUALITY ASSURANCE

A. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body when FSC Certified wood is specified

B. Product Performance: Provide documents showing compliance to the following WDMA attributes, validating the specified WDMA Performance Duty Level:
   1. Adhesive Bonding Durability: WDMA TM-6
   2. Cycle Slam: WDMA TM-7
   3. Hinge Loading: WDMA TM-8
   4. Screw Holding: WDMA TM-10
      a. Door Face
      b. Vertical Door Edge
      c. Horizontal Door Edge (applies when hardware is attached)

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package factory-finished doors individually in manufacturer's standard plastic bags, stretch wrap, or cardboard cartons.

C. Mark each door on top rail with opening number used on Shop Drawings. Include manufacturer's order number and date of manufacture.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
      b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
   2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
   3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Marshfield DoorSystems, or equal.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A-11, "Architectural Wood Flush Doors."

B. Regional Materials: Where available based on inclusive list of approved manufacturers, flush wood doors shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

C. Certified Wood: Flush wood doors shall be certified according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification." FSC claims are to be based on "new" wood contribution only. All recycled, reclaimed, and recovered material, even if it is FSC Recycled, must be applied towards the MR 4 credit.

D. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain added urea formaldehyde.

E. Low-Emitting Materials: Fabricate doors that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." All composite wood and agrifiber products must meet this requirement. Prefer products that are third party certified through SCS Indoor Advantage Gold.

F. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

G. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

H. Doors located in walls identified as “Privacy” wall type provide with acoustic door seals
   1. Pack HM frames with mineral wool at these locations.

I. Wood-Based Particleboard-Core Doors:
   1. Provide wood-based particleboard core doors with a minimum density per ANSI A208.1, Grade LD-2 as required to meet WDMA Performance Duty level specified without added blocking. Provide solid wood reinforcement at locksets, closers, and flush bolt locations.
   2. Construction: Five plies. Stiles and rails are bonded to core, and then entire unit is abrasive planed before veneering.
   3. WDMA I.S.1-A Performance Grade: As specified in Article 2.2.

2.3 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Marshfield DoorSystems; "Signature Series" or equal.
   2. Grade: Custom.
   3. Faces: MDO.
      a. Apply MDO directly to high-density fiberboard crossbands.
         1) Closed-grain hardwood veneer, bonded to structural composite lumber.
         2) Horizontal Edges: Structural composite lumber. Bond smooth PVC edge band to structural composite lumber, providing cleanable surface.
         3) Core: Wood-based Particleboard, or fire-resistant composite,
         4) Construction: Five plies. Stiles and rails are bonded to core, and then entire unit is abrasive planed before veneering.
         5) WDMA I.S.1-A Performance Grade: Heavy Duty.

2.4 LIGHT FRAMES AND LOUVERS

A. Factory Glazing: Refer to Section 088000 "Glazing" for glass view panels in flush wood doors. Factory install glass as required. Fill glazing bead nail holes in factory finished doors.

B. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard flush wood beads unless otherwise indicated.
   1. Wood Species: Any closed-grain hardwood.
   2. Profile: Flush rectangular beads, profile per Marshfield W-8.
   3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips as required and approved for such use.

C. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated. Profile per Marshfield Veneer Clad Light Bead, matching non-rated W-8 profile.
   1. Wood Species: Any closed-grain hardwood.

2.5 FABRICATION

A. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
   1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
   2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

B. Openings: Factory cut and trim openings through doors.
   1. Light Openings: Trim openings with moldings of material and profile indicated.
   2. Glazing: Factory install glazing in fire rated **and in doors indicated to be factory finished**]. Comply with applicable requirements in Section 088000 "Glazing."

2.6 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces and vertical edges with one coat of wood primer specified in Section 099100" Interior Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs. Any deficiencies must be corrected prior to door installation.
   2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
   1. Install fire-rated doors according to NFPA 80.
   2. Install smoke- and draft-control doors according to NFPA 105.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; 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 at heads, jambs, and between pairs of doors. Provide 1/8 inch 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 from bottom of door to top of threshold unless otherwise indicated.
      a. Comply with NFPA 80 for fire-rated doors.
   2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
   3. Trim bottom rail only to extent permitted by labeling agency.

3.3 ADJUSTING

A. Operation: Correct any deficiency that prohibits the door from swinging or operating freely. Do not remove hinge screws after initial insertion. Shims used for alignment purposes must be inserted between hinge and frame. Do not insert shims between hinge and door.

B. To prevent stile failure, insure that door closers are properly adjusted and do not limit the door opening swing. Limit door opening swing only with a properly located stop.

C. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION - 08 14 16

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 08 15 40

FIBERGLASS (FRP) DOORS AND FRAMES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Fiberglass reinforced plastic (FRP) Doors

B. Fiberglass reinforced plastic (FRP) Frames

1.2 RELATED SECTIONS

A. Applicable provisions of Division 1 shall govern all work under this section Division 4 Section "Unit Masonry Assemblies for installing anchors and grouting frames in masonry construction.
   1. Division 8 Section "Door Hardware" for door hardware and weather-stripping.
   2. Division 8 Section "Glazing" for glass in doors and frames.
   3. Division 9 Section "Painting" for field painting factory-primed doors and frames.

1.3 - QUALITY ASSURANCE

A. General: Provide fiberglass reinforced door and frame units made of components of standard construction furnished by one manufacturer as coordinated assemblies.

B. Manufacturer: Company specializing in the manufacture of fiberglass doors and frames with a minimum of five years documented experience.

C. Construction: Verify that FRP doors and frames are manufactured utilizing pultruded fiberglass components for flexibility, durability, superior strength and chemical resistance. Press-molded doors and frames will not be accepted. Resin rich door edges and gelcoat are prone to chipping and cracking (brittle).

D. Resins: Resins shall comply with USDA and FDA standards for incidental food contact.

E. Flame Spread Rating: Flame retardant structural shapes meet the minimum flame spread rating less than or equal to 25 when tested according to ASTM E84.

F. Fire-rated doors and frames to conform to NFPA 252 (2008), CAN4 S104 (1985), UL10C (2001), and UL9 (2005).

G. Impact Strength: FRP doors and panels 10.32 foot-pounds per inch of notch, ASTM D-256.

H. Tensile Strength:
   1. FRP doors and panels 12,000 psi, ASTM D-638.
   2. FRP frames 30,000 psi, ASTM D-638.

I. Flexural Strength: FRP doors, panels, and frames 25,000 psi, ASTM D-790.

J. Compressive Strength:
   1. FRP doors and panels 18,000 psi, ASTM D-695.
   2. FRP frames 30,000 psi, ASTM D-695.

K. Water Absorption: FRP doors, panels, and frames .27 %, ASTM D-570.

L. Hardware Reinforcements: FRP doors and frames fabricated with a minimum screw holding strength of 1,000 lbs. Tested with a #12 x 1-1/4" hinge screw.

M. Paint Adhesion: Coating for FRP doors, panels, and frames to conform to AAMA 624-07 for color uniformity, film adhesion, specular gloss, direct impact, abrasion resistance, and chemical resistance.

N. Warranty: Warranty fiberglass doors and frames for life of the initial installation against failure due to corrosion. Additionally, warranty fiberglass doors and frames for a period of 10 years against failure due to materials and workmanship, from date of substantial completion.

1.4 SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, and finishes.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage exists. Minor damages may be repaired provided refinished items match new work and are acceptable to the Architect. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Avoid using non-vented plastic or canvas covers that could create a humidity chamber.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Edgewater FRP Door - 175 N. Western Ave. Neenah, Wisconsin 54956
Phone: 920-886-1995 Fax: 920-886-1998
2. Substitutions: None

2.2 DOORS

A. Interior Doors: Provide doors complying with requirements indicated below:
1. E-S series (heavy duty) from the "Cutting Edge" product line (seamless).
2. Doors to have at least two internal full height heavy duty vertical fiberglass stiffeners for warp resistance.
3. Expanded polystyrene solid foam core.

B. Exterior Doors and High Traffic Areas: Provide doors complying with requirements indicated below:
1. E-P series (Extra Heavy Duty) or E-S series from the "Cutting Edge" product line (seamless).
2. Doors to have full height heavy duty vertical fiberglass stiffeners 6 inches on center for superior strength.
3. Expanded polystyrene solid foam core.

C. Fire-rated Doors: Provide doors complying with the requirements indicated below:

1. E-F series (Fire) from the "Cutting Edge" product line (seamless).
2. Doors to have fire-rating as indicated per schedule.
3. Fire-rated mineral core.

D. Vision Lite Systems: Lite opening shall be completely sealed utilizing fiberglass pultrusions, integrated into the units sub-frame during construction.

E. Door Louvers: Provide sight-proof louvers for doors, where indicated. Stationary louvers to be manufactured utilizing fiberglass inverted "V" blades. Louver openings shall be completely sealed in the same manner as lite openings.

F. Transom/side Panels: Transoms to be identical to the doors in construction and materials - if applicable to this project.

2.3 FRAMES

A. General: Provide pultruded fiberglass frames for doors, transoms, sidelites and borrowed lites - where indicated.

B. Frames: Comply with the requirements of grade specified for corresponding doors. Frames for E-S (standard), E-P (premier), and E-C (custom) series fiberglass doors to be manufactured from 0.1875 inch (4.8 mm) thick fiberglass pultrusions. Profile must be of standard hollow type to permit installation into new concrete or block walls, as well as slip-on drywall situations. Solid (foam filled) or boxed frames will not be accepted.

C. Fire-rated Frames: Frames for E-F (fire) series fiberglass doors to be manufactured from 0.1875 inch (4.8 mm) thick fiberglass pultrusions. Profile must be of standard hollow type to permit installation into new concrete or block walls. *Coated hollow metal frames will not be accepted.*

D. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

E. Plaster Guards: Provide plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

F. Supports and Anchors: Fabricated from no less than 0.125 inch (3.18 mm) thick pultruded fiberglass material.
1. Wall Anchors in New Masonry Construction: Provide T-strap or wire anchors.
2. Wall Anchors in Existing Masonry Construction: Provide six (three per jamb) Redhead or Lock-bolt type flat head, stainless steel expanding sleeve bolts, 3/8 inch diameter, 4 inches in length.
3. Wall Anchors in New Steel or Wood Stud Construction: Provide multi-purpose type fiberglass anchor supports in backside of frames for attachment from the stud wall into the frames anchor supports. This installation must take place prior to setting drywall.
4. Existing Steel or Wood Stud: Provide drywall slip-on frame anchoring system - compression type.

2.4 FABRICATION

A. General: Fabricate fiberglass door and frame units to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Core Construction: Manufacturer's standard core construction that complies with the following:

1. E-S (standard) series to have expanded polystyrene foam core.
2. E-P (premier) series to have full height vertical fiberglass stiffeners, 6 inches on center. Voids to be filled with expanded polystyrene foam.
3. E-C (custom) series to have expanded polystyrene foam, polyurethane foam or vertical fiberglass stiffeners, where indicated.
4. E-F (fire) series to have fire-rated mineral core.
5. Hollow/honeycomb core will not be accepted.

C. Stiles and Rails: Fabricate doors utilizing heavy duty pultruded fiberglass tubular members.

D. Door Faces: Laminated composite faces shall be urethane fused to the stile and rail assembly, including the vertical stiffeners and core material, utilizing a two-part 100 percent reactive urethane adhesive, and then cured under pressure until completely bonded.

E. Clearances: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch (19 mm) at bottom, with standard being 5/8 inch (15.9 mm) at bottom.

F. Door Edges: Lock stile to be factory beveled 1/8" in 2" for rub-free operation. Square lock-edge will not be accepted.

G. Tolerances: Maximum diagonal distortion - 1/16 inch (1.6 mm) measured with straight edge, corner-to-corner.

H. Hardware Reinforcement: Fabricate all hardware reinforcements utilizing premium high density polyethylene (HDPE) and fiberglass blocking. Any form of wood or metal reinforcements will not be accepted.

I. Exposed Fasteners: Unless otherwise indicated, provide stainless steel, countersunk flat or oval heads for exposed screws and bolts.

J. Thermal-Rated (insulating) Assemblies: At exterior locations and elsewhere shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies, with an "R" value of 11-12.

K. Hardware Preparations: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Doors and frames must be factory pre-drilled for all mortised hardware preps. Pilot and through-bolt holes for all surface mounted hardware to be drilled at the project site during installation.

L. Frame Construction: Fabricate frames to size and shape shown on drawings.
1. Fabricate frames with mitered resin-welded corners and seamless face joints.
2. Provide set-up and resin welded frames with temporary spreader bars.
3. Provide 4 or 6 inch terminated/hospital stops - where indicated.

M. Hardware Locations: Locate hardware as indicated on shop drawings or if not indicated, according to manufacturer’s standard locations.

N. Glazing/Louver Stops: Manufacturer's standard two-piece PVC retainers.
1. Provide non-removable stops on outside of exterior and on secure side of interior doors for glass, louver, and other panels in doors.
2. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.
3. Loose, eight piece trim kits will not be accepted. Additionally, retainers held in place by two-sided tape are not acceptable.
4. Glass to be supplied and installed under section 08 80 00, unless stated otherwise.

O. Astragals: Fabricate astragals for pairs of doors utilizing fiberglass materials in either flat or "T" configuration where indicated.

2.5 FINISHES

A. Prime Finish: Pre-clean and shop prime each door and frame ready for finish painting, performed at the jobsite under Section 09 90 00.
   1. Where indicated, furnish fiberglass doors and frames factory pre-finished.
      a. Finish: Manufacturers standard chemical resistant waterborne acrylic enamel topcoat.
      b. Sheen: Satin or semi-gloss - as indicated.

B. Door Faces: Face skins shall be smooth. Due to the unit's extra-long life expectancy, minor repairs on facings must be easily blended in the event of damage. Slightly textured gelcoat facings will not be accepted.

C. Finish on fiberglass frames must match that of the fiberglass doors to which they are installed. Gel coated doors and polyurethane coated frames together as a unit will not be accepted.

2.6 HARDWARE

A. Hardware: All hardware shall be furnished under section 08 71 00, unless stated otherwise.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install fiberglass doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
   1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.
   2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge locations on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
   3. In existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with stainless steel expansion bolts and masonry anchorage devices.
   4. For openings 90 inches (2286 mm) or more in height, install an additional anchor at hinge and strike jambs.

C. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

D. Door Installation: Fit fiberglass doors accurately in frames. Shim as necessary.

3.2 ADJUSTING AND CLEANING

A. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

B. Cleaning: Clean fiberglass door and frame assemblies in accordance with manufacturer's recommended procedure.

END OF SECTION 08 15 40

SECTION 08 33 00

FIREGARD – ROLLING FIRE DOORS / SMOKESHIELD FIRE DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Electric operated
2. Automatic closing
3. Overhead rolling fire doors with SmokeShield® UL leakage rated assembly label.

B. Related Sections:
1. 05 50 00 Metal Fabrications. Door opening jamb and head members.
2. 06 10 00 Rough Carpentry. Door opening jamb and head members.
3. 08 71 00 Hardware. Padlocks. Masterkeyed cylinder.
4. 09 91 00 Painting. Field painting.
5. Division 26. Electrical wiring and conduit, fuses, disconnect switches, connection of operator to power supply, installation of control station and wiring, and connection to alarm system.

C. Products That May Be Supplied, But Are Not Installed Under This Section:
1. Control station.
2. Smoke/heat detectors.
3. Annunciator.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements:
1. Provide doors with underwriters' Laboratories, Inc. label for the first rating classification, 2 hr
2. Provide doors with underwriters' Laboratories, Inc. label for "Leakage Rated Assembly" or "S" label.
3. Comply with NFPA 105 air leakage requirements.
4. Pass UL test procedure 1784.

1.3 SUBMITTALS

A. Reference Section 1 33 00 Submittal Procedures; submit the following items:
1. Product Data
2. Shop Drawings: Include special conditions not detailed in Product Data. Show interface with adjacent work.
3. Quality Assurance/Control Submittals:
   a. Provide proof of manufacturer ISO 9001: 2008 registration.
   b. Provide proof of manufacturer and installer qualifications – see 1.4 below.
   c. Provide manufacturer's installation instruction.
4. Closeout Submittals:
   a. Operation and Maintenance Manual.
   b. Certificate stating that installed materials comply with this specification.

1.4 QUALITY ASSUANCE

A. Qualifications:
1. Manufacturer Qualifications: ISO 9001:2008 registered and a minimum of five years' experience in producing counter fire doors and smoke control units of the type specified.
2. Installer Qualifications: Manufacturer's approval.

1.5 DELIVERY STORAGE AND HANDLING

A. Reference Section 01 66 00 – Product Storage and Handling Requirements.

B. Follow manufacturer's instructions.

1.6 WARRANTY

A. Standard Warranty: Two years from date of shipment against defects in material and workmanship.

B. Maintenance: Submit for owner's consideration and acceptance of maintenance service agreement for installed products.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturer: Cornell Iron Works, Inc., Crestwood Industrial Park, Mountaintop, PA 18707. Telephone: (800) 233-8366, Fax: (800) 526-0841. Underwriters Laboratories, Inc. (UL), ISO 9001:2008 Registered.

B. Model: ERD11

2.2 MATERIALS

A. Curtain:
1. Slats: No. 5F, flat faced 20 gauge, Grade 40 steel, ASTM A653 galvanized steel zinc coating.
2. Bottom Bar: Two 2 x 2 x 1/8 inch (50 x 50 x 3.2 mm) structural steel angles.
3. Fabricate interlocking continuous slat sections with high strength steel endlocks secured with two 1/4 inch (6.35 mm) rivets per UL requirements.
4. Slat Finish:
a. GalvaNex™ Coating System and phosphate treatment followed by baked-on polyester powder coat, to be determined; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.

B. Guides: Fabricate with minimum 3/16 inch (4.76 mm) structural steel. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stopper to prevent over travel of curtain and bottom bar. Top 16 ½ inches (419.10 mm) of coil side guide angles to be removable for ease of curtain installation and as needed for future curtain services.
1. Finish:
a. Steel: Phosphate treatment followed by baked-on polyester powder coat, to be determined; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.

C. Counterbalance Shaft Assembly:
   1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width.
   2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque.

D. Brackets: Fabricate from minimum 1/4 inch (6.35 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.
   1. Finish:
      a. Phosphate treatment followed by baked-on polyester powder coat, to be determined; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better

E. Hood: 24 gauge galvanized steel with reinforced top and bottom edges. Provide minimum 1/4 inch (6.35 mm) steel intermediate support brackets as required to prevent excessive sag.
   1. Finish:
      a. GalvaNex™ Coating System and phosphate treatment followed by baked-on polyester powder coat to be determined; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better.

F. Smoke Seal:
   1. Bottom Bar, Motor Operated Doors: Combination smoke seal/sensing edge.
   2. Guides and Head: Replaceable, UL listed, nylon piles smoke seals sealing against fascia side of curtain.

2.3 ACCESSORIES

A. Locking
   1. Masterkeyable cylinder operable from both sides of bottom bar.
   2. Provide interlock switches on motor operated units.

B. Provide Floor Level Test Device for FireGard Motor, Chain or Crank operator. Allows for testing of the fire door at floor level instead of at the location of the fuselink.

2.4 OPERATION

A. M100 FireGard™; Motor Operated: Model FS, UL listed and FM approved, NEMA 1 enclosure rating, horsepower as recommended by manufacturer, 115v single phase service. Provide open drip-proof motor, removable without affecting setting of limit switches; UL listed thermal overload protection; maintenance free solenoid actuated brake; planetary reduction gearing and adjustable rotary limit switch mechanism; transformer with 24v control secondary; and all integral electrical components prewired to terminal blocks.
   1. Automatic closure shall be activated by Central alarm system or power outage. Doors shall not require a releasing device for alarm signal activation.
   2. Doors shall maintain a closing speed of not more than 9 inches (229 mm) per second during automatic closing. When automatic closure is activated, electric sensing edge and push button are inoperable.
   3. Doors shall be fail-safe and close upon power failure.
   4. Resetting of spring tension or mechanical dropouts shall not be required. Upon restoration of power and/or clearing of the alarm signal, doors shall immediately reset by opening with the push button.

5. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.

B. Control Station: Flush mounted, “open/close” key switch with “Stop” push button; NEMA 1B.

C. Entrapment Protection: Provide the following primary entrapment protection device to enable momentary contact close operation.
1. Provide NEMA 4X photo eye sensors consisting of a transmitter and receiver that are to be mounted within 6 inch (152.4mm) of the floor, projecting an IR beam across the entire width of the door. Interruption of beam before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Electrical contractor to provide low voltage wiring from the transmitter and receiver to the door operator.

D. Sensing/Smoke Seal Edge: Provide automatic reversing control by an automatic sensing switch within neoprene or rubber astragal extending full width of door bottom bar.
1. Provide an electric sensing edge device. Contact before door fully closes shall cause door to immediately stop downward travel and reverse direction to the fully opened position. Provide a wireless sensing edge connection to motor operator eliminating the need for a physical traveling electric cord connection between bottom bar sensing edge device and motor operator.

E. Automatic Closing and Speed Governor Mechanism:
1. M100 FireGard Motor Operated System:
a. Activation: Central alarm system or power outage.
b. Operation: Motor operator shall close door upon signal from central alarm or power outage.
c. Closing Speed: Not more than 9 inches (229 mm) per second.
d. Reset Procedure: Operation of control station after alarm is cleared and/or power is restored; resetting of spring tension or mechanical dropouts shall not be required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrate.

C. Commencement of work by installer is acceptance of substrate.

3.2 INSTALLATION

A. General: Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports.

B. Comply with NFPA 80 and NFPA 105 and follow manufacturer’s installation instructions.

3.3 ADJUSTING

A. Following completion of installation, including related work by other, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

3.4 FIELD QUALITY CONTROL

A. Site Test: Test doors for normal operation and automatic closing. Coordinate with authorities having jurisdiction to witness test and sign Drop Test Form.

3.5 CLEANING

A. Clean surfaces soiled by work as recommended by manufacturer.

B. Remove surplus materials and debris from the site.

3.6 DEMONSTRATION

A. Demonstrate proper operation to Owner's Representative.

B. Instruct Owner's Representative in maintenance procedures.

END OF SECTION – 08 33 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 08 36 00

OVERHEAD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Full view aluminum overhead doors

B. Electric door operators

1.2 PERFORMANCE CRITERIA

A. Design doors to withstand positive and negative wind loads as calculated in accordance with design wind loads. Safety Factor: 1.5 times design wind load.

PART 2 - PRODUCTS

2.1 MANUFACTURER & MODEL NUMBER

A. Clopay Building Products Company

B. Full View Aluminum Doors
   1. Heavy Duty 2.125 inches Door - Clopay Model 903I
   2. Finish: See Finish Schedule
   3. Glazing: 1/2 inch insulated tempered glass glazing.
   4. Locks: District standard, key per SECTION 08 71 00
   5. High Lift design as shown on Drawings

C. Accessories: weatherstipping, tracks, counterbalance, and all accessories highest quality by door manufacturer.

D. Electric Door Operator: Factory pre-wired controls, starter, gear-reduction unit, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories complete for proper operation.
   1. Obstruction Detection Device with sensor edge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s written installation instructions including all recommendations.

END OF SECTION – 08 36 00

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Aluminum-framed entrances and storefronts systems, including exterior entrance doors, transoms, sidelights, exterior storefront-type framing system and project-out casement windows installed in storefront framing.

B. Related Sections:
1. Self-adhering window and door flashing is specified in Section 07 25 00.
2. Joint sealants are specified in Section 07 92 00.
3. Door hardware is specified in Section 08 71 00.
4. Glazing is specified in Section 08 80 00.

1.2 PERFORMANCE CRITERIA

A. Minimize air infiltration and condensation at glass and frames to 0.06 cfm per square foot of fixed area when tested with ASTM E283 at an inward test pressure differential of 1.57 psf.

B. No water penetration when tested in accordance with ASTM E331 at an inward test pressure differential of 6.24-psf.
1. Windows: When closed and locked, there shall be no leakage as defined in ASTM E547 and ASTM E331 at a static air pressure differential of 12-psf.

C. Assembly Thermal Transmittance:
1. Storefront and Entrances: U-Factor not to exceed 0.39.
2. Operable windows: U-Factor not to exceed 0.44.

D. Structural Performance: Conduct tests for structural performance in accordance with ASTM E330. 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-percent of their clear span.
1. Deflection Normal to Plane of the Wall: Test pressure required to measure deflection of framing members normal to the plane of the wall shall be equivalent to the specified wind load. Deflection shall not exceed 1/175 of the clear span, when subjected to uniform load deflection test.
2. Deflection Parallel to the Plane of the Wall: Test pressures required to measure deflection parallel to the plane of the wall shall be equal to 1.5 times the specified wind pressure. Deflection of any member carrying its full dead load shall not exceed an amount that will reduce glass bite below 75-percent 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-inch. The clearance between the member and an operable door or window shall be at least 1/16-inch.
3. Window Uniform Load Deflection: There shall be no deflection in excess of 1/175 of the span of any framing member with a minimum static air pressure difference of 105-psf applied in the positive and negative direction in accordance with ASTM E330

E. Window Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than Frame 51, Glass 54.

1.3 SUBMITTALS

A. Product Data: Furnish product data for each system showing manufacturer's standard details and fabrication methods, data on finishing, hardware, and accessories, and recommendations for maintenance and cleaning.

B. Shop Drawings: Include for fabrication and installation, including large scale elevations, plans, and full scale detail sections of typical members, anchors, reinforcement, expansion provisions, and glazing. Include full scale details at head, jambs, spandrels, sill and mullions for each opening.
   1. Include structural analysis data signed and sealed by a qualified professional engineer, licensed in the State of California, responsible for their preparation. Clearly indicate all loads imposed on the primary building structure.
   2. Indicate interface with adjacent construction and flashings.
   3. Reference window types indicated on architectural window types drawings.
   4. Reference architectural elevation, plans, sections and details.
   5. Reference structural details and members.
   6. Indicate flashings, brake shape trim and closures.
   7. Show details of intersections of frame caps.
   8. Coordinate submittal with glazing submittals.

C. Samples for Verification: Furnish two samples of each type and color of aluminum finish selected, on 12-inch long sections of extrusions or formed shapes and 6-inch square sheets.

D. Test Reports: Furnish certified test reports from a qualified independent testing laboratory showing that aluminum-framed entrances and storefronts have been tested in accordance with specified test procedures and comply with specified performance characteristics. Where such testing has not been performed, test through an independent testing laboratory or agency and furnish certified test results.

E. LEED Submittals:
   1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.

1.4 WARRANTY

A. Furnish written warranty covering aluminum-framed entrances and storefronts that fail in materials or workmanship within 10-years from date of Substantial Completion. Failures include, but are not limited to structural failures including excessive deflection, excessive leakage or air infiltration, faulty operation, and deterioration of metals, metal finishes, and other materials beyond normal weathering.

B. Furnish written warranty covering aluminum finish against cracking, checking, blistering, peeling, flaking, chipping, chalking and fading, as defined, for 10-years following date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER & TYPES

A. Kawneer “ENCORE” (basis of design), or equal. Thermally broken extruded aluminum frames.
   1. Storefront: Nominal 2” x 4-1/2” sections, center glazed.

2. Operable windows: Awning type top hinged, 2” exposure frames, with screens.
3. Finishes:
   a. Storefront and Operable windows: Clear Bronze anodized aluminum.
4. Entrances: Wide (5-1/2”) stile & rail type, dual glazed lites, continuous geared type hinges (Roton, or equal). Automatic entrances at main entries shown on Drawings and 08 71 00 Hardware Schedule.

B. Hardware – see Section 08 71 00:
1. Comply with ESUHSD Shop Standards.
2. Bar type ADA operator controls at automatic entrances.
3. Surface mounted closers.
4. Premium pulls.
5. Standard push plates, weatherstippring, and ADA thresholds by door manufacturer.

C. Spandrel Panels:
1. Dow Corning Vacuum Insulation Panel, or equal, adhered to glass, white color, smooth finish. R-Value minimum R-30, approximately 1” thickness.

D. Infill Panels:
1. Mapes Architectural Panels, MapeShape, or equal.
2. Flush surface to exterior.
3. Glazed to standard 1” glazing pockets in storefront.
4. Color: “Champagne”

E. Brake Metal Trim (to be provided by Storefront supplier):
1. Thickness: 0.125 inch.
2. Shapes as shown on Drawings.
3. Color: “Champagne”.

2.2 MATERIALS

A. Aluminum Members: 6063-T5 alloy and temper.

B. Fasteners: Aluminum or Series 300 nonmagnetic stainless steel.

C. Do not use exposed fasteners except for application of hardware. For application of hardware, use Phillips flat-head machine screws countersunk flush that match the finish of member or hardware item being fastened.

D. Concealed Flashing: Dead-soft stainless steel or extruded aluminum as selected by manufacturer for compatibility with other components.

E. Brackets and Reinforcements: Aluminum or nonmagnetic stainless steel. Provide non-staining, non-ferrous shims for installation and alignment as required.

F. Weatherstripping: Manufacturer's standard replaceable type. Provide weatherstripping on meeting stiles of pairs of doors and at bottom rail of each door leaf.

G. Framing System Gaskets and Sealants: Manufacturer’s standard, recommended by manufacturer for joint type.

2.3 COMPONENTS

A. Framing Systems: Provide storefront and entrance framing systems fabricated from extruded aluminum members of size and profile indicated. Include sub-frames and other reinforcing members as required. Shop fabricate and preassemble frame components where possible. Provide frame sections without exposed seams. Provide compensating channels.

1. Mullion Configuration: Provide pockets at the inside glazing face to receive resilient elastomeric glazing. Mullions and horizontals shall be one piece. Make provisions to drain moisture accumulation to the exterior.

B. Stile-and-Rail Type Entrance Doors: Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and fillet welds.
1. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.
2. Design: 1-3/4-inch thick, 5-inch nominal vertical stiles, 6 1/2 -inch inch top rail, and minimum 10-inch bottom rail.
3. Each door leaf shall be equipped with an adjusting mechanism located in the top rail near the lock stile, which provides for minor clearance adjustments after installation.

C. Windows:
1. Window Type: Top hinged, project out complying with ANSI/AAMA/NWWDA 101/I.S.2-97 for a Class and Grade of C-HC40 – C-HC70.
2. The frame and ventilator corner construction shall consist of a mitered corner joint with an internal clip, sealed and mechanically staked.
3. The frame shall have a continuous primary weather seal of polyethylene clad urethane foam, the rainscreen weatherstripping shall be dual durometer Santoprene. Each corner shall be neatly mitered.
4. The frame and ventilator shall be factory fabricated and assembled.
5. Each vent shall be equipped with heavy-duty 4-bar stainless steel hinges conforming to AAMA 904.1 with a positive stop and adjustable friction shoe. Locking hardware, strikes, and keepers shall be cast white bronze.

2.4 FABRICATION

A. Fabricate systems to designs, sizes and thicknesses indicated, and to comply with specified standards.

B. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site. Disassemble components only where necessary for shipment and installation.
1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.
2. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.

C. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish.
1. Welding behind finished surfaces shall be performed to minimize distortion and discoloration on the finished surface.

D. Reinforcing: Install reinforcing as required for hardware, performance requirements, sag resistance and rigidity and to support mullion-mounted sunshades.

E. Dissimilar Metals: Separate dissimilar metals with bituminous paint, suitable sealant, elastomeric tape, or gasket between the surfaces. Do not use coatings containing lead.

F. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members.

G. Conceal fasteners wherever possible.

H. Weatherstripping: For exterior doors, provide compression weatherstripping against fixed stops. At other edges, provide sliding weatherstripping retained in adjustable strip mortised into door edge.

I. Provide miscellaneous aluminum brake metal closures and flashings as indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's instructions and recommendations for installation.

B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or panels. Install components in proper alignment and relation to established lines. Provide proper support and anchor securely in place

C. Installation Tolerances:
1. Variation from Plane: Do not exceed 1/8-inch in 12-feet of length or 1/4-inch in any total length.
2. Offset from Alignment: The maximum offset from true alignment between two identical members abutting end-to-end in line shall not exceed 1/16-inch.
3. Diagonal Measurements: The maximum difference in diagonal measurements shall not exceed 1/8-inch.
4. Offset at Corners: The maximum out-of-plane offset of framing at corners shall not exceed 1/32-inch.

D. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
1. Paint dissimilar metals where drainage from them passes over aluminum.
2. Paint aluminum surfaces in contact with mortar or concrete with alkali-resistant coating.
3. Paint wood and similar absorptive material in contact with aluminum and exposed to the elements or otherwise subjected to wetting, with 2-coats of aluminum house paint. Seal joints between the materials with sealant.

E. Drill and tap frames and doors and apply surface-mounted hardware in compliance with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

F. Set sill members and other members in bed of sealant, or use joint fillers or gaskets to provide weathertight construction. Comply with requirements of Section 07 92 00.

G. Where flashings are indicated adjacent to work specified in this Section, provide flashings in 0.040-inch aluminum unless otherwise indicated, finished to match entrances and storefronts.

H. Set miscellaneous brake shapes flush with hairline joints to adjacent storefront systems.

3.2 ADJUSTING

A. Adjust operating hardware to function properly for smooth operation without binding, and to prevent tight fit at contact points and weatherstripping.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing agency to perform specified testing.

B. Water Penetration: Test areas of installed storefront framing systems and operable window where directed by the District’s Representative for compliance with system performance requirements according to ASTM E1105 at minimum differential pressure of 20-percent of inward acting wind-load deign pressure, but not less than 6.24-lbf/sq. ft.

C. Air Infiltration Test: Conduct tests in accordance with ASTM E783. Allowable air infiltration shall not exceed 1.5 times the amount specified in the performance requirements.

D. Repair or remove work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

3.4 CLEANING

A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.

B. Clean glass surfaces after installation, complying with the requirements specified in Section 08 80 00. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.5 PROTECTION

A. Institute protective measures required throughout the remainder of the construction period to ensure that aluminum entrances and storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

B. Provide adhered, non-marring strippable plastic protection over all framing members at time of installation, prior to glazing.

END OF SECTION – 08 41 13

SECTION 08 41 23

FIRE RATED ALUMINUM FRAMED ENTRANCES AND STOREFRONTS-FIREFRAMES® ALUMINUM SERIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. Fire rated glazing and framing systems for installation as windows in interior openings

B. Related Sections:
1. Section 05 12 00 “Structural Steel:” Steel attachment members
2. Section 05 50 00 “Metal Fabrications:” Steel attachment members inserts and anchors
3. Section 07 84 00 “Firestopping:” Firestops between work of this section and other fire resistive assemblies.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA)
1. AAMA 2603-2002 Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
2. AAMA 2604 -2005 Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
3. AAMA 2605 -2005 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. American Society for Testing and Materials (ASTM):
1. Fire safety related:
a. ASTM E119: Methods for Fire Tests of Building Construction and Materials.

2. Material related
a. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2007.
b. ASTM A 1011/A 1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2006b.

C. American Welding Society (AWS)
1. AWS D1.3 - Structural Welding Code - Sheet Steel; 2007

D. Builders Hardware Manufacturers Association, Inc.
1. BHMA A156 - American National Standards for door hardware; 2006 (ANSI/BHMA A156).

E. National Fire Protection Association (NFPA):
1. NFPA 80: Fire Doors and Windows.
2. NFPA 251: Fire Tests of Building Construction & Materials
3. NFPA 252: Fire Tests of Door Assemblies
4. NFPA 257: Fire Test of Window Assemblies

F. Underwriters Laboratories, Inc. (UL):
1. UL 9: Fire Tests of Window Assemblies.
2. UL 10 B: Fire Tests of Door Assemblies
3. UL 10 C: Positive Pressure Fire Tests of Window & Door Assemblies
4. UL 263: Fire tests of Building Construction and Materials

5. UL-752 Ratings of Bullet-Resistant Materials

G. American National Standards Institute (ANSI):
1. ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings

H. Consumer Product Safety Commission (CPSC):
1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials

I. American Society of Civil Engineers (ASCE)
1. ASCE 7 – Minimum Design Loads for Buildings and Other Structures; 2005

1.3 DEFINITIONS

A. Manufacturer: A firm that produces primary glass, fabricated glass or framing as defined in referenced glazing publications.

1.4 SUBMITTALS

A. Product Data:
1. Technical Information: Submit latest edition of manufacturer's product data providing product descriptions, technical data, Underwriters Laboratories, Inc. listings and installation instructions.

B. Shop Drawings:
1. Include plans, elevations and details of product showing component dimensions; framing opening requirements, dimensions, tolerances, and attachment to structure
2. Provide templates for the location of embeds and anchor locations required for any adjoining work (if applicable).

C. Samples. For following products:
1. Glass sample-as provided by manufacturer
2. Sample of frame
3. Verification of sample of selected finish

D. Glazing Schedule: Use same designations indicated on drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

E. Warranties: Submit manufacturer's warranty.

F. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements.
1. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualifications according to
1. International Accreditation Service for a Type A Third-Party Inspection Body (Field Services ICC-ES Third-Party Inspections Standard Operating Procedures, 00-BL-S0400 and S0401)
2. International Accreditation Service for Testing Body-Building Materials and Systems
a. Fire Testing
1) ASTM Standards E 119
2) CPSC Standards 16 CFR 1201
3) NFPA Standards 251, 252, 257

4) UL Standards 9, 10B, 10C, 1784, UL Subject 63
5) BS 476; Part 22: 1987
6) EN 1634-1

B. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 257 and UL 9.

C. Fire-Rated Wall Assemblies: Assemblies complying with ASTM E119 that are classified and labeled by UL, for fire ratings indicated, based on testing in accordance with UL 263, ASTM E119.

D. Listings and Labels - Fire Rated Assemblies: Under current follow-up service by Underwriters Laboratories® maintaining a current listing or certification. Label assemblies' accordance with limits of manufacturer's listing.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle under provisions specified by manufacturer.

1.7 PROJECT CONDITIONS

A. Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner coordinate planned measurements with the work of other sections.
1. Note whether field or planned dimensions were used in the creation of the shop drawings.

B. Coordinate the work of this section with others effected including but not limited to: other interior components and door hardware beyond that provided by this section

1.8 WARRANTY

A. Provide the Pilkington Pyrostop® and Fireframes® standard five-year manufacturer warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - (ACCEPTABLE MANUFACTURERS/PRODUCTS]

A. Manufacturer Glazing Material: "Pilkington Pyrostop®" fire-rated glazing as manufactured by the Pilkington Group and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 (800-426-0279) fax (800-451-9857) e-mail sales@fireglass.com, web site http://www.fireglass.com

B. Frame System: "Fireframes® Aluminum Series" fire-rated frame system as manufactured and supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 (800-426-0279) fax (800-451-9857) e-mail sales@fireglass.com web site http://www.fireglass.com

C. Substitutions: Substitutions for Glazing Material and Frame System not permitted.

2.2 PERFORMANCE REQUIREMENTS

A. System Description:
1. Steel fire-rated glazed wall and/or window system, dual aluminum cover cap format
a. Face widths available:
1) 2"
2) Custom extruded aluminum cover caps
3) Custom stainless steel cover caps
b. Duration – Windows Capable of providing a fire rating for 120 minutes.

c. Duration – Walls: Capable of providing a fire rating for 120 minutes.

B. Delegated design: For the performance requirements listed below requiring structural design provide data, calculations and drawings signed and sealed by an engineer licensed in the state where the project is located.

C. Design Requirements
1. Design and size the system to withstand structural forces placed upon it without damage or permanent set when tested in accordance with ASTM E330 using load 1.5 times the design wind loads and of 10 seconds in duration at +/- 10 PSF.

2.3 MATERIALS - GLASS

A. Low-E Coated glass for use in insulated exterior units See Section 08 80 00

B. Fire Rated Glazing: Composed of multiple sheets of clear high visible light transmission glass laminated with an intumescent interlayer.

C. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201(Cat. I and II).

D. Properties Interior Glazing

Property	
Fire Rating	120 minute
Manufacturer's designation	120-106
Glazing type	IGU
Nominal Thickness	2-1/4" (57mm)
Weight in lbs/sf	22.9
Daylight Transmission	75%
Sound Transmission Coefficient	46dB

E. Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacture, testing laboratory (UL), fire rating period, safety glazing standards, and date of manufacture.

F. Glazing Accessories: Manufacturer's standard compression gaskets, standoff, spacers, setting blocks and other accessories necessary for a complete installation.

2.4 MATERIALS –ALUMINUM FRAMES

A. Aluminum Framing System 120 min.
1. Steel Frame — The steel framing members are made of two halves, nom. 1.9 in. wide (48.3 mm) with a nom. minimum depth of 1.38 in. (35 mm) with lengths cut according to glazing size.
2. Aluminum Trim — Supplied with the steel framing members. Nom. 2 in. (50.8 mm) wide with a nom. depth of 1.54 in. (39 mm) with lengths cut according to glazing size.
3. Stainless Steel Standoffs — Supplied with the steel framing members. Nom 5/16 in. (8 mm) diameter with a nom. minimum depth of 1 1/8 in. (28 mm) with depth adjusted to match Pilkington Pyrostop® Panel thickness.
4. Stainless Steel Moment and Connecting Braces: — Supplied with the steel framing members. Nom 3/8 in. (10 mm) thick with a nom. minimum depth of 1 1/8 in. (28 mm) with depth adjusted to match Pilkington Pyrostop® Panel thickness.
5. Framing Member Fasteners — Supplied with the steel framing members. Screws are M6 x16mm Button Head Socket Cap Screws for frame assembly and #6 x 1" Pan Head Sheet Metal Screws for door installation.

6. Glazing Gasket — Supplied with the steel framing members. Nom. 3/4 in. (19 mm) by 3/16 in. (4.5 mm) black applied to the steel framing members to cushion and seal the glazing material when installed.

2.5 FABRICATION

A. Obtain reviewed shop drawings prior to fabrication.

B. Fabrication Dimensions: Fabricate fire-rated assembly to field dimensions.

C. Factory prepared, fire-rated steel door assemblies by TGP to be prehung, prefinished with hardware preinstalled for field mounting.

D. Field glaze door and frame assemblies.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish frames after assembly.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

2.7 FINISHES

A. Anodized Finishes
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
3. Color: Match Kawneer “Champagne”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Examine substrates and members to which the work of this section attaches or adjoins prior to frame installation are acceptable for product installation in accordance with manufacturer’s instructions. Provide openings plumb, square and within allowable tolerances. The manufacturer recommends 3/8 inch shim space at all walls

B. Notify Architect of any conditions which jeopardize the integrity of the proposed fire wall / door system.

C. Do not proceed until such conditions are corrected.

3.2 INSTALLATION

A. See Fireframes Aluminum Series Installation Manual

3.3 REPAIR AND TOUCH UP

A. Anodized Finishes
   1. Protect the anodized finish from harsh chemicals such as concrete/mortar or muriatic acid/brick wash. If reasonable care is taken during handling and high and low pH chemicals can be avoided, repair and/or touch-up of an anodize finish will not be needed.
   2. Some rub marks on an anodized surface can be removed with a mild abrasive pad such as a Scotch-Brite pad prior to touch up painting.
   3. Touch-up paint should be used even more sparingly over anodize. Only the visible raw aluminum in the scratch or gouge should be touched up with a matching paint.

B. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged.

3.4 PROTECTION AND CLEANING

A. Protect 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.
   1. Do not clean with astringent cleaners. Use a clean “grit free” cloth and a small amount of mild soap and water or mild detergent.
   2. Do not use any of the following:
      a. Steam jets
      b. Abrasives
      c. Strong acidic or alkaline detergents, or surface-reactive agents
      d. Detergents not recommended in writing by the manufacturer
      e. Do not use any detergent above 77 degrees F
      f. Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.
      g. Metal or hard parts of cleaning equipment must not touch the glass surface

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION 08 41 23

SECTION 08 56 59

ALUMINUM CASHIER WINDOW

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes:
1. Aluminum cashier windows as indicated in drawings and in sections.

1.2 SUBMITTALS

A. Product Data: Submit Manufacturer's technical product data substantiating that products comply.

B. Shop Drawings: Submit for fabrication and installation of windows. Include details, elevations and installation requirement of finish hardware and cleaning.

C. Certification: Provide printed data in sufficient detail to indicate compliance with the contract documents.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver windows crated to provide protection during transit and job storage.

B. Inspect windows upon delivery for damage. Unless minor defects can be made to meet the Architect's specifications and satisfaction, damaged parts should be removed and replaced.

C. Store windows at building site under cover in dry location.

1.4 PROJECT CONDITIONS

A. Field measurements: Check opening by accurate field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

1.5 WARRANTY

A. All material and workmanship shall be warranted against defects for a period of one (1) year from the original date of purchase.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER'S

A. Basis of Design: Design is based on Aluminum Cashier Window, catalog number SCW103N, manufactured by C.R. Laurence Co., Inc. (800) 421-6411.

2.2 MATERIALS

A. Frames: Aluminum cashier window frame to be 1.390" x .625" extruded aluminum. Overall frame size to be 30" W x 32" H (includes 2" H stainless steel shelf).

B. Finish: To match Kawneer "champagne".

C. Glazing: 1/4 inch clear tempered glass.

D. Shelf: Provide a shelf not less than 2 inches thick with recessed deal tray. The shelf is to be the full width of the window and 18 inches deep centered under the glazing.

E. Voice Transmission: Communication permitted by 834A no draft speak-thru centered in glazing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install frames and glazing in accordance with manufacturer's printed instructions and recommendations. Repair damaged units as directed (if approved by the manufacturer and the architect) or replace with new units.

3.2 CLEANING

A. Clean frame glazing surfaces after installation, complying with requirements contained in manufacturer's instructions. Remove excess glazing sealant compounds, dirt or other substances.

3.3 PROTECTION

A. Institute protective measures required throughout the remainder of the construction period to ensure that all the windows do not incur any damage or deterioration, other than normal weathering, at the time of acceptance.

END OF SECTION – 08 56 59

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install all necessary architectural finish hardware meeting or exceeding University of California Davis Facility Standards, except those items specifically mentioned to be furnished elsewhere.

B. Wherever items of architectural finish hardware are not definitely specified and are required for proper completion and/or operation of the work, or some item of hardware may no longer be available, such architectural finish hardware shall be furnished in type, quality and finish suitable for the service required and comparable to those specified for similar conditions, and the University's Representative shall be so notified immediately.

C. Performance Requirements
   1. Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware.
   2. All hardware shall be manufactured to template.

D. Related Sections:
   1. Hollow metal doors and frames are specified in Section 08 11 13.
   2. Prefinished steel frames are specified in Section 08 11 16.
   3. Flush wood doors are specified in Section 08 14 16.
   4. Aluminum-framed entrances and storefronts are specified in Section 08 41 13.

1.2 SUBMITTALS

A. Hardware Schedule: Prepare complete schedule of finish hardware for review by the University's Representative. Reference items clearly to groups specified, door-type designations shown, location, and other pertinent data. Verify suitability, function, thickness of members, or other factors affecting appropriate selection. List manufacturers' names or suitable abbreviation to facilitate reviewing, opposite each item scheduled.

B. List only readily obtainable hardware that appears in current catalogs, and furnish catalog cuts of each different type of hardware included in schedule.
   1. Include the following information:
      a. Type, style, function, size and finish of each hardware item.

b. Name, part number and manufacturer of each item.
c. Fastenings and other pertinent information.
d. Explanation of abbreviations, symbols and codes contained in schedule.
e. Door and frame sizes and materials.
f. List of manufacturers used and their nearest representative with address and phone number.

C. Product Data: Submit product data on specified hardware. Indicate locations and mounting heights of each type of hardware.

D. Keying Schedule: Submit separate detailed schedule indicating clearly how the University's Representative final instructions on keying of locks has been fulfilled.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements
1. Conform to CBC for requirements applicable to fire rated doors and frames, and to exit doors.
2. Comply with all applicable requirements of National Fire Protection Association Standard 80, "Fire Doors and Windows," and Standard 101, "Life Safety Code" and the Underwriters' Laboratories for fire-rated openings. If automatic self-latching bolts, coordinators, gasketing, and astragals are required to meet the Standard, they shall be provided.
3. Conform to ADA and CBC for requirements for accessibility by disabled persons.

B. Source Limitations: Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver key blanks to manufacturer of key control system for subsequent delivery to University.

1.5 COORDINATION

A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fails in materials or workmanship within specified warranty period.

B. Warranty Period: Two years from date of Substantial Completion, except as follows:
1. Exit Devices: Three years from date of Substantial Completion.
2. Manual Closers: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS
PART 3 -
3.1 HINGES, GENERAL

A. Template Requirements: Provide only template-produced units.

A. Hinge Base Metal: Stainless steel, with stainless-steel pin.

B. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; required for all outswinging exterior doors.

C. Fasteners: Comply with the following:
1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
3. Screws: Phillips flat-head. Finish screw heads to match surface of hinges.

3.2 HINGES

A. Manufacturers:
1. Bommer Industries, Inc. (BI).
2. Hager Companies (HAG).
3. Lawrence Brothers, Inc. (LB).
4. McKinney Products Company; an ASSA ABLOY Group company (MCK).

5. Or equal.

B. Hinges: Door butts shall be stainless steel with stainless steel hinge pins. All doors to have non-rising pins.
   1. Hinges shall be sized in accordance with the following:
      a. Height:
         1) Doors up to 41 Inches Wide: 4-1/2 inches.
         2) Doors 42” to 48 Inches Wide: 5 inches.
         3) Doors over 48 Inches Wide: 6 inches.
      b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
      c. Number of Hinges: Furnish 3 hinges per leaf to 7’-5” in height. Add 1 for each additional 2 feet in height.
   2. Type: Ball-bearing throughout.

3.3 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 pounds.

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 5 pounds to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors.

D. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

E. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing. ANSI 4-7/8- inch strikes shall be used for all cylindrical and mortise locks. Locks, latches, and deadlocks shall have wrought boxes.

3.4 MECHANICAL LOCKS AND LATCHES

A. Heavy Duty Mortise Locks and Latches
   1. Schlage, L9000 Series, L06 lever trim both sides, F keyway, 6-pin tumbler.
      a. Finished cylinders and keying system are University Furnished, University Installed Medeco lock cylinders.
      b. Provide construction cores and keys only on doors where security is required during construction.

c. Ensure that locksets will easily accept cylinders with no extra effort or modification.

2. All locksets shall have multiple functions within 1 case (9050, 9060, 9070, 9080). Locksets shall be reversible without opening the lock case. All locksets shall have lever handles, and shall operate in both the up and down directions. All locksets shall be able to change lock function by changing the lock cylinder tailpiece.
3. Chassis: Mortise design, corrosion-resistant plated cold-rolled steel.
4. Locking Spindle: Stainless steel, interlocking design.
5. Latch Retractors: Forged steel. Balance of inner parts: Corrosion-resistant plated steel, or stainless steel.
6. Springs: Full compression type.

B. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4-inch diameter steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller. Strike alloy deadbolt with reinforcer and two 3 inch long screws. ANSI A156.5, 1992 Grade 1 certified.

3.5 KEYLESS ENTRIES

A. Proximity Readers: Allegion MT15, or equal.

B. Keypads: Allegion MTK15, or equal.

C. Locksets: Electronically unlocked.

D. Exit Devices: EL function.

E. Provide Power supplies, transfers, and all ancillary items as required for functions specified.

3.6 EXIT DEVICES

A. Provide rim devices with keyed removable mullions at double doors.
1. Exception: Interior storage room & closet pairs, and 2-way exit cross corridor doors where shown on drawings.

B. Basis of Design:
1. Von Duprin Series AX98, or equal is the standard of quality. All devices shall be ANSI A156.3, 2001, Grade 1.certified and have a 3-year manufacturers warranty. Stainless steel or plated finish as specified; aluminum or brass are not acceptable. Moving parts made of die-cast pot or white metals are also not acceptable. All devices shall use durable compression spring design. Devices, latches, trim or controls, incorporating tension springs are not acceptable. Lever trim shall be of wrought construction and designed with a breakaway feature, intended to minimize repair costs due to damage from vandalism. Exit devices shall incorporate a dampener type mechanism to decelerate the pushbar on its return stroke eliminating noise associated with the devices operation.

C. Accessibility Requirements: Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22 N).

1. Ives 8190 12” offset pulls at all exterior devices.

D. Comply with NFPA 101. Exit devices shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

E. Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

F. Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

G. Provide devices with cylinder dogging

3.7 LOCK CYLINDERS & KEYING

A. Finish cylinders and Keying: University furnished and installed. Contractor shall verify that doors will easily accept cylinders with no extra effort or modification.

B. Construction cylinders: Provide only on doors where security is necessary during construction.

3.8 KNOX BOXES

A. Provide 3200 series recessed at locations shown on drawings, exit plan A0.1.

3.9 CLOSERS

A. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.

B. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16-inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.

C. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16 inch steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.

D. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.

E. Closers shall be installed to permit doors to swing 180 degrees.

F. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.

G. Head Rail 6-1/2”, no drop bars.

H. Maximum effort to operated doors shall not exceed 8.5 lbs. for exterior doors and 5 lbs. for interior doors, such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the door may be increased not to exceed 15 lbs.

I. Closer shall utilize full complement bearing at shaft to provide greatest load carrying capabilities of the shaft. Pinion and pistons shall be hardened regardless of size, to provide durable wearing surfaces. Closers shall be hand specific for each application; universal type closers are not acceptable. Concealed head and floor closers are not acceptable. Closers utilizing pressure relief valves are not acceptable.

J. Manufacturers:
   1. LCN is Basis of Design.
   2. Or equal.

3.10 AUTOMATIC ENTRANCE DOORS

A. Operators
   1. Switch activates the door to open and to close after the time delay expires. Provide infinite adjustments to the opening and backcheck speeds.
      a. Opening and closing speed: 4 - 6 seconds.
      b. Opening force:
         1) Measured 1 inch out from the lock stile or the door, not to exceed 15 pounds in either direction. Adjustable without affecting the opening speed.
         2) Adjustable closing time delay: 2 - 30 seconds.
   2. Automatic reverse if an object stops the door. Master control unit must provide immediate reversal of door motion without undue strain on the drive train by providing stepped voltage to the motor.
   3. Capable of operation without damage to the operator as an automatic or manually operated door.
   4. Rough-in and wire for optional key card entry system.
   5. Provide a locked door motor protection circuit that will shut off current to the exterior push pads when the door is locked or otherwise prevented from opening.
   6. Manufacturer: Horton 4800 & 7100 series, LCN 9540, or equal.
   7. Surface mount all operators. On double doors the operator housing must span across the entire opening, and only one door of each pair is to be automated.

B. Push Bar Actuators
   1. Provide interior and exterior 36” bar type actuators. Both upper body and foot control shall activate the door.
   2. Provide Campus master keyed switch to shut off power to the outside push bars after normal hours of operation, Locknetics 653-14-L2 (no known equal).
   3. Wikk Industries, Inc. Ingress’R model I36-3, clear anodized, or equal.
      a. Hardwired connection.
      b. Bollard BPS SM-IG-INGR-48-CL with prep for Card Reader at Lobby Main entrance.
      c. Wall mounted at restroom 1106/1108 and Classroom Main entrance

3.11 STOP
PART 4 -

A. Manufacturers:
   1. Basis of Design: Trimco (TBM).
   2. Other manufacturers that may be acceptable:
      a. IVES Hardware; an Ingersoll-Rand Company (IVS).
      b. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).
      c. Or equal.

B. Provide floor type with appropriate fasteners, no further than 4” from wall. Where floor type cannot be used, provide overhead type.

C. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
   1. Basis of Design for overhead stops: Glynn Johnson.

4.2 DOOR GASKETING

A. Manufacturers:
   1. Pemko Manufacturing Co. (PEM).
   2. Reese Enterprises (RE).
   3. Zero International (ZRO).
   4. Or equal.

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
   1. Compression bulb type gasketing will not be acceptable.
   2. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
   3. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
   4. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

E. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

4.3 THRESHOLDS

A. Manufacturers:
   1. Pemko Manufacturing Co. (PEM).
   2. Reese Enterprises (RE).
   3. Zero International (ZRO).
   4. Or equal.

B. Accessibility Requirements: Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.

C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch (13 mm) high.

D. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant.

E. Use 1/4-inch fasteners, red-head flat-head sleeve anchors.

F. Seals: Sponge silicone gasketing to meet ASTM E 283-1984 test standards. Provide silicone gasket at all rated and exterior doors.

G. Provide thresholds at all exterior doors and where indicated on schedule.

4.4 FABRICATION

A. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

B. Fasteners
1. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
2. Screws for butt hinges shall be flathead, countersunk, full-thread type.
3. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
4. Provide expansion anchors for attaching hardware items to concrete or masonry.
5. All exposed fasteners shall have a phillips head.
6. Finish of exposed screws to match surface finish of hardware or other adjacent work.
7. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

C. Finishes:
1. Satin chromium US26D or brushed stainless steel US32D.
2. Door closers shall be powder-coated (689) to match other hardware.
3. Aluminum items to be finished anodized aluminum US28 (628), except thresholds which can be furnished as standard mill finish.

PART 5 - EXECUTION

5.1 INSTALLATION

A. Steel Doors and Frames: Comply with DHI A115 Series. Drill and tap doors and frames for surface-applied door hardware according to ANSI A250.6.

B. Wood Doors: Comply with DHI A115-W Series.

C. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
   3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

E. Sound rated gasketing: Provide a sound seal to the head and jamb of Sound Rated Doors. It may be applied directly to head or jamb or to the doorstop. If application of seal is to be on doorstop, where door hardware prevents the use of a continuous seal along the face of the stop, place a rubber seal in the corner of the jamb or head where it meets the stop.
   1. It is vital that the door compress the seal. Install the seals and adjust such that there is compression of the seals around the complete perimeter. If rubber seals are used in the corners between the jamb and stop, install in such a manner that will cause at least 30% compression when door is closed.

F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with University Representative.
   1. Configuration: Provide one power supply for each door opening.
   2. Configuration: Provide the least number of power supplies required to adequately serve doors with electrified door hardware.

G. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
   1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

5.2 DOOR HARDWARE SETS

A. Exterior Aluminum Doors

1. Main Entrance – Automatic leaf 1100.03 & 1300

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Cont Hinge	Storefront mfg	#14 Clear
1	Exit Device	EL98-NL-EO	Von Duprin	US26D
1	Pull	8190-12” offset	Ives	US26D
1	Operator	4800LE	Horton	PC – Alum
1	Power Supply	PS-873-AO-2	Von Duprin	Mfg standard
1	Junction Box	JB7	Von Duprin	Mfg standard
1	Power Transfer	EPT-10	Von Duprin	Mfg standard
1	Proximity Reader	Mount on bollard		
2	Push Bar	Ingress’R model l36-3	Wikk Industries	Clear Anod
2	Bollard (1100.03)	BPSSM-IG-INGR-48-CL	Wikk Industries	Clear Anod
1	Head and jamb seals	Pile	Pemko	Black
1	Door Bottom	234	Pemko	A (mill alum)
1	Threshold	Standard ADA	Pemko	A (mill alum)
1	Removable mullion	KR 4954	Von Duprin	Paint
1	Sweep	345	Pemko	A (mill alum)
*	Number of hinges, as specified.			

2. Main Entrance – Manual leaf 1100.03 & 1300

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Cont Hinge	Storefront mfg	#14 Clear
1	Exit Device	CD98-NL-OP	Von Duprin	US26D
1	Pull	6605	FSB	SS
1	Cylinder		Schlage	
1	Closing Device	4110-3049EDA	LCN	PC – Alum
1	Head and jamb seals	Pile	Pemko	Black
1	Door Bottom	234	Pemko	A (mill alum)
1	Threshold	Standard ADA	Pemko	A (mill alum)
1	Sweep	345	Pemko	A (mill alum)
*	Number of hinges, as specified.			

3. Commons & Multipurpose Pairs 1100.04, 1100.05, 1310.01, 1310.02, 1310.05, & Northeast Stair Exit, 1S2.01

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Cont Hinge	Storefront mfg	#14 Clear
1	Exit Device (active)	CD98-NL-OP	Von Duprin	US26D
1	Exit Device (inactive)	CD98-EO	Von Duprin	US26D
2	Pulls	6605	FSB	SS
2	Closing Device	4110-3049EDA	LCN	PC – Alum
1	Head and jamb seals	Pile	Storefront mfg	Black
2	Door Bottom	234	Pemko	A (mill alum)
1	Threshold	Standard ADA	Storefront mfg	A (mill alum)
1	Removable mullion	KR 4954	Von Duprin	Paint
2	Sweep	345	Pemko	A (mill alum)
*	Number of hinges, as specified.			

4. Classroom Courtyard & Courtyard Entrance 1100.01, 1211.02, 1215.02

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Cont Hinge	Storefront mfg	#14 Clear
1	Exit Device	EL98-NL-OP (1100.01)	Von Duprin	US26D
1	Exit Device	CD98-NL-OP	Von Duprin	US26D
1	Pull	6605	FSB	SS
1	Closing Device	4110-3049EDA	LCN	PC - Alum
1	Proximity Reader	Mount on wall	Door 1100.01 only	
1	Head and jamb seals	Pile	Storefront mfg	Black
1	Door Bottom	234	Pemko	A (mill alum)
1	Threshold	Standard ADA	Storefront mfg	A (mill alum)
1	Sweep	345	Pemko	A (mill alum)
*	Number of hinges, as specified.			

5. Roof Access 3100.01

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Cont Hinge	Storefront mfg	#14 Clear
1	Lockset (active)	L9080	Schlage	US26D
1	Flushbolt (inactive)	FB458	Ives	US32D
2	Stops and Holders	70H	Glynn Johnson	US26D
1	Head and jamb seals	S44	Pemko	Black
1	Astragal	357	Pemko	SP (paint)
2	Door sweep	234	Pemko	A (mill alum)
1	Threshold	271	Pemko	A (mill alum)
2	Sweep	345	Pemko	A (mill alum)
*	Number of hinges, as specified.			

B. Exterior Steel Doors

1. South Entry 1100.07 and Upper Floor Exits 2200, 2100.03, 3401, 3100.02

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Hinges	ANSI A5112	US32D
1	Exit Device	98-L-06-F	Von Duprin	US26D
1	Exit Device	EL98-NL-OP	Door 1100.07	
1	Pull	6605	FSB	SS
1	Exit Device	98-L-06-F-2	Doors 3100.02 & 3401	
1	Closing Device	4110-3049EDA	LCN	PC – Alum
1	Proximity Reader	Mount on wall	Door 1100.07 only	
1	Head and jamb seals	Pile	Pemko	Black
1	Door Bottom	234	Pemko	A (mill alum)
1	Threshold	Standard ADA	Pemko	A (mill alum)
1	Sweep	345	Pemko	A (mill alum)
*	Number of hinges, as specified.			

2. Northwest Exit Pair 1100

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Hinges	ANSI A5112	US32D
2	Exit Device	98-L-06-F	Von Duprin	US26D

2	Closing Device	4110-3049EDA	LCN	PC – Alum
1	Head and jamb seals	Pile	Pemko	Black
1	Door Bottom	234	Pemko	A (mill alum)
1	Threshold	Standard ADA	Pemko	A (mill alum)
1	Removable mullion	KR 4954	Von Duprin	Paint
1	Sweep	345	Pemko	A (mill alum)
*	Number of hinges, as specified.			

3. Mechanical Pair 1198

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Hinges	ANSI A5112	US32D
1	Lockset (active)	L9080	Schlage	US26D
1	Flushbolt (inactive)	FB458	Ives	US32D
1	Stops and Holders (inactive)	70H	Glynn Johnson	US26D
1	Closer (active)	4111 HEDA	LCN	PC Alum
1	Head and jamb seals	S44	Pemko	Black
1	Astragal	357	Pemko	SP (paint)
2	Door sweep	234	Pemko	A (mill alum)
1	Threshold	271	Pemko	A (mill alum)
2	Sweep	345	Pemko	A (mill alum)
*	Number of hinges, as specified.			

4. Electrical 1199, Pantry 1310.09

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	Hinges	ANSI A5112	US32D
1	Lockset	L9080 (1310.09)	Schlage	US26D
1	Exit Device	98-L-06 (1199)	Von Duprin	US26D
1	Closer	4111 HEDA	LCN	PC Alum
1	Head and jamb seals	S44	Pemko	Black
1	Door sweep	234	Pemko	A (mill alum)
1	Threshold	271	Pemko	A (mill alum)
1	Sweep	345	Pemko	A (mill alum)
*	Number of hinges, as specified.			

5. Northeast Gate, 1401 & Stair access Gate, 3402

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Exit Device	98-L-06	Von Duprin	US26D
2	Gate Closer	4011	LCN	PC Alum
All items suitable for exterior application				
*	Number of hinges, as specified.			

6. Northwest Stair Gate (pair), 1S1

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
2	Exit Device	98-E0	Von Duprin	US26D
2	Gate Closer	4011	LCN	PC Alum

All items suitable for exterior application				
*	Number of hinges, as specified.			

C. Interior Wood Fire Doors

1. Suite Entrance 1120.01, 1130.01

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Exit Device	EL98-L-06	Von Duprin	US26D
1	Closing Device	4110-3049EDA	LCN	PC – Alum
1	Keypad	Mount on wall		
1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

2. Multipurpose Room Pairs 1310.06, 1310.07, 1310.10

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
2	Lockset	L9060	Schlage	US26D
2	Exit Device	98-L-06-F (11310.06)	Von Duprin	US26D
2	Closing Device	4110-3049EDA	LCN	PC Alum
1	Magnetic Holder	SEM 7850	LCN	PC Alum
1	Head and jamb seals	S44	Pemko	Black
4	Protective Trim	Kick Plates KOO38	Trimco	SS
1	Removable mullion	KR 4954	Von Duprin	Paint
Door Operation: Doors normally in open position. Magnetic Holder linked to Fire Alarm.				
*	Number of hinges, as specified.			

3. Cross Corridor Pairs 1100.02, 2100.01 (Double Exit Frame)

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
2	Exit Device	9847-EO-F	Von Duprin	US26D
2	Closing Device	4110-3049EDA	LCN	PC – Alum
2	Magnetic Holder	SEM 7850	LCN	PC - Alum
1	Head and jamb seals	S44	Pemko	Black
Door Operation: Doors normally in open position. Magnetic Holder linked to Fire Alarm. When doors are in closed position, operation sends internal notice to Control PC alerting door was operated. Coordinate this control and alarm with UCD.				
*	Number of hinges, as specified.			

4. Classroom Entrance 1211.01, 1213, 1215.01

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Exit Device	98-L-06-F	Von Duprin	US26D
1	Closing Device	4110-3049EDA	LCN	PC Alum

1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

5. Exit Stair 1S2.02, 2S2, 3S3, Cross Corridor single 1100.06, 2100.02

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Exit Device	98-L-06-F	Von Duprin	US26D
1	Magnetic Lock	Locknetics 2280	Door 3S3	PC-Alum
1	Keyswitch	Allegion 653-14-L2	Door 3S3	Satin Chrome
Locate Keyswitch at First Floor Stair 3 on north wall immediately before entering stair. Provide signage: "3rd FLOOR DOOR OVER-RIDE".				
1	Closing Device	4110-3049EDA	LCN	PC Alum
1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

6. Suite Entrance 2120.01, 2120.02, 2126.01, 2130.02

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080PEU	Schlage	US26D
1	Closing Device	4110-3049EDA	LCN	PC Alum
1	Proximity Reader	Mount on wall		
1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

7. Office 2130.03, 2130.05, Catering Kitchen 1111.02

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9050	Schlage	US26D
1	Closing Device	4110-3049EDA	LCN	PC Alum
1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

8. Elevator Machine Room 1140, Storage 2109

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080	Schlage	US26D
1	Closing Device	4110-3049EDA	LCN	PC Alum
1	Head and Jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

D. Interior Wood non-rated Doors
1. Suite Entrance Pair 3140.01 double exit, fire release

No.	Item	Description	Manufacturer	Finish

*	Hanging Devices	A5112	ANSI/BHMA	US32D
2	Exit Device	98-L-BE-06-F	Von Duprin	US26D
2	Closing Device	4110-3049EDA	LCN	PC – Alum
1	Head and jamb seals	S44	Pemko	Black
1	Fixed center mullion		Hollow Metal	Paint
*	Number of hinges, as specified.			

2. Medium & Large Conference Rooms 2119, 3119.01, 3119.02, Surge 3120.01, 3120.02, Suite/Workstation Entrance 1150.01, 2130.01, 2150.01, 2150.02, Media Resources 2213.01, 2213.02

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Exit Device	EL98-L-06	Von Duprin	US26D
1	Closing Device	4110-3049EDA	LCN	PC – Alum
1	Proximity Reader	Mount on wall	Except 2213.02	
1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

3. Conference Pair 3130.01

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080PEU	Schlage	US26D
	Proximity Reader	Mount on wall		
1	Auto Flush Bolt	FB40 Series	Glynn-Johnson	US26D
1	Floor Stop w/ Holder	1257M	Trimco	SS
1	Coordinator	COR x FB	Glynn-Johnson	PC Alum
1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

4.

4A. Offices / Advice, 1120.02, 1120.04, 1120.05 1120.08, 1130.02, 1130.03, 1130.04, 1130.05, 1130.06, 1130.07, 1150.02, 1150.05, 2120.03, 2120.04, 2120.05, 2120.06, 2120.07, 2126.02, 2130.08, 2130.09, 2130.10, 2130.11, 2130.12, 2150.04, 2150.06, Quiet 1217

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9050	Schlage	US26D
1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

4B. Offices / Advice, 3140.02, 3140.03, 3140.04, 3140.05, 3140.06, 3140.08, 3140.09, 3140.10, 3140.11, 3140.12, 3140.13, 3140.14, 3140.15, 3140.16, 3140.17

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080PEU	Schlage	US26D
1	Proximity Reader	Mount on wall		
1	Head and jamb seals	S44	Pemko	Black

*	Number of hinges, as specified.			

5. Computer Labs 2202, 2205, 2207

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080PEU	Schlage	US26D
1	Keypad	Mount on Jamb	Alarm – coordinate with UCD	
1	Closing Device	4110-3049EDA	LCN	PC Alum
1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

6. Classrooms 1204, 1206, 1208, 1210, 1212, 1214, 2204, 2206, 2208, 2210

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9060	Schlage	US26D
1	Closing Device	4110-3049EDA	LCN	PC Alum
1	Head and jamb seals	S44	Pemko	Black
*	Number of hinges, as specified.			

7. Restrooms 1106, 1108 automatic entry

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Operator	7100	Horton	PC – Alum
1	Junction Box	JB7	Von Duprin	Mfg standard
4	Push Bar	I36-3	Wikk Industries, Inc.	ADA
2	Protective Trim Units	Kick Plates KOO38	Trimco	SS
1	Push Plate	1001-3	Trimco	SS
1	Pull	1017-3B	Trimco	SS
*	Number of hinges, as specified.			

8. Restrooms 1301, 1305, 2102, 2104, 2209, 2211, 3104, 3106

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Closing Devices	4110-3049EDA	LCN	PC - Alum
2	Protective Trim Units	Kick Plates KOO38	Trimco	SS
1	Push Plate	1001-3	Trimco	SS
1	Mop Plate	KM050	Trimco	SS
1	Pull	1017-3B	Trimco	SS
*	Number of hinges, as specified.			

9. Shower & Family Restroom 1102, 1302

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9496	Schlage	US26D

1	Closing Devices	4110-3049EDA	LCN	PC - Alum
2	Protective Trim Units	Kick Plates KOO38	Trimco	SS
*	Number of hinges, as specified.			

10. MDF/BDF/IDF 1160, 2140, 3140.07, Electrical Rooms 2160, 3140.20

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080	Schlage	US26D
*	Number of hinges, as specified.			

11. Breakrooms, 1109, 2103, 3110, Catering Kitchen 1111.01

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080PEU	Schlage	US26D
1	Closing Device	4110-3049EDA	LCN	PC Alum
1	Keypad	Mount on jamb		
*	Number of hinges, as specified.			

12. Janitor 1104, 1303, 2107, 3102

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080	Schlage	US26D
1	Closing Device	4110-3049EDA	LCN	PC Alum
*	Number of hinges, as specified.			

13. Lactation 2105

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9496	Schlage	US26D
1	Keypad	Mount on wall		
1	Electric Strike	6200	Schlage	
1	Closing Device	4110-3049EDA	LCN	PC Alum
*	Number of hinges, as specified.			

14. Storage 1142, 1202, 1310.08, 1310.11, 1310.12, 2150.03, 3140.19

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080 (PEU at 3140.19)	Schlage	US26D
1	Proximity Reader	Mount on wall	3140.19 only	
*	Number of hinges, as specified.			

15. Storage Pairs 1110

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Lockset	L9080	Schlage	US26D
1	Flush Bolt	FB458	Ives	US32D
*	Number of hinges, as specified.			

16. Copy, Conference 1120.07, 1150.03, 1150.04, 2130.07, 3130.02, 3140.18

No.	Item	Description	Manufacturer	Finish
*	Hanging Devices	A5112	ANSI/BHMA	US32D
1	Latchset	L9010	Schlage	US26D
*	Number of hinges, as specified.			

17. Sliding Glass Doors

No.	Item	Description	Manufacturer	Finish
*	Rollers	Tandem	Kawneer	
1	Deadlock	1847	Adams Rite	
1	Thumbturn	Interior	Kawneer	
1	Pull	Extruded handle	Kawneer	
*	Number of hinges, as specified.			

E. Special Doors
   1. Elevator smoke guard – see Section 08 34 83
   2. Folding partitions – see Section 10 22 26
   3. Overhead Doors – see Section 08 36 00

END OF SECTION - 08 71 00

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install all necessary architectural finish hardware meeting or exceeding ESUHSD Standards, except those items specifically mentioned to be furnished elsewhere.

B. Wherever items of architectural finish hardware are not definitely specified and are required for proper completion and/or operation of the work, or some item of hardware may no longer be available, such architectural finish hardware shall be furnished in type, quality and finish suitable for the service required and comparable to those specified for similar conditions, and the District's Representative shall be so notified immediately.

C. Performance Requirements
1. Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware.
2. All hardware shall be manufactured to template.

D. Related Sections:
1. Hollow metal doors and frames are specified in Section 08 11 13.
2. Prefinished steel frames are specified in Section 08 11 16.
3. Flush wood doors are specified in Section 08 14 16.
4. Aluminum-framed entrances and storefronts are specified in Section 08 41 13.

1.2 SUBMITTALS

A. Hardware Schedule: Prepare complete schedule of finish hardware for review by the District's Representative. Reference items clearly to groups specified, door-type designations shown, location, and other pertinent data. Verify suitability, function, thickness of members, or other factors affecting appropriate selection. List manufacturers' names or suitable abbreviation to facilitate reviewing, opposite each item scheduled.

B. List only readily obtainable hardware that appears in current catalogs, and furnish catalog cuts of each different type of hardware included in schedule.
1. Include the following information:
   a. Type, style, function, size and finish of each hardware item.
   b. Name, part number and manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Explanation of abbreviations, symbols and codes contained in schedule.
   e. Door and frame sizes and materials.
   f. List of manufacturers used and their nearest representative with address and phone number.

C. Product Data: Submit product data on specified hardware. Indicate locations and mounting heights of each type of hardware.

D. Keying Schedule: Submit separate detailed schedule indicating clearly how the District's Representative final instructions on keying of locks has been fulfilled.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements
   1. Conform to CBC for requirements applicable to fire rated doors and frames, and to exit doors.
   2. Comply with all applicable requirements of National Fire Protection Association Standard 80, “Fire Doors and Windows,” and Standard 101, “Life Safety Code” and the Underwriters’ Laboratories for fire-rated openings. If automatic self-latching bolts, coordinators, gasketing, and astragals are required to meet the Standard, they shall be provided.
   3. Conform to ADA and CBC for requirements for accessibility by disabled persons.

B. Source Limitations: Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver key blanks to manufacturer of key control system for subsequent delivery to District.

1.5 COORDINATION

A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fails in materials or workmanship within specified warranty period.

B. Warranty Period: Two years from date of Substantial Completion, except as follows:
   1. Exit Devices: Three years from date of Substantial Completion.
   2. Manual Closers: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 HINGES, GENERAL

A. Template Requirements: Provide only template-produced units.

B. Hinge Base Metal: Stainless steel, with stainless-steel pin.

C. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; required for all outswinging exterior doors.

D. Fasteners: Comply with the following:
   1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
   2. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
   3. Screws: Phillips flat-head. Finish screw heads to match surface of hinges.

2.2 HINGES

A. Manufacturers:
1. Bommer Industries, Inc. (BI).
2. Hager Companies (HAG).
3. Lawrence Brothers, Inc. (LB).
4. McKinney Products Company; an ASSA ABLOY Group company (MCK).
5. Or equal.

B. Hinges: Door butts shall be stainless steel with stainless steel hinge pins. All doors to have non-rising pins.
1. Hinges shall be sized in accordance with the following:
a. Height:
1) Doors up to 41 Inches Wide: 4-1/2 inches.
2) Doors 42” to 48 Inches Wide: 5 inches.
3) Doors over 48 Inches Wide: 6 inches.
b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
c. Number of Hinges: Furnish 3 hinges per leaf to 7’-5” in height. Add 1 for each additional 2 feet in height.
2. Type: Ball-bearing throughout.

2.3 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 pounds.

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 5 pounds to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors.

D. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

E. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing. ANSI 4-7/8- inch strikes shall be used for all cylindrical and mortise locks. Locks, latches, and deadlocks shall have wrought boxes.

2.4 MECHANICAL LOCKS AND LATCHES

A. Heavy Duty Mortise Locks and Latches
1. Schlage, L9000 Series, L06 lever trim both sides, F keyway, 6-pin tumbler.
a. Finished cylinders and keying system are District Furnished, District Installed Medeco lock cylinders.
b. Provide construction cores and keys only on doors where security is required during construction.
c. Ensure that locksets will easily accept cylinders with no extra effort or modification.
2. All locksets shall have multiple functions within 1 case (9050, 9060, 9070, 9080). Locksets shall be reversible without opening the lock case. All locksets shall have lever handles, and shall operate in both the up and down directions. All locksets shall be able to change lock function by changing the lock cylinder tailpiece.
3. Chassis: Mortise design, corrosion-resistant plated cold-rolled steel.
4. Locking Spindle: Stainless steel, interlocking design.
5. Latch Retractors: Forged steel. Balance of inner parts: Corrosion-resistant plated steel, or stainless steel.
6. Springs: Full compression type.

B. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4-inch diameter steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller. Strike alloy deadbolt with reinforcer and two 3 inch long screws. ANSI A156.5, 1992 Grade 1 certified.

2.5 KEYLESS ENTRIES

A. Proximity Readers: Allegion MT15, or equal.

B. Keypads: Allegion MTK15, or equal.

C. Locksets: Electronically unlocked.

D. Exit Devices: EL function.

E. Provide Power supplies, transfers, and all ancillary items as required for functions specified.

2.6 EXIT DEVICES

A. Provide rim devices with keyed removable mullions at double doors.
1. Exception: Interior storage room & closet pairs, and 2-way exit cross corridor doors where shown on drawings.

B. Basis of Design:
1. Von Duprin Series AX98, or equal is the standard of quality. All devices shall be ANSI A156.3, 2001, Grade 1.certified and have a 3-year manufacturer's warranty. Stainless steel or plated finish as specified; aluminum or brass are not acceptable. Moving parts made of die-cast pot or white metals are also not acceptable. All devices shall use durable compression spring design. Devices, latches, trim or controls, incorporating tension springs are not acceptable. Lever trim shall be of wrought construction and designed with a breakaway feature, intended to minimize repair costs due to damage from vandalism. Exit devices shall incorporate a dampener type mechanism to decelerate the pushbar on its return stroke eliminating noise associated with the devices operation.

C. Accessibility Requirements: Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22 N).
1. Ives 8190 12" offset pulls at all exterior devices.

D. Comply with NFPA 101. Exit devices shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

E. Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

F. Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

G. Provide devices with cylinder dogging

2.7 LOCK CYLINDERS & KEYING

A. Finish cylinders and Keying: District furnished and installed. Contractor shall verify that doors will easily accept cylinders with no extra effort or modification.

B. Construction cylinders: Provide only on doors where security is necessary during construction.

2.8 KNOX BOXES

A. Provide 3200 series recessed at locations shown on drawings, exit plan A0.1.

2.9 CLOSERS

A. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.

B. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16-inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.

C. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16 inch steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.

D. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.

E. Closers shall be installed to permit doors to swing 180 degrees.

F. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.

G. Head Rail 6-1/2”, no drop bars.

H. Maximum effort to operated doors shall not exceed 8.5 lbs. for exterior doors and 5 lbs. for interior doors, such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the door may be increased not to exceed 15 lbs.

I. Closer shall utilize full complement bearing at shaft to provide greatest load carrying capabilities of the shaft. Pinion and pistons shall be hardened regardless of size, to provide durable wearing surfaces. Closers shall be hand specific for each application; universal type closers are not acceptable. Concealed head and floor closers are not acceptable. Closers utilizing pressure relief valves are not acceptable.

J. Manufacturers:
   1. LCN is Basis of Design.
   2. Or equal.

2.10 AUTOMATIC ENTRANCE DOORS

A. Operators
1. Switch activates the door to open and to close after the time delay expires. Provide infinite adjustments to the opening and backcheck speeds.
a. Opening and closing speed: 4 - 6 seconds.
b. Opening force:
1) Measured 1 inch out from the lock stile or the door, not to exceed 15 pounds in either direction. Adjustable without affecting the opening speed.
2) Adjustable closing time delay: 2 - 30 seconds.
2. Automatic reverse if an object stops the door. Master control unit must provide immediate reversal of door motion without undue strain on the drive train by providing stepped voltage to the motor.
3. Capable of operation without damage to the operator as an automatic or manually operated door.
4. Rough-in and wire for optional key card entry system.
5. Provide a locked door motor protection circuit that will shut off current to the exterior push pads when the door is locked or otherwise prevented from opening.
6. Manufacturer: Horton 4800 & 7100 series, LCN 9540, or equal.
7. Surface mount all operators. On double doors the operator housing must span across the entire opening, and only one door of each pair is to be automated.

B. Push Bar Actuators
1. Provide interior and exterior 36” bar type actuators. Both upper body and foot control shall activate the door.
2. Provide Campus master keyed switch to shut off power to the outside push bars after normal hours of operation, Locknetics 653-14-L2 (no known equal).
3. Wikk Industries, Inc. Ingress’R model I36-3, clear anodized, or equal.
a. Hardwired connection.
b. Bollard BPS SM-IG-INGR-48-CL with prep for Card Reader at Lobby Main entrance.
c. Wall mounted at restroom 1106/1108 and Classroom Main entrance

2.11 STOP

A. Manufacturers:
1. Basis of Design: Trimco (TBM).
2. Other manufacturers that may be acceptable:
a. IVES Hardware; an Ingersoll-Rand Company (IVS).
b. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).
c. Or equal.

B. Provide floor type with appropriate fasteners, no further than 4” from wall. Where floor type cannot be used, provide overhead type.

C. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
1. Basis of Design for overhead stops: Glynn Johnson.

2.12 DOOR GASKETING

A. Manufacturers:
1. Pemko Manufacturing Co. (PEM).
2. Reese Enterprises (RE).
3. Zero International (ZRO).
4. Or equal.

B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
   1. Compression bulb type gasketing will not be acceptable.
   2. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
   3. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
   4. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

D. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

E. Gasketing Materials: ASTM D 2000 and AAMA 701/702.

2.13 THRESHOLDS

A. Manufacturers:
   1. Pemko Manufacturing Co. (PEM).
   2. Reese Enterprises (RE).
   3. Zero International (ZRO).
   4. Or equal.

B. Accessibility Requirements: Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.

C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch (13 mm) high.

D. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant.

E. Use 1/4-inch fasteners, red-head flat-head sleeve anchors.

F. Seals: Sponge silicone gasketing to meet ASTM E 283-1984 test standards. Provide silicone gasket at all rated and exterior doors.

G. Provide thresholds at all exterior doors and where indicated on schedule.

2.14 FABRICATION

A. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

B. Fasteners
   1. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
   2. Screws for butt hinges shall be flathead, countersunk, full-thread type.
   3. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
   4. Provide expansion anchors for attaching hardware items to concrete or masonry.
   5. All exposed fasteners shall have a phillips head.
   6. Finish of exposed screws to match surface finish of hardware or other adjacent work.

7. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

C. Finishes:
1. Satin chromium US26D or brushed stainless steel US32D.
2. Door closers shall be powder-coated (689) to match other hardware.
3. Aluminum items to be finished anodized aluminum US28 (628), except thresholds which can be furnished as standard mill finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Steel Doors and Frames: Comply with DHI A115 Series. Drill and tap doors and frames for surface-applied door hardware according to ANSI A250.6.

B. Wood Doors: Comply with DHI A115-W Series.

C. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

E. Sound rated gasketing: Provide a sound seal to the head and jamb of Sound Rated Doors. It may be applied directly to head or jamb or to the doorstop. If application of seal is to be on doorstop, where door hardware prevents the use of a continuous seal along the face of the stop, place a rubber seal in the corner of the jamb or head where it meets the stop.
1. It is vital that the door compress the seal. Install the seals and adjust such that there is compression of the seals around the complete perimeter. If rubber seals are used in the corners between the jamb and stop, install in such a manner that will cause at least 30% compression when door is closed.

F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings.
1. Configuration: Provide one power supply for each door opening.
2. Configuration: Provide the least number of power supplies required to adequately serve doors with electrified door hardware.

G. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

END OF SECTION - 08 71 00

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Interior and exterior glass and glazing

B. Mirror glass

1.2 RELATED SECTIONS

A. SECTION 08 41 13 ALUMINUM-FRAMED ENTRANCES, STOREFRONTS

B. SECTION 08 41 23 FIRE RATED ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

1.3 DEFINITIONS

A. Deterioration of insulating glass is defined as failure of hermetic seal due to other causes than breakage which results in intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating resulting from seal failure, and any other visual evidence of seal failure or performance.

B. Deterioration of laminated glass is defined as the development of manufacturing defects including edge separation or delamination which materially obstructs vision through glass.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

A. Provide glass and glazing that has been produced, fabricated and installed to withstand normal thermal movement, wind loading and impact loading (where applicable), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.

B. Normal thermal movement is defined as that resulting from an ambient temperature range of 120-deg. F. and from a consequent temperature range within glass and glass framing members of 180-deg. F.

C. Provide heat strengthened glass lites where recommended by glass manufacturer as determined by glass stress analysis calculations based on glass unit sizes indicated and shading patterns occurring on the glass. Furnish copies of the glass stress analysis calculations and show the location of glass units required to be heat strengthened on the shop drawings.

1.5 SUBMITTALS

A. Product Data: Manufacturer's technical data for each glazing material and fabricated glass product required, including installation and maintenance instructions.

B. Samples: 12-inch square samples of each type of glass indicated and specified except for clear single pane units, and 12-inch long samples of each type of sealant or gasket exposed to view.

C. Shop Drawings: Show location of exterior glass units required to be heat strengthened based on glass stress analysis calculations.

D. LEED Submittals:
1. Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.

1.6 QUALITY ASSURANCE

A. Glazing Standards: Comply with recommendations of the following manufacturer and associations except where more stringent requirements are specified:
   1. Glass Association of North America (GANA) "Glazing Manual" and "Sealant Manual".
   2. Sealed Insulating Glass Manufacturers Association (SIGMA): TM-3000 "Vertical Glazing Guidelines" and TB-3001 "Sloped Glazing Guidelines".

B. Safety Glass: Where safety glass is indicated or required, provide products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.

C. Fire-Rated Glazing Products for Door and Window Assemblies: Products compliant with NFPA 257 and NFPA 80 or as tested in accordance with UL 9 for fire-protection hour ratings specified on Drawings.

D. Insulating Glass Certification Program: Provide insulating glass units permanently marked with appropriate Insulating Glass Certification Council (IGCC) certification label.

E. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that required for this Project, with a record of successful in-service performance.

1.7 ENVIRONMENTAL QUALITY ASSURANCE

A. Adhesives, sealants and sealants primers used on the interior of the building shall comply with South Coast Air Quality Management District (SCAQMD) Rule #1168. VOC limits as specified.

B. Available LEED Credits:
   1. Credit EQ 4.1 – Low-Emitting Materials, Adhesives & Sealants.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials during delivery, storage, and handling; comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture, temperature changes, direct exposure to sun and from other causes.

1.9 PROJECT CONDITIONS

A. Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when glazing channel substrates are wet.

B. Install glazing sealants at ambient and substrate temperatures above 40-deg. F.

1.10 WARRANTY

A. Laminated Glass: Furnish written warranty signed by glass manufacturer, agreeing to furnish replacements for those laminated glass units which develop manufacturing defects as defined, within 4-years from date of Substantial Completion.

B. Insulating Glass: Furnish written warranty signed by glass manufacturer, agreeing to furnish replacements for those insulating glass units developing manufacturing defects as defined, within 10-years from date of Substantial Completion.

C. Mirror Glass: Furnish written warranty agreeing to furnish replacement mirrors for those units developing silver spoilage within 15-years from date of Substantial Completion.

D. This warranty shall be in addition to and not a limitation of other rights the District may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS

A. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Thickness as indicated, specified, or recommended by glass manufacturer.

B. Manufacture heat-treated glass by horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed.

2.2 GLASS TYPES

A. Clear Float Glass: ASTM C1036, Type I, Class 1, Quality q3, 1/4-inch thick.

B. Clear Tempered Float Glass: ASTM C1048, Condition A, Type I, Class 1, Quality q3, Kind FT; 1/4-inch thick.

C. Exterior Glazing: PPG Solarban 70XL, or equal, Solar Control Low-E Insulating Glass
   1. Color Starphire (clear)
   2. Type 1: South & West facing walls
      a. Outdoor Lite: 6mm Solarban 70XL (2) on Starphire
      b. ½" Airspace
      c. Indoor Lite: 6mm Sungate 600 (4) on Clear
      d. VLT = 58%; SHGC = 0.26; Winter U-Value = 0.23
   3. Type 2: East & North facing walls
      a. Outdoor Light: 6mm Solarban 70XL (2) on Starphire
      b. ½" Airspace
      c. Indoor Lite: 6mm Clear
      d. VLT – 64%; SHGC = 0.27; Winter U-Value = 0.28
   4. Tempered units
      a. Outdoor Lite: 6mm Solarban 70XL (2) on Clear
      b. ½" Airspace
      c. Indoor Lite: 6mm Clear
      d. VLT, SHGC, & U-Value to match exposures listed above.

D. Mirror Glass: ASTM C1036, Type I, Class 1, Quality q1 for units under 25-square feet, Quality q2 for units over 25-square feet, silver coated and electrolytically copper plated, with edges protected with clear vinyl tape or other protective coating applied before installation.
   1. Provide stainless steel channel or angle frames with maximum 1/2-inch exposed legs, with No. 4 finish.
   2. Mirrors shall be in single piece units for each location unless otherwise indicated.

E. Clear Fire-Rated (Non-Wire) Glass: Clear (non-wire) fire-rated, labeled with appropriate marks of testing and inspecting agency acceptable to authorities having jurisdiction. Provide glass complying with safety impact rating where required. All materials used in fire rated assemblies must have identifying labels as required by CBC Section 716.

F. Interior Glazing: Clear Float single glazing ¼", safety tempered where required by code and as shown on drawings.

2.3 ELASTOMERIC GLAZING SEALANTS

A. General: Comply with recommendations of sealant and glass manufacturer's for selection of glazing sealants with performance characteristics suitable for applications indicated and conditions at time of installation.
   1. Compatibility: Select sealants with proven compatibility with other materials with which they will come into contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
   2. Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants which have performance characteristics suitable for applications indicated and conditions 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 (EPA Method 24).
4. Colors: Color of exposed sealant as approved by District's Representative from manufacturer's standards.

B. Silicone Glazing Sealant: One-part elastomeric silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25, Uses NT, G, A and 0 as applicable.
1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Structural Silicone Glazing Sealant: One-part elastomeric silicone sealant complying with ASTM C920, Type S, Grade NS, Class 40, Uses T, NT, M, G, A, and 0 as applicable.
1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 100 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100-percent, non-staining and non-migrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged in rolls with a release paper backing, complying with AAMA 800.

B. Expanded Cellular Glazing Tape: Closed-cell, polyvinyl chloride foam tape, factory coated with adhesive on both surfaces, packaged on rolls with release liner protecting adhesive, and complying with AAMA 800 for product 810.5.

C. Glazing Sealant for Fire-Rated Glass: Listed and approved by UL, Warnock Hersey or other approved testing agency.

D. Glazing Tape for Fire-Rated Glass: EPDM or other approved flame resistant gasket material approved by testing agency.

2.5 GLAZING GASKETS

A. Dense Elastomeric Compression Seal Gaskets: Molded or extruded neoprene, EPDM, or silicone gaskets of profile and hardness required to maintain watertight seal; complying with ASTM C864.

B. Soft Compression Gaskets: Extruded or molded closed cell, integral-skinned neoprene, EPDM, or silicone of profile and hardness required to maintain watertight seal; complying with ASTM C509, Type II, black.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. Compatibility: Provide materials with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.

C. Setting Blocks: Neoprene, EPDM or silicone blocks as required, 80 to 90 Shore A durometer hardness.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place.

E. Warm Edge Spacers: Shall comply with ASTM F1249

F. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement.

G. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-staining, non-extruding, non-outgassing, strips of closed-cell plastic foam of density, site, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.

H. Mirror Mastic: As recommended by glass installer for securing glass.
1. VOC Content: Not more than 70 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

B. Clean cut or flat grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect work for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; presence and functioning of weep system on framing having weeps; existence of minimum required face or edge clearances; and for effective sealing of joinery. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members to receive glass. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are to be used.

3.3 GLAZING, GENERAL

A. Comply with printed recommendations of glass, sealants, gaskets, and other glazing materials manufacturers.

B. Coordinate with framing system manufacturers for proper glazing channel dimensions to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with acceptable tolerances.

C. Protect glass from edge damage during handling and installation.
1. Use a rolling block in rotating glass units to prevent damage to corners. Use suction cups to shift glass units within openings; do not raise of drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening.
2. Remove and dispose of glass units with edge damage or other imperfections of a kind that would weaken glass when installed and impair performance and appearance.

D. Apply primers to joint surfaces where required for sealant adhesion.

E. Install setting blocks of proper size in sill rabbet, located to comply with referenced glazing standard. Set blocks in thin course of sealant.

F. Provide spacers inside and out, of size and spacing to preserve required face clearances for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking to comply with requirements of referenced glazing standard except where otherwise required by glass unit manufacturer.

H. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

I. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

J. Square cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 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 in one continuous length. Do not stretch tapes to make them fit opening.

C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these 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. Do not remove release paper from tape until just before each lite is installed.

F. Apply heel bead of elastomeric sealant.

G. 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 center of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

C. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers 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. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.7 PROTECTION AND CLEANING

A. Protect glass from breakage. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances. Remove immediately by methods recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction for build-up of dirt, scum, alkali deposits or staining. Remove as recommended by glass manufacturer.

D. Remove and replace glass which is broken, chipped, cracked, abraded or damaged during construction, including natural causes, accidents and vandalism.

E. Wash glass on both faces not more than 4-days prior to date scheduled for inspection for Substantial Completion. Use methods recommended by glass manufacturers.

END OF SECTION – 08 80 00

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Light-gauge non-load bearing wall framing systems, including metal studs, wall furring, and backing plates.

1.2 RELATED SECTIONS

A. Load-bearing metal studs are specified in Section 05 40 00.

B. Metal suspension systems are specified in Section 09 22 26.23.

1.3 DESIGN AND PERFORMANCE REQUIREMENTS

A. Engineer non-structural metal framing to comply with the following requirements.
   1. Stud Systems: Select steel studs in accordance with manufacturer’s standard load tables and the following deflection criteria, based on stud depth and spacing indicated and partition height required:
      a. Partitions to Receive Gypsum Board: L/120.
      b. Framed Ceilings: L/360.

B. Structural supports and blocking for light fixtures and miscellaneous wall- or ceiling-mounted items shall be designed and engineered by Contractor.

1.4 SUBMITTALS

A. Product Data: Manufacturer's specifications and installation instructions for each type of metal support system, including provisions for fixture and equipment anchorage.

B. Shop Drawings: Show provision for fixture and equipment anchorage to stud systems different from typical systems or details indicated.

C. LEED Submittals:
   1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

1.5 QUALITY ASSURANCE

A. Tolerances: Provide metal studs and furring installations that are plumb, true, straight, and rigid.

B. Welder's Qualifications: AWS D1.1 and 1.3 as applicable.

C. Fire-Test-Response Characteristics: Provide components that comply with rating requirements specified for fire-rated assemblies under UL 2079 for non-load bearing wall systems.

D. Deflection Clips and Firestop Track: Connections and/or top runner provided in fire-resistance-rated assemblies shall be certified by UL 2079 for cyclic movement requirements.

1.6 ENVIRONMENTAL QUALITY ASSURANCE

A. Recycled Content for Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of pre-consumer recycled content is not less than percentages required for the LEED Credit.

B. Available LEED Credits:
   1. Credit MR 4.1 and MR 4.2 – Recycled Content.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver products in the original unopened packages, containers, or bundles with manufacturer's label intact and legible.

B. Remove products delivered in broken, damaged, rusted or unlabeled condition from the Project site immediately.

C. Protect products from rusting and other sources of damage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Studs:
   1. Material: Mill-certified galvanized steel conforming to ASTM A653, G40 coating, minimum yield strength 33,000-psi.
   2. Construction: Formed C-channel section conforming to ASTM C645.

B. Stud Thickness: As required for specified deflection criteria, based on stud depth and spacing indicated and partition height required. If stud spacing is not indicated, space studs at 16-inches on center.

C. Runner Tracks:
   1. Material: Mill-certified galvanized steel conforming to ASTM A653, G40 coating, minimum yield strength 33,000-psi.
   2. Construction: Formed channel section conforming to ASTM C645.
   3. Size: Minimum 1-inch flange width; web depth matching studs.
   4. Thickness: Same as studs.

D. Vertical Deflection Connection:
   1. Code Criteria: Meet required head of wall connection criteria as required by CBC and as indicated in UL2079 for cyclic wall movement.

E. Material Composition: ASTM A653, SS grade 50, class 1, 50-ksi minimum yield strength, 65-ksi minimum tensile strength, G-60 hot dipped galvanized coating.

F. Material Thickness: 0.036-inch.

G. Clips shall be designed for positive attachment to structure and stud web using step-bushing technology to provide frictionless vertical movement.

H. Provide clips with attached bushing and screw of the series, size, and configuration as recommended by manufacturer.

I. Top track devices pre-assembled to top track assembly in standard 12-foot lengths, with clips installed at spacing to coincide with stud spacing indicated may be used at Contractor's option.

J. Metal Channels: Mill-certified galvanized steel conforming to ASTM C653, G40 coating, minimum yield strength 33,000-psi.

   1. Framing, Furring, and Stiffening:

Size, Inches	Pounds per 1,000 Lineal Feet
3/4 cold rolled	300
1-1/2 cold rolled	475
2 cold rolled	590

2. Furring Channels: Minimum 20-gauge galvanized steel with knurled faces; hat-shaped or Z-section as required.

K. Tie Wire: No. 16-gauge, galvanized, single-strand annealed steel or No. 18-gauge, galvanized, double-strand annealed steel.

L. Screws: ASTM C1002, Type S, pan head sheet metal screws, minimum 1/2-inch length.

M. Runner Track Fasteners: Tempered-steel pins with corrosive resistant plating or coating, 9/64-inch diameter, minimum 1-1/8-inch penetration.

N. Backing Plates: Provide backing plates as indicated.

O. Compression or Isolation Strips: Fiberglass, 1/2-inch nominal thickness, width equal to width of tracks or studs where used; density such that material will compress to one-half or less of loose thickness.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

A. Verify that conditions are satisfactory for the installation of metal support systems. Do not commence the installation until unsatisfactory conditions have been corrected.

B. Coordinate installation of metal support systems with the installers of other related work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install non-load-bearing steel framing members in accordance with ASTM C754, and as specified.

B. Cutting:
1. General: Cut framing components squarely or on angle as required to fit tightly with proper bearing against abutting members.
2. Cutting Studs: If stud web is cut more than 50-percent, or stud flanges are cut, restore stud to original strength by wire-tying, or welding on steel reinforcement.

C. When studs extend to the underside of structural slabs, secure at top with a slip connection to accommodate slab deflection.

3.3 NON-LOAD-BEARING VERTICAL METAL FRAMING

A. Runner Tracks: Align at floor and ceiling with partition layouts. Secure to structure with specified fasteners located 2-inches from each end and spaced not to exceed 24-inches on center.

B. Coordinate installation of continuous isolation strips or acoustical sealant at acoustical partitions with installation of top and bottom runner tracks.

C. Where partition comes to underside of profile metal deck, create an acoustic seal to fill the profile. Use either metal plate or fiberglass and acoustic sealant, as indicated.

D. Where studs extend to structure above, provide vertical deflection accommodating devices where each stud connects to structural members above.

E. Installation of Metal Studs:
1. Install studs spaced 16-inches on center unless otherwise indicated. Screw-fasten framing connections using a minimum of 2 screws for each connection.
2. At partition corners and intersections, provide a minimum of 3 studs.
3. Splice studs where required, by nesting with a minimum lap of 8-inches; fasten laps with 2 screws through each flange.

4. Unless otherwise indicated, frame door openings with double 16-gauge vertical studs securely attached to each jamb of door frame.
   a. At head, install runner track; cut flanges at ends, bend web 90-degrees and screw attach to jamb studs.
   b. Install jack studs over door opening, spaced same as full-height studs.
   c. Where control joints extend upward from door jambs, install a jack stud spaced 1/2-inch from each jamb stud. Space next full-height stud not more than 6-inches from each jamb stud.
   d. Attach jamb studs to metal door frames with metal clips, each with 2 screws into jamb stud.
5. Frame openings other than door openings in the same manner as for doors, and install framing below sills of openings to match framing required above door heads.
6. Frame both sides of expansion and control joints with a separate stud; do not bridge the joint with framing components.
7. Install continuous horizontal stiffeners in partitions where recommended by stud manufacturer for partition height, stud gauge, stud spacing, number of layers of gypsum board used, and anticipated stud deflection.
8. Stiffen openings with horizontal channels. Provide one channel continuous across head of openings extending to third stud beyond on each side. Provide one channel at each frame anchor extending to third stud beyond. Wire-tie or weld horizontal channels to each stud.

F. Chase-Wall Framing:
1. Align two parallel rows of floor and ceiling runners according to partition layout.
2. Position steel studs vertically in runners with flanges in same direction, with studs on opposite sides of chase directly across from each other. Anchor to runners in accordance with manufacturer's instructions.
3. Cross brace chase studs with 12-inch wide gypsum wallboard gussets or minimum 2-1/2-inch steel studs. Attach web-to-web with screws. If chase wall studs are not opposite, brace with horizontal runners and braces.

G. Wall Furring, Direct Attachment:
1. Attach hat-shaped metal furring channels either vertically or horizontally. For furring positioned horizontally, attach a furring member not more than 4-inches from both the floor and ceiling. Secure with fasteners placed on alternate channel flanges, spaced on 16-inch centers.
2. Attach Z-shaped metal channels vertically, spaced 16-inches on center unless otherwise indicated, with fasteners spaced 24-inches on center.

3.4 BACKING PLATES

A. Install as indicated and specified for support of wall-hung cabinets, toilet partitions and accessories, and other items to be mounted on vertical surfaces.

B. Welding shall comply with AWS D1.3.

C. Paint welds with a rust-inhibitive paint.

3.5 HORIZONTAL FRAMED SURFACES

A. Joist frame with studs of size, gauge and spacing indicated or as determined from manufacturer’s standard tables based on specified deflection criteria.

B. Provide runner channels to receive studs at ceiling and walls of same gauge as studs. Secure with mechanical fasteners at 24-inches on center maximum.

C. Secure studs to channels with screws.

D. Provide furring channels in resilient sound isolation clips as indicated.

3.6 SOUND CONTROL WORK

A. Specified requirements apply to framing for interior partitions indicated as sound partitions.

B. Isolate top and bottom runners from direct contact with structure by installing over either:

1. Continuous compression or isolation strips as specified, or
2. Two continuous 1/4-inch beads of acoustical sealant specified in Section 07 92 19 applied at quarter points of track width.

C. Studs at terminal ends of partitions abutting intersecting walls or partitions, and studs that would otherwise contact intermediate structural columns shall be similarly installed over strips or sealant.

3.7 INSTALLATION TOLERANCES

A. Variation from Plumb: Maximum 1/8-inch in 10-feet, non-cumulative.

B. Variation from Level: Maximum 1/8-inch in 10-feet, non-cumulative.

C. Variation from True Plane: Maximum 1/8-inch in 10-feet, non-cumulative.

D. Variation from True Position: Maximum 1/4-inch, non-cumulative.

E. Variation of Member from Plane: Maximum 1/8-inch, non-cumulative.

3.8 CONSTRUCTION WASTE MANAGEMENT

A. Comply with applicable provisions of Division 01 Section 01 74 00 including, but not limited to:
1. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION – 09 22 16

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 09 22 26.23

METAL SUSPENSION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Metal ceiling suspension systems, including suspended system for gypsum wallboard ceilings

1.2 RELATED SECTIONS

A. SECTION 09 51 13 – ACOUSTICAL PANEL CEILINGS

1.3 SUBMITTALS

A. Product Data: Manufacturer's specifications and installation instructions for each type of suspension system, including provisions for fixture and equipment anchorage.
   1. Include ICC-ES test reports showing proposed hanger and bracing wire fasteners are capable of supporting specified loads.

B. LEED Submittals:
   1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

1.4 QUALITY ASSURANCE

A. Ceiling-support system shall limit deflection of finished ceilings to less than L/360.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Provide metal ceiling suspension system components with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum percentage of cost of materials used for the Project as required for the LEED Credit.

B. Available LEED Credits:
   1. Credit MR 4.1 and MR 4.2 – Recycled Content.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver products in the original unopened packages, containers, or bundles with manufacturer's label intact and legible.

B. Remove products delivered in broken, damaged, rusted, or unlabeled condition from Project site immediately.

C. Protect products from rusting and other sources of damage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Channels: ASTM C645, galvanized in accordance with ASTM A653, G60 coating designation. Provide framing, furring and stiffening channels as required.

B. Hanger Wire: 8-gauge galvanized, soft, mild annealed steel.

C. Diagonal Bracing Wire: 12-gauge galvanized, soft, mild annealed steel.

D. Tie Wire: 16-gauge, galvanized, single-strand annealed steel.

E. Screws:
   1. General: ASTM C646, corrosion resistant, for attachment to metal framing 25-gauge and lighter; ASTM C954 for attachment to metal framing 20-gauge and heavier.
   2. Thread and head designs and lengths as recommended by manufacturer for uses and materials involved.

F. Hanger and Bracing Wire Fasteners:
   1. Hanger Wires: Connection device capable of carrying not less than 100-pounds.
   2. Bracing Wires: Connection device capable of carrying not less than 200-pounds or the actual design load, whichever is greater, with a safety factor of 2 without yielding.

G. Furring Channel Clips: Fabricated from galvanized wire, for attaching furring channels to cold-rolled channels.

PART 3 - EXECUTION

3.1 SUSPENDED CEILING SUSPENSION FRAMING

A. Install suspended ceiling suspension system consisting of hanger wires, carrying channels and furring channels in accordance with ASTM C635 requirements and as required to limit ceiling deflection as specified.

B. Separate ceiling hanging and bracing wires at least 6-inches from unbraced ducts, pipes, and conduit.

C. Provide recesses and openings for lighting fixtures, registers, access panels, and other items to be installed in ceilings; provide additional furring channels where required by opening.

3.2 CONSTRUCTION WASTE MANAGEMENT

A. Comply with applicable provisions of Division 01 Section 01 74 00 including, but not limited to:
   1. Separate and recycle waste materials to the maximum extent possible.

END OF SECTION - 09 22 26.23

SECTION 09 22 36

CEMENT PLASTER LATHING AND LATH ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section includes cement plaster lathing and lath accessories over a continuous water-resistive barrier system with solid continuous sheathing and framed structural supports.

1.2 RELATED SECTIONS

A. Section 07 25 00 Water Resistive Barrier System

B. Section 09 24 00 Portland Cement Plastering

1.3 SUBMITTALS

A. Product Data: Submit each type of lath, fastener and accessory.

B. Shop Drawings: Submit wall elevation shop drawings showing lath accessory locations, for District's Representative's review and approval. Submit shop drawings for any locations requiring lath accessories that are not clearly depicted in Drawings.

C. LEED Submittals:
1. Credit MR 4.1and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

1.4 QUALITY ASSURANCE

A. Installer shall have 5 years of documented previous lathing experience on at least 5 similar scope projects, using the specified or generically comparable materials.

B. Perform work in accordance with the current building code requirements.

C. Follow recommendations of ASTM C1063 *Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster*, Portland Cement Association *Plaster/Stucco Manual EB049* and ACI 524-R *Guide to Portland Cement Based Plaster.*

D. Mock-ups: Provide products, assemblies, and related materials for the composite mock-ups specified in Section 01 43 39 Mock-ups.

E. Pre-Installation Conference: Conduct conference at Project site in accordance with the requirements of Section 01 31 10 Project Meetings and the following:
1. Notify participants including District's Representative, Contractor, Sheet Metal Flashing, Window and Sealant Subcontractors as appropriate and District's Waterproofing Consultant at least 7 calendar days before conducting meeting.
2. Review material selections and procedures to be followed in performing the Work.
3. Review in detail job conditions, schedule, construction sequence, and quality of completed installation.
4. Review installation of lathing, lath accessories, with special attention to detailing of control joints and expansion joints.

5. Record discussions of conference and any conflict, incompatibility, or inadequacy. Furnish a copy of record to each participant.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Provide lathing and lath accessories with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum percentage of cost of materials used for the Project as required for the LEED Credit.

B. Available LEED Credits:
1. Credit MR 4.1 and MR 4.2 - Recycled Materials.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Refer to Section 01 60 00 Product Requirements.

B. Deliver products and materials in original unopened packages, containers, or bundles with manufacturer's label intact and legible.

C. Remove items delivered in broken, damaged, rusted, or unlabeled condition from Project site immediately.

D. Protect lathing and lath accessories from moisture and other sources of damage.

E. Store metallic materials and accessories indoors, off the floor.

PART 2 - PRODUCTS

2.1 LATHING

A. Lath for vertical surfaces (walls): Self-furred, welded wire, galvanized steel, 17 gage, 1-1/2 inch x 1-1/2 inch, 1.14 lbs./sy.
1. Chicago Metallic 38-3/8 inch x 150 ft long rolls, or equal, no known equal.
a. 1/4 Inch self-furred lath, to the underside of the cross wire, each cross wire is furred. Furring rows every 3 inch on center.
b. Double wires at fastener locations.

B. Lath for horizontal surfaces (ceilings/soffits): Self-furred with continuous V-groove, expanded metal, galvanized steel G60, 3.4 lbs./sy., with paper backing to facilitate spray applications. Chicago Metallic, or equal.

2.2 FASTENERS

A. Screws (for light gage metal framing):
1. General: ASTM C646, corrosion resistant, for attachment to metal framing 25 gauge and lighter; ASTM C954 for attachment to metal framing 20 gauge and heavier.
2. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of not fewer than three exposed threads.

B. Tie Wires: No. 18 gauge, galvanized, single strand annealed steel.

2.3 LATH ACCESSORIES

A. General: Fabricated from hot-dip galvanized steel sheet, ASTM A 653/A 653M, G60 zinc coating. 26 gauge minimum, 3/4 inch minimum ground depth, typical unless otherwise noted below. Cemco, Amico, Stockton Products, or equal.
   1. Foundation weep screed flashing: #7 Foundation weep screed, with sloped drainable plaster termination surface, 3-1/2 inch solid sheet metal flange, non-perforated.
   2. Soffit drip screed: #12 soffit drip, with sloped drainable plaster termination surface, 3-1/2 inch solid sheet metal flange, non-perforated.
   3. Drip screed above wall opening head flashings such as windows, doors, louvers: #36 drip screed, 3-1/2 inch solid sheet metal flange, non-perforated.
   4. Soffit vent: Standard profile soffit vent reveal screed.
   5. Outside corner reinforcement: Welded wire, galvanized, plastic nose. Corner-Aid, or equal.
   6. Casing bead: Square edge, expanded sheet metal flange. Provide deep leg casing bead where required for perpendicular sealant bearing surface.
   7. Expansion joint: 2-piece galvanized steel, solid sheet metal flanges.
      a. For horizontal orientations only: Drainable, non-perforated: M-Slide, or equal.
      b. For vertical orientations on walls only: #40.
   8. Control joint:
      a. 1/2 Inch ground depth, minimum.
      b. For vertical orientations on walls only, and all soffits: XJ-15, galvanized steel, expanded sheet metal flanges.
      c. For horizontal orientations on walls only: Solid leg #15 control joint, G90 galvanized steel, Cemco, or equal, no known equal.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install materials in conformance with CBC Chapter 25 requirements and ASTM C1063.

B. Install lath continuously and perpendicular to supports, over the water-resistive barrier system and continuous solid sheathing.

C. Fasten lath to supports at 6 inches on center and avoid installing excessive fasteners to minimize cracking.

D. Fasten lath edges into framing, within 2 inches from lath sides or edges.

E. Provide control joints conforming to locations identified by District’s Representative, but not to exceed 10 feet on center maximum.

3.2 INSTALLATION OF LATHING

A. Vertical walls:
   1. Install horizontal drainage components including sheet metal flashings, weep screeds, soffit drips, 1-piece horizontal control joints, 2-piece horizontal expansion joints and drip screeds, and weather lap with water-resistive barrier system components to ensure drainage.
   2. Install lath horizontally onto vertical wall surfaces, lap lath sides and ends not less than 1 mesh for wire lath.
   3. Attach lathing to framing supports with fasteners spaced 6 inches apart vertically, generally between the doubled lath wires when using screws into metal framing, or at cross wires when using nails into wood framing, at each vertical framing support member.
   4. Lath fasteners into horizontal framing or blocking in framed vertical walls are not required.

5. Install lath continuously into and around wall corners, where the structural support system is the same on both sides of the corner. Provide #30 control joint at interior corners of different support system substrates.
6. Wire tie or crimp lathing side laps as required to assure continuous direct lathing contact during plastering.
7. Prevent damage to, and immediately repair damage that does occur, to the water-resistive barrier system. Repair defects of the water-resistive barrier system immediately when observed and as lathing progresses. Repair any conditions caused by lathing and lath accessory installation that would allow water intrusion, such as spinners and shiners (removed or abandoned fasteners that miss supports), tears, rips overdriven fasteners, or any other condition that would allow bulk water intrusion beyond the water-resistive barrier system into the building.

B. Horizontal ceilings and soffits:
1. Lap lath sides and ends not less than 1 inch for expanded sheet metal lath at soffits.
2. Comply with CBC 2507.3 requirements for soffit lath fasteners and installation.

3.3 INSTALLATION OF LATH ACCESSORIES

A. General:
1. Align grounds of lath accessories to true lines, plumb, level, and straight. Bend expanded flange accessories into fine alignment, do not shim.
2. Connect lengths of accessories as recommended by the manufacturer to assure a continuous line.
3. Install accessories to provide required depth of plaster and to bring plaster surface to required planar tolerance.
4. Secure lath accessories in place as required to prevent dislodging or misalignment during plastering installation. Use self-tapping screws into metal framing supports.
5. In general, attach lath accessories over water-resistive barrier system, over lathing, unless noted otherwise.
6. Terminate ends of lath accessories at intersections with other lath accessories. Do not allow in–line butt splices at locations other than at lath accessory intersections.
7. Lap water-restive barrier system components and lathing over solid flange lath accessories and drainage flashings to ensure drainage.
8. Fasten solid flange lath accessories 7 inches on center into the upper 1-1/2 inch of solid vertical flange, into supports.
9. Embed laps, terminations, transitions and intersections into solid sealant setting bed to prevent bulk water intrusion into the wall assembly.

B. Lath accessory installation and fastening:
1. Weep, soffit, and drip screeds: Fasten through solid flange into supports.
2. Soffit vent: Discontinue lath and water-resistive barrier system at vent, fasten vent into supports.
3. Casing beads:
   a. Use single length casing beads wherever length of run does not exceed 10 feet and miter or cope corners.
   b. Provide 3/8 in. minimum gap for sealant between casing bead, wall openings and penetrations.
   c. Set casing beads level, plumb, and true to line, fasten to supports.
   d. Provide casing beads at the following locations:
      1) Where plaster abuts dissimilar construction.
      2) At perimeter of openings where edges of plaster will not be concealed by other Work.
4. Outside corner reinforcement: Fasten to supports. Install continuous corner reinforcement for full length of external corners.
5. Expansion joint: Fasten flanges into supports, centered over gap in supports.

6. District's Representative will approve location of control and expansion joints. At intersections of vertical and horizontal joints, continue horizontal joint through intersection.
7. Solid flange #15 control joint, horizontal: Discontinue lath through control joint. Fasten upper solid flange of control joint and lath side into supports. Fasten lath side below control joint into supports and wire tie lower control joint expanded sheet metal flange to lath side at 7 inches on center.
8. Expanded flange control joint, vertical: Discontinue lath through control joint, fasten lath edges to supports at 7 inches on center. Wire tie expanded sheet metal flanges of control joints onto lath at 7 inches on center.

END OF SECTION 09 22 36.23

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 09 24 00

PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes three-coat exterior portland cement plasterwork (stucco), including the following:
   1. Scratch coat
   2. Brown coat
   3. Wall Sheathing

1.2 RELATED SECTIONS

A. Section 09 30 00 Tile

B. Section 07 25 00 Water Resistive Barrier System

C. Section 07 92 00 Joint Sealants

D. Section 09 22 36 Cement Plaster Lathing and Lath Accessories

1.3 SUBMITTALS

A. Installer qualifications and experience.

B. Product Data: For each product indicated.

C. Installation: Provide information regarding intended application means and methods of complying with specified moist curing requirements. If using other methods of application, certify that products and applications comply with specified requirements.

D. LEED Submittals:
   1. Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and pre-consumer recycled content.
      a. Include statement indicating costs for each product having recycled content.
   2. Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.

E. Finish coat samples for Initial Selection: Manufacturer’s standard color charts and small scale samples indicating color and textures available.

F. Finish coat samples for Verification Purposes: 24-inch x 24-inch square samples for each finish, color, and texture; prepare using same tools and technique to be used for installation.

1.4 QUALITY ASSURANCE

A. Installer shall have 5 years of documented previous plastering experience on at least 5 similar scope projects, using the specified or generically comparable materials.

B. Comply with current building code requirements.

C. Comply with ASTM C926 Standard Specification for Application of Portland Cement Based Plaster recommendations.

D. Perform Work in accordance with current Portland Cement Association *Plaster/Stucco Manual EB049* and ACI 524-R *Guide to Portland Cement Based Plaster*.

E. Fire-Resistance Ratings: Where indicated, provide Portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" and/or NFPA 285, as applicable.

F. Mock-ups: Provide products, assemblies, and related materials for composite mock-ups specified in Division 01.

G. Finish Coatings shall have been tested to meet or exceed the following:
   1. Physical Tests:
      a. Abrasion Resistance: ASTM D 968.
      b. Absorption-Freeze-Thaw.
      c. Accelerated Weathering: ASTM G23 3,000 hour, no deterioration.
      d. Mildew Resistance: Mil Standard 810B: no growth.
      e. Moisture Resistance: ASTM D 2247: no deleterious effects 14 days.
      f. Salt Spray Resistance: ASTM B 117: 5 Percent concentration for 300 hours, no deleterious effects.
      g. Water Vapor Transmission: ASTM E 96: Water Methods Procedure.
   2. Fire Tests: ASTM E84.

H. Pre-Installation Conference: Conduct conference at Project site in accordance with the requirements of Division 01 and the following:
   1. Notify participants including District's Representative, Contractor, and District's Waterproofing Consultant at least 7 calendar days before conducting meeting.
   2. Review material selections and procedures to be followed in performing the Work.
   3. Review in detail job conditions, schedule, construction sequence, and quality of completed installation.
   4. Review installation of lathing, lath accessories, with special attention to detailing of control joints and expansion joints.
   5. Record discussions of conference and any conflict, incompatibility, or inadequacy. Furnish a copy of record to each participant.

I. Inspections: Coordinate required inspections before covering Work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Refer to Section 01 60 00 Product Requirements,

B. Deliver products in original unopened packaging with legible identification.

C. Store products in a cool, dry place under cover, out of direct sunlight, protected from the elements and from damage. Store at a temperature between 40-deg. F. and 110-deg. F.

1.6 PROJECT CONDITIONS

A. Exterior Plasterwork:
   1. Apply and continuously moist cure scratch and brown plaster coats and prevent plaster from drying out during minimum 48 hour curing period after installation.
   2. Apply plaster only when ambient temperature is between 40 and 80 deg F.
   3. Schedule work to avoid application in direct sunlight.
   4. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

B. Protection
   1. Protect surrounding areas and surfaces from damage during application of the synthetic finish coat system.
   2. Protect finished work from water penetration behind the system when stopping for the day or when completing an area.
   3. Protect adjacent materials during application and protect applied material from weather and other damage while material cures.

C. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

1.7 COORDINATION

A. Mock-ups: Be responsible for timely arrangement for and provision of products, assemblies, and related materials for composite mock-ups specified in Section 01 43 39 Mock-ups. Coordinate Work of other applicable Sections with Work of this Section.

1.8 WARRANTY

A. Warrant synthetic finish coat materials to be free from defects in materials and workmanship for a period of 3-years from the date of Substantial Completion. This warranty shall be in addition to and not a limitation of other rights the District may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.1 PLASTER MATERIALS

A. Portland cement: ASTM C 150, Type I.

B. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.

C. Sand aggregate: ASTM C 897.

D. Fiber for scratch and brown coats: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in Portland cement plaster.

E. 100 Percent trowelable finish coating: Standard finish coat, color to be similar to paint color; for use over Portland cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for finishes.
   1. ParexLaHabra, Inc. 533 Sand Smooth, or equal.
   2. Color: As selected from manufacturer’s full line of colors by District’s Representative.
   3. Finish: “Smooth”.

2.2 WALL SHEATHING

A. Dow Thermax 3/4” R-5.0 continuous exterior insulation/sheathing (over metal studs) or equal.

2.3 MISCELLANEOUS MATERIALS

A. Water for mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Bonding agent: ASTM C 932.

2.4 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.
   1. Fiber content: Add fiber to scratch and brown coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.

B. Base-coat mixes for use over lathing: Portland cement mixes for scratch and brown coats for plasterwork as follows:
   1. Scratch coat: For cementitious material, mix 1 part Portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
   2. Brown coat: For cementitious material, mix 1 part Portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material (sum of separate volumes of each component material).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present for compliance with requirements and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C926.

3.3 INSTALLATION - GENERAL

A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

3.4 MIXING

A. General: Use mechanical mixers for mixing plaster; do not hand mix. Do not use frozen, caked, or lumped material. Clean mechanical mixers, mixing boxes, and tools after mixing each batch; keep free of plaster from previous mixes. Thoroughly mix plaster with proper amount of water until uniform in color and consistency. Retempering not permitted; discard plaster which has begun to stiffen.

3.5 PLASTER APPLICATION

A. General: Comply with ASTM C926.
   1. Allow no deviations exceeding 1/4 inch in 10 feet or 1/8 inch in 4 feet, from a true plane in finished plaster surfaces, as measured by a full-length straightedge placed on the surface.
   2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated.

B. Curing times and intervals between plaster coats:

1. General: Apply and continuously moist cure plaster scratch and brown coats, regardless of ambient temperature, wind or humidity conditions. Moist cure by using a fine water mist spray such as from a Hudson sprayer, do not apply bulk water such as from a water hose.
2. Scratch Coat: Moist cure scratch coat for 2 days minimum before applying brown coat.
3. Brown Coat: Moist cure brown coat for 2 days minimum after installation.
4. Alternate Methods of Application: When using alternate methods of application, moist cure for final base coat for 7 days minimum.
5. Finish coating system: Verify brown coat surface condition acceptability, including field testing for alkalinity of surface conditions and comply with manufacturer's written requirements.

C. Brown coat: In preparation for factory-prepared finish coating, float and use sufficient pressure to densify the brown coat surface uniformly to provide a surface receptive to bonding of the finish coat.

D. Plaster finish coating system: Trowel finish to accepted texture following manufacturer's written instructions.

3.6 CUTTING AND PATCHING

A. Cut, patch, replace, and repair plaster as necessary to accommodate other Work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.7 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from doorframes, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09 24 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Gypsum board and accessories

1.2 PERFORMANCE CRITERIA

A. ASTM C36 Regular type
   1. Type X at fire rated partitions.
   2. Greenboard at all wet locations.

B. Provide gypsum panel products with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of percentage of cost of materials used for the Project as required for the LEED Credit.
   1. Credit MR 4.1 and MR 4.2 – Recycled Content.

1.3 SUBMITTALS

A. Product Data: Manufacturer's specifications and installation instructions for each type of gypsum wallboard and accessory required.

B. Layout Drawings: Furnish layout drawing showing proposed location of control joints.

C. LEED Submittals:
   1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

PART 2 - PRODUCTS

2.1 MANUFACTURER & MODEL NUMBER

A. 5/8” thick gypsum wallboard with tapered and wrapped edges.

PART 3 - EXECUTION

3.1 APPLICATION

A. Finish Levels:
   1. Level 0: In areas of temporary construction, no taping or accessories are required.
   2. Level 1: In plenum areas above ceilings, attics, electrical closets, and other areas not normally exposed to the public, joints and interior angles shall have tape embedded in joint compound. Surfaces shall be free of excess joint compound. Tool marks and ridges are acceptable.
   3. Level 2: Where water-resistant gypsum backing board is used as a substrate for tile, joints and interior angles shall have tape embedded in joint compound and one separate coat of joint compound applied over joints, angles, fastener heads, and accessories. Surface shall be free of excess joint compound. Tool marks and ridges not affecting the installation of tile are acceptable.

4. Level 3: Where textured finish or wall coverings are to be applied, joints and interior angles shall have tape embedded in joint compound and one separate coat of joint compound applied over joints, angles, fastener heads, and accessories. Joint compound shall be smooth and free of tool marks and ridges.
5. Level 4: Unless otherwise specified in another finish level, joints and interior angles on exposed gypsum board shall have tape embedded in joint compound and two separate coats of joint compound applied over joints, angles, fastener heads, and accessories. Joint compound shall be smooth and free of tool marks and ridges.
6. Level 5: Not used.

END OF SECTION – 09 29 00

SECTION 09 30 00

TILE

PART 1 - GENERAL

1.1 SUMMARY

A. Thin set interior wall tile.

B. Crack Protection and waterproofing membrane.

C. Setting Materials.

D. Grout.

E. Cementitious backing board.

1.2 REFERENCES

A. ANSI A108 Series/A118 Series - American National Standards for Installation of Porcelain Tile.

B. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Porcelain Tile.

C. TCNA Handbook for Porcelain and Glass Tile Installation.

1.3 SUBMITTALS

A. Product Data: Furnish manufacturer's product data for each specified product.

B. Shop Drawings: Show tile patterns and locations and widths of expansion, contraction, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification: Furnish samples of the following items. Where products involve color and texture variations, furnish sets showing full range of variations expected.
   1. Each type and composition of tile for each color and texture required, at least 12-inches square, mounted on plywood or hardboard backing and grouted.
   2. Full-size units of each type of trim and accessory for each color required.
   3. Metal edge or divider strips in 6-inch lengths.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, and variety of tile from a single source with resources to provide products of consistent quality in appearance without delaying progress of the work.

B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

C. Field-Constructed Mock-Up: Before installing tile, erect mock-up to demonstrate aesthetic effects and qualities of materials and installation.
   1. Locate on site in a location and size as directed by the District’s Representative. Mock up is not to be used as product in the final building.
   2. Obtain District’s Representative's acceptance before start of final work

3. Retain and maintain during construction in undisturbed condition as a standard for judging completed work.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Adhesives, sealants and sealant primers used on the interior of the building shall comply with Bay Area Air Quality Management District Rule #51. VOC limits

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with ANSI A137.1 for labeling sealed tile packages.

B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.

B. Maintain temperatures at 50-deg. F. or more in tiled areas during installation and for 7-days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.8 EXTRA MATERIALS

A. Furnish additional tile for replacement and maintenance, at the rate of approximately 3-percent, to the nearest full carton, for each size, color, pattern, and type installed. Identify each carton as to contents.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Tile:
1. Toilet Room Wall Tile: Thin set Porcelain wall tile with coved tile base. Provide bullnose trim at outside corners and field butted square inside corners.
2. Trim: Units to match adjoining flat tile.
   a. Straight base for thin set; coved for thick set.
   b. Bullnose wainscot caps and external corners
   c. Field butted interior corners.
3. Colors and sizes as shown on Drawings.

B. Backing materials and membranes:
1. Cementious Backing Board: Wonderboard, Durock, or equal. Minumum 1/2” thickness.
2. Crack control membrane: Custom Building Products RedGard Fabric Membrane, or equal.

C. Setting materials:
1. Portland Cement: ASTM C150, Type I.
2. Sand: ASTM C144
3. Hydrated Lime: ASTM C206 or C207, Type S.
4. Water: Clean, clear, potable.
5. Cement Mortar: Job mixed, Portland cement, sand, water, and hydrated lime at Contractor's option, proportions specified in ANSI A108.1.
6. Latex Portland-Cement Mortar: ANSI A118.4.

7. Bond Coat: Portland cement paste on a plastic setting bed, or dry-set or latex-Portland cement mortar on a cured setting bed, except where any one type is specified in referenced TCA installation method.

D. Grouting Materials:
1. Commercial Portland cement Grout: ANSI A118.6, color as approved by the District's Representative from manufacturer's standard colors.
2. Dry-Set Grout: ANSI A118.6, color as approved by the District's Representative from manufacturer's standard colors.
3. Latex-Portland Cement Grout: ANSI A118.6, color as approved by the District's Representative from manufacturer's standard colors.
4. Chemical-Resistant Epoxy Grout: ANSI A118.3, color as approved by the District's Representative from manufacturer's standard colors.
5. Grout Schedule:
a. Wall Tile: Commercial Portland cement, dry-set, or latex-Portland cement.
b. Public Toilet Room Floors: Epoxy.

E. Miscellaneous Materials:
1. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8-inch wide at top edge with integral provision for anchorage to mortar bed or substrate.
2. Sealer: As recommended by tile and grout manufacturers.
3. Curing Cover: 40-pound Kraft membrane.
4. Elastomeric Sealant: As specified in Section 07 92 00.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrates and areas where tile or stone will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.

3.2 PREPARATION

A. Blending: For tile exhibiting color variations within the range selected, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standard: Comply with referenced parts of ANSI 108 series of tile installation standards.

B. TCA Installation Guidelines: Comply with TCA "Handbook for Porcelain Tile Installation" installation methods referenced.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars or covers overlap tile.

E. Jointing Pattern: Unless otherwise indicated, lay tile in grid pattern. Align joints when adjoining tiles on walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise indicated.
1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so that extent of each sheet is not apparent in finished work.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.
1. Prepare joints and apply sealants as specified in Section 07 92 00.

H. Slope to drains:
1. Epoxy floors: drop drains ¾” and slope for minimum 6’ circle around drain.

3.4 TILE INSTALLATION METHODS

A. Interior Walls:
1. Thin-set over Cementitious Backing Board: Install over cementitious backing board in accordance with ANSI A108.5 using TCA Method W244

3.5 EXPANSION JOINTS

A. Comply with TCA Method EJ171. Proposed joint locations shall be approved by the District’s Representative.
1. Interior: Provide expansion joints at 24- to 36-feet on center in both directions, over cold joints and saw-cut control joints, and where tile abuts restraining surfaces. Joint spacing for tile exposed to direct sunlight or moisture shall be 12-to 16-feet on center. Joint width for paver tile shall be minimum 1/4-inch wide; Porcelain tile and glazed wall tile shall be minimum 1/8-inch.
2. Exterior Install expansion joints not to exceed 20’ any direction.

B. Sealant Materials: As specified in Section 07 92 00.

3.6 CLEANING

A. Upon completion of placement and grouting, clean tile surfaces so they are free of foreign matter.
1. Remove latex-Portland cement grout residue from tile as soon as possible.
2. Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work. Do not use acid or acid cleaners to clean tile.

3.7 CURING

A. Damp cure tile installations, including Portland cement grouts, for a minimum of 72-hours.
1. Cover with clean non-staining Kraft paper.

3.8 PROTECTION

A. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures tile is without damage or deterioration at time of Substantial Completion.
   1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

B. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

C. Apply sealer to Portland cement grout installations in accordance with sealer manufacturer's recommendations. Apply to small test area and obtain District's Representative's approval before proceeding with application over large areas.

3.9 CONSTRUCTION WASTE MANAGEMENT

A. Separate waste in accordance with the Waste Management Plan and place in designated areas in the following categories for recycling:
   1. ½ tiles and larger, set aside for reuse by District, non-profit organizations such as Habitat for Humanity, etc.
   2. Broken tile and cut offs smaller than ½ tile, excess mortar and grout, crush for use as mosaic, sub-base or fill
   3. Separate metal waste and place in designated areas for recycling or reuse
   4. Separate cardboard waste and place in designated areas for recycling.

END OF SECTION – 09 30 00

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Acoustic Ceiling Panels.

B. Metal ceiling suspension systems.

1.2 SUBMITTALS

A. Product Data: Manufacturer's descriptive and technical data and illustrations. Include MSDS data sheets.

B. Material Samples: Duplicate sets of full-size panels for each type and size of acoustical unit required.

C. LEED Submittals:
1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

1.3 ENVIRONMENTAL QUALITY ASSURANCE

A. Recycled Content: Provide acoustical panels with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum percentage by weight as required for the LEED Credit.

B. Applicable LEED Credits:
1. Credit MR 4.1 and MR 4.2 – Recycled Content.

1.4 EXTRA MATERIALS

A. In addition to acoustical panels for completing installations required, furnish additional units, in typical field sizes, for each type of unit used in the work.

B. Furnish quantities equal to not less than 3-percent of total installed area of each type of unit or greater to result in full carton lots for each type, except not less than one full carton for any one type of unit.

C. Supply extra units from production lots or color runs the same as for units used in the work, and supply in cartons as factory packaged and labeled. Also identify cartons with Project name and type of ceiling panel.

D. Deliver materials to project premises just prior to substantial completion, and store at location as directed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL CEILING PANELS

A. Typical Ceiling Panels: Armstrong.
1. See Room Finish Schedule

B. Typical Suspension system: USG Donn DX 15/16” Exposed Tee.
   1. Bracing Wires: Connection device capable of carrying not less than 200-pounds or the actual design load, whichever is greater, with a safety factor of 2 without yielding.
   2. Compression Stiffeners: Minimum 20-gauge metal stud with 7/8-inch flange up to 4-feet in length; minimum 25-gauge metal stud with 1-5/8-iinch flange and lips up to 8-feet in length. Provide structural calculations for compression stiffeners greater than 8-feet in length.
   3. Wall Angle M7.

PART 3 - EXECUTION

3.1 AMBIENT CONDITIONS

A. Building shall have been entirely enclosed and heated not less than 10-days before start of suspended-ceiling work.

B. Before installation, acoustical units shall have been stored within the spaces where they are to be used for not less than 3-days, and with cartons opened and stripped sufficiently to permit units to stabilize to ambient conditions.

C. Remove and replace all acoustical panel ceiling products that are exposed to water and display mold and mildew. Removal shall occur as soon as possible after exposure to water.

3.2 INSTALLATION

A. Install acoustical panels in suspended grid system in accordance with manufacturer's instructions.

B. Touch-up edges to match factory cut panels.

3.3 COMPLETION

A. Acoustical panels shall rest uniformly on their supporting members and shall be flat and free from twist and warp.

B. Exposed surfaces of acoustical units shall be clean and free from scratches, dents, tool marks, stains, discoloration, fingerprints, and other defects and damage.

3.4 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Division 01 Section 01 74 00 including, but not limited to:

   1. Separate waste and place in designated areas in the following categories for recycling:
      a. ½ panels and larger, set aside for reuse by District, non-profit organizations such as Habitat for Humanity, etc.
      b. Place scrap panels in designated areas for recycling or reuse.
      c. Separate cardboard waste and place in designated areas for recycling.

END OF SECTION – 09 51 13

SECTION 09 61 43

WATER VAPOR EMISSION TESTING

PART 1 - GENERAL

1.1 SUMMARY

A. Concrete moisture vapor emission and alkalinity testing.
   1. Testing is required in all areas scheduled to receive adhesive applied flooring systems.

1.2 RELATED SECTIONS

A. Cast-in-place concrete is specified in Section 03 30 00.

B. Resilient sheet flooring is specified in Section 09 65 16.

C. Tile carpeting is specified in Section 09 68 13.

1.3 SUBMITTALS

A. Test Data: Submit result of testing, location and interior building conditions during testing period.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Acclimate interior conditions to the working environment of the Owner prior to performing the following testing methods and in accordance with system manufacturer recommendations:

B. Moisture: Perform ASTM F1869 anhydrous calcium chloride testing directly on concrete surface; without damaging installed product at a rate of one (1) test for each 1,000 square foot of floor space.

C. Alkalinity: Perform ASTM F710 alkalinity testing during retrieval of moisture tests, directly inside dome area by placing several drops of manufacture provided solution to concrete surface. Wait 60-seconds and apply digital LCD pH meter. Record results to the nearest hundredth on final test report.

D. Repair damage to treatment as needed to meet flooring tolerance.

END OF SECTION 09 61 43

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 09 65 16

RESILIENT SHEET FLOORING AND BASE

PART 1 - GENERAL

1.1 SUMMARY

A. Resilient sheet flooring.

B. Resilient planks.

C. Resilient base.

1.2 RELATED SECTIONS

A. Water vapor emission testing is specified in Section 09 61 43.

1.3 SUBMITTALS

A. Product Data: Submit for each type of product specified.

B. Shop Drawings: Show location of seams and edge strips. Indicate location of columns, doorways, enclosing partitions, built-in cabinets, and locations where cutouts are required in flooring.

C. Samples:
1. For verification purposes in form of 6-inch by 9-inch sections of each different color and pattern of resilient sheet floor covering product specified, showing full range of variations expected in these characteristics.
2. Sample of coved base outside corner showing heat welding techniques to be used in forming outside corners. Modify as directed by the District's Representative until corner sample is approved.

D. Maintenance data for resilient sheet floor coverings.

E. LEED Submittals:
1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
2. Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage Installer that is certified by floor covering manufacturer as competent in the technique for heat-welding seams.

B. Fire Performance Characteristics: Provide resilient sheet floor coverings with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by Underwriters Laboratories, Inc. (UL) or another testing and inspecting agency acceptable to authorities having jurisdiction.
1. Critical Radiant Flux: 0.45-watts per sq. cm or more per NFPA 253 (ASTM E648).
2. Smoke Density: Less than 450 per NFPA 258 (ASTM E662).

C. Resilient sheet flooring shall have a slip resistance coefficient of 0.6.

D. Comply with ESUHSD Standards & Design Guide.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Provide linoleum sheet flooring with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 10-percent of cost of materials used for the Project.

B. Adhesives and sealants shall comply with Bay Area Air Quality Management District (BAAQMD) Rule #51. VOC limits as follows:
   1. Flooring Adhesives: 150 g/L.

C. Available LEED Credits:
   1. Credit MR 4.1 and MR 4.2 – Recycled Content
   2. Credit EQ 4.1 – Low-Emitting Materials, Adhesives & Sealants.

1.6 REGULATORY REQUIREMENTS

A. Slip Resistant Surfaces: Conform to the more restrictive provisions of Title III of the Americans with Disabilities Act or California Building Code (CBC).

B. Resilient flooring shall have a coefficient of friction of at least 0.6 per ASTM D2047.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver resilient sheet floor coverings and installation accessories to Project site in original manufacturer's unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store flooring materials in dry spaces protected from the weather with ambient temperatures maintained between 50- and 90-deg. F.

C. Move resilient sheet floor coverings and installation accessories into spaces where they will be installed at least 48-hours in advance of installation.

1.8 PROJECT CONDITIONS

A. Maintain a minimum temperature of 70-deg. F. in spaces to receive resilient sheet floor coverings for at least 48-hours prior to installation, during installation, and for not less than 48-hours after installation. After this period, maintain a temperature of not less than 55-deg. F. and not more than 95-deg. F. unless otherwise acceptable to the floor covering manufacturer.

B. Do not install resilient sheet floor coverings until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic while installing resilient sheet floor covering.

D. Provide for continuous ventilation during installation using as close to 100-percent outside air as possible.

1.9 SEQUENCING AND SCHEDULING

A. Install resilient sheet floor coverings and accessories after other finishing operations, including painting, have been completed.

B. Do not install resilient sheet floor coverings over concrete slabs until the slabs have cured and are sufficiently dry to bond with adhesive as specified in Section 09 61 43.

1.10 WARRANTY

A. Warrant resilient sheet flooring to be free from defects in materials and workmanship for a period of 5-years from the Date of Substantial Completion. This warranty shall be in addition to and not a limitation of other rights the District may have against the Contractor under the Contract Documents.

1.11 EXTRA MATERIALS

A. Deliver extra materials to District. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.

B. Furnish not less than 5-percent, in roll form of each different composition, wearing surface, color, and pattern of resilient sheet floor covering installed.

PART 2 - PRODUCTS

2.1 FLOORING AND BASE MATERIALS

A. Vinyl Planks: See Finish Schedule.

B. Rubber Base: Burke, Flexco, or equal. Patterns and colors as specified on Drawings.
1. Style: Cove with top-set toe for use with resilient flooring, straight with no toe for use with carpet.
2. Height: 4-inches.
3. Lengths: Coils in lengths standard with manufacturer but not less than 100-feet.
4. Exterior Corners: Premolded.
5. Interior Corners: Premolded.
6. Ends: Premolded.

2.2 INSTALLATION ACCESSORIES

A. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

B. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by floor covering manufacturer for applications indicated.

C. Adhesives: Provide type and brands of solvent free water-resistant adhesive as recommended by manufacturer of resilient flooring for conditions of installation. Adhesives shall allow slab moisture content up to 10 lbs. Provide adhesive warranty for slab moisture failure.

D. Rod for Heat-Welding Seams: Product of floor covering manufacturer in color as approved by the District's Representative.

E. Provide rubber cap for cove vinyl sheet flooring, carpet edge for glue down applications, reducer strip for resilient flooring, and tile/carpet transition strips.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710 and the following:
1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive.
2. Finishes of subfloors comply with tolerances and other requirements specified in Section 03 30 00 for slabs receiving resilient flooring.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
4. Slab moisture levels shall do not exceed 10 lbs.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with manufacturer's installation specifications to prepare substrates indicated to receive resilient sheet floor coverings.

B. Use trowelable leveling and patching compounds per floor covering manufacturer's direction to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

D. Broom or vacuum clean substrates to be covered by resilient sheet floor coverings immediately before installation. Following cleaning, examine substrates to determine if there is visually any evidence of moisture, alkaline salts, carbonation, or dust.

E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to application of adhesive. Apply according to manufacturer's directions.

3.3 INSTALLATION

A. Comply with resilient sheet floor covering manufacturer's installation instructions and other requirements indicated that are applicable to each type of floor covering installation included in Project.

B. Lay out resilient sheet floor coverings to comply with the following requirements:
1. Maintain uniformity of resilient sheet floor covering direction.
2. Arrange for a minimum number of seams and place them in inconspicuous and low traffic areas, but in no case less than 6-inches away from parallel joints in flooring substrates.
3. Match edges of resilient floor coverings for color shading and pattern at seams.
4. Avoid cross seams.

C. Scribe, cut, and fit resilient sheet floor coverings to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture, including cabinets, pipes, outlets, edgings, thresholds, and nosings.

D. Extend resilient sheet floor coverings into toe spaces, door reveals, closets, and similar openings. Extend resilient sheet flooring under fixed base cabinets and floor cases.

E. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.

F. Adhere resilient sheet floor coverings to flooring substrates by method approved by floor covering manufacturer.
1. Produce completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections.
2. Comply with floor covering manufacturer's directions including those for trowel notching, adhesive mixing, and adhesive open and working times.

G. Heat-weld seams in sheet vinyl floor coverings. Prepare, weld, and finish seams to produce a surface flush with adjoining sheets.

H. Integral Flash Cove Base: Where indicated, cove resilient sheet floor coverings up vertical surfaces to form integral base of height indicated over cove support strip with top edge butted against and covered by cap molding. Form inside and outside corners in accordance with manufacturer’s instructions and to match approved sample.

I. Hand roll resilient sheet floor coverings in both directions from center out to embed floor coverings in adhesive and eliminate trapped air. At walls, door casings, and other locations where access by roller is impractical, press floor coverings firmly in place with flat-bladed instrument.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing resilient sheet floor coverings:
   1. Remove visible adhesive and other surface blemishes using cleaner recommended by floor covering manufacturers.
   2. Sweep or vacuum floor thoroughly.
   3. Do not wash floor until after period recommended by floor covering manufacturer.
   4. Damp-mop floor to remove black marks and soil.

B. For linoleum sheet flooring, expose installed flooring to either natural or artificial light to allow “drying room yellowing” on installed flooring to disappear prior to initiating temporary protection procedures.

C. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by floor covering manufacturer.
   1. Cover resilient sheet floor coverings with undyed, untreated building paper until inspection for Acceptance of Work.
   2. Do not move heavy and sharp objects directly over resilient sheet floor coverings. Place plywood or hardboard panels over floor coverings and under objects while they are being moved. Slide or roll objects over panels without moving panels.

D. Clean resilient sheet flooring not more than 4-days prior to dates scheduled for inspections intended to establish date of Acceptance of Work in each area of Project. Clean resilient sheet floor coverings by method recommended by manufacturer.

3.5 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Division 01 Section 01 74 00 including, but not limited to:

   1. Separate waste and place in the following categories for re-use:
      a. Sheet materials larger than 2-sq. ft.
   2. Linoleum and cork, if used, are biodegradable and may be shredded and composted.
   3. Close and seal tightly all partly used adhesive containers and store protected in well-ventilated fire-safe area at moderate temperatures.
   4. Place used adhesive tubes and containers in areas designated for hazardous materials.

END OF SECTION – 09 65 16

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 09 68 13

TILE CARPETING

PART 1 - SUMMARY

1.1 DESCRIPTION

A. Tile Carpeting.

1.2 RELATED SECTIONS

1. Water vapor emission testing is specified in Section 09 61 43.

1.3 SUBMITTALS

A. Manufacturer's literature describing products and installation methods. Include manufacturer's Certification of Compliance with fire rating requirements.

B. Samples:
1. For verification purposes, two full size tiles of each color and pattern selected.
2. 12-inch long sample of carpet accessories.

C. Layout Drawings: Show layout of each area to be covered for approval of pattern, and any pertinent installation details.

D. Maintenance Manuals: Printed copies of manufacturer's recommendations for care, cleaning, and maintenance of specified carpet tiles. Manufacturers' representative shall demonstrate on the job the recommended system of maintenance.

E. Maintenance Materials:
1. Furnish the District with a minimum of 5-percent of each different material and color used in this Project from same dye lot or production run for compatibility with the installed materials.

F. Furnish materials in securely wrapped packages or factory sealed packing with the manufacturer's standard labels and the material and color designation used in these specifications.

G. Deliver material to the District’s on site designated storage place, unloaded and positioned in place per District's instructions.

H. Furnish a signed receipt indicating materials and quantities upon delivery.

I. LEED Submittals:
1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
2. Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
3. Credit EQ 4.3: Product data for carpet and carpet adhesive. Indicate carpet compliance with Carpet and Rug Institute’s Green Label Plus program, and VOC content of carpet adhesive in g/L calculated according to 40 CFR 59, Subpart D.

1.4 QUALITY ASSURANCE

A. Fire Hazard Classification: Class I floor finish. Minimum critical flux limit of 0.45-watts/square centimeter when tested in accordance with NFPA 253.

B. Static electricity generation of installed carpet shall not exceed 3.5 KV at 70-deg. F and 20-percent R.H. for life of carpet tile.

C. Installer's Qualifications: Installer shall be approved by carpet tile manufacturer, and shall have regularly been providing installations of the types required for no less than 5-years.

D. Visually perceptible deviations in color at sides and end seams shall not be acceptable.

E. Indoor Air Quality: Carpet tile shall meet or exceed the minimum standards contained in the Carpet and Rug Industry (CRI) Institute consumer information label.
   1. Comply with CRI – Carpet and Rug Institute Indoor Air Quality Green Label Testing Program.
   2. All carpet tile products shall comply with the VOC limit established by the Carpet and Rug Institute (CRI) Green Label Indoor Air Quality Test Program.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Provide carpet tile with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 10-percent of cost of materials used for the Project.

B. Carpet tile adhesives shall comply with Bay Area Air Quality Management District (BAAQMD) Rule #51. Maximum VOC content shall be 150 g/L.

C. Carpet tile installed in the building interior shall meet the testing and product requirements of Carpet and Rug Institute's Green Label Plus program.

D. Available LEED Credits:
   1. Credit MR 4.1 and MR 4.2 – Recycled Content.
   2. Credit EQ 4.1 – Low-Emitting Materials, Adhesives & Sealants.
   3. Credit EQ 4.3 – Low-Emitting Materials, Carpet Systems.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver and store packaged materials in original containers labels intact until time for use, with seals unbroken and store rolls in a flat position. Protect from damage, dirt, stains and moisture.

B. Do not store carpet tile near products that can off gas harmful substances.

1.7 PROJECT CONDITIONS

A. Sequencing Schedule: Do not install carpet tiles until building is entirely closed in, wet work and painting is completed, and heating system is in operation.

B. Use adhesives in strict compliance with manufacturer's recommendations, and ventilate area with maximum outside air for a minimum of 48-hours after installation.

C. Test substrates to ensure that no dusting will occur through installed carpet tile. Apply sealer on porous concrete surfaces where required to prevent dusting.

1.8 INDOOR AIR QUALITY

A. Pre-ventilate carpet tile in well ventilated, uninhabited space for a few days prior to installation.

B. Provide maximum ventilation during installation.

C. Isolate area of installation from remainder of building.

D. Clean new carpet tile thoroughly with a high-efficiency particulate air (HEPA) filtration vacuum.

1.9 WARRANTY

A. Warrant the carpet tile to be free of defects for a period of 5-years from date of Substantial Completion. This warranty shall be in addition to and not a limitation of other rights the District may have against the Contractor under the Contract Documents.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Vendor as specified on Drawings.

2.2 ACCESSORIES

A. Crack Filler: Latex base type.

B. Adhesives: Provide type and brands of solvent free water-resistant adhesive as recommended by manufacturer of carpet tiles for conditions of installation. Adhesives shall allow slab moisture content up to 10 lbs. Provide adhesive warranty for slab moisture failure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive carpet tiles and verify that surfaces are suitable for installation.

B. Test concrete floors for moisture with suitable moisture meter. Moisture shall not exceed 10 lbs.

C. Do not begin installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Subfloor:
   1. Prior to installation, repair minor floor irregularities and thoroughly clean floor, leaving no dirt or grit.
   2. Fill cracks exceeding 1/16-inch in width with crack filler and sand smooth.
   3. Confirm compatibility of adhesive with sealers or curing agents on concrete floors.

3.3 INSTALLATION

A. Apply carpet tiles in strict accordance with manufacturer's instructions using the peel-and-stick method of installation.

B. Cut evenly along walls, cut and fit evenly around projections, corners, pipes, electrical outlets, floor air or heating elements, and trim strips.

C. Securely fasten carpet edging strips to floor wherever carpet tiles meet different floor material and no threshold or other divider is noted.

D. Extend carpet tile materials under all open-bottomed and raised-bottom obstructions, and under removable flanges of obstructions. Extend carpet tiles into closets and alcoves of rooms indicated to receive carpeting, unless another material is specifically identified to be used in that space. Carpet tile shall be installed under all movable furniture and equipment.

E. Finish installation shall be free from visual defects.

F. The District's Representative may review carpet tile scraps and retain any he chooses. Remove remainder of scraps from site.

G. Leave carpet, base and walls clean and free from stains, blemishes and other foreign material-. Remove loose threads and vacuum clean.

H. Installation shall not receive furniture or heavy traffic for 48-hours after installation.

3.4 CLEAN UP

A. After completion of the carpet tile installation, remove all waste and excess materials, tools and equipment. The complete installation shall be thoroughly vacuumed, using an upright, commercial grade, beater type cleaner, and left in a clean condition. Provide all necessary temporary protection required.

3.5 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the Applicable provisions of Division 01 Section 01 74 00 including, but not limited to:
1. All scraps of unused material shall be reclaimed and recycled by the carpet tile manufacturer. Include a detailed confirmation of the material received by the manufacturer and documentation that these materials haven recycled into new flooring materials. No incineration of reclaimed materials is acceptable.

END OF SECTION 09 68 13

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Painting and finishing of interior and exterior exposed items and surfaces, including surface preparation, priming and coats of paint specified in addition to shop-priming and surface treatments specified in other Sections.

B. Work includes painting exposed pipes and ducts, hangers, exposed steel and iron, and primed metal surfaces of Mechanical and Electrical equipment, and general sheet metal work, except as otherwise indicated or specified.

C. Work includes painting hardware specified as primed (USP or 600).

D. Work includes sanding shop-primed surfaces and applying specified primer and finish coats. Also, cleaning of any rust, welds and prep for paint.

E. "Paint" means coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

F. Surfaces Not to Be Painted:
1. Pre-finished items, including but not limited to acoustic materials, casework, and finished mechanical and electrical equipment, including light fixtures, switchgear and distribution cabinets.
2. Concealed surfaces such as walls or ceilings in concealed areas and inaccessible areas, furred areas, pipe spaces, and duct shafts.
3. Finished metal surfaces such as anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials, exterior aluminum entrances, storefronts, and windows.
4. Acrylic plaster finish over Portland-cement plaster.
5. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts.

G. Following categories of work are included under other Sections:
1. Shop priming ferrous metal items including structural steel, metal fabrications, hollow metal work and similar items. The work of this Section includes sanding and applying specified primer on all shop-primed surfaces exposed to view in the completed work.
2. Shop priming of fabricated components such as architectural woodwork, wood casework and shop-fabricated or factory-built mechanical and electrical equipment or accessories.
3. Piping identification is specified in Division 25.

H. Do not paint over code-required labels, equipment identification, performance rating, name, or nomenclature plates.

1.2 SUBMITTALS

A. Certification: Furnish certification by the paint manufacturer that products supplied comply with local regulations controlling the use of volatile organic compounds (VOCs).

B. Samples: Furnish samples of each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.
1. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture is achieved.
2. Furnish samples on the following substrates for review of color and texture only:
a. Painted Wood: Two 12-inch square samples of each color and material on hardboard.
b. Stained or Natural Wood: Two 4-inch x 8-inch samples of natural and stained wood finish on actual wood samples.

C. LEED Submittals:

1. Credit EQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.

1.3 QUALITY ASSURANCE

A. Manufacturer: Minimum 5-years manufacturing experience with a full product line.

B. Applicators Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent.

C. Single Source Responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use thinners approved by paint manufacturer, and use within recommended limits.

D. Coordination of Work: Review other Sections in which prime paints are to be provided to ensure compatibility of coatings system for various substrates. Upon request, furnish information or characteristics of finish materials to be used.

E. Requirements of Regulatory Agencies: Comply with applicable rules and regulations of governing agencies for air quality control.
1. Comply with current applicable regulations of the local air quality district, California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).
2. Regulatory changes may affect the formulation, availability, or use of specified coatings. Confirm availability of coatings to be used prior to start of painting.

F. Field Samples: On interior and exterior wall surfaces provide full-coat finish samples on at least 100-sq. ft. of surface, as directed, until required sheen, color and texture is obtained; simulate finished lighting conditions for review of in-place work. Approved samples will be used as a standard for the Project.

G. Comply with ESUHSD Standards & Design Guide.

1.4 INTERIOR ENVIRONMENTAL QUALITY ASSURANCE

A. Architectural paints, coatings and primers applied to interior walls and ceilings shall not exceed VOC content limits established in Green Seal Standard GS-11, Paints, First Edition, May 20, 1993.
1. Flats: Maximum 50 g/L.
2. Non-Flats: Maximum 150 g/L.

B. Anti-corrosive paint and coatings shall have a maximum VOC content of 250 g/L established in Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997.

C. Clear wood finishes, floor coatings, stains, and shellacs applied to interior elements: Do not exceed the VOC content limits established in Bay Air Quality Management District (BAAQMD) Rule 3, Architectural Coatings, amended July 1, 2009.
1. Clear wood finishes:
   a. Varnish – 350-g/L.
   b. Lacquer – 550-g/L.
   c. Clear Brushing Lacquer – 680 g/L.
   d. Floor Coatings – 250-g/L.
2. Sealers:
   a. Waterproofing Sealers – 250-g/L.
   b. Sanding Sealers – 350-g/L.
3. Shellacs:
   a. Clear – 730-g/L.
   b. Pigmented – 550-g/L.
4. Stains: 250-g/L.

D. Available LEED Credits:
   1. Credit EQ 4.2 – Low-Emitting Materials, Paints & Coatings.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name, batch number, color, and directions.

B. Store materials in tightly covered containers. Maintain containers in a clean condition, free of foreign materials and residue.

C. Keep storage area neat and orderly. Remove oily rags and waste daily. Ensure that workers and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.6 JOB CONDITIONS

A. Apply water-base paints when temperature of surfaces to be painted and surrounding air temperatures are between 50-deg. F. and 90-deg. F., unless otherwise permitted by paint manufacturer's printed instructions.

B. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45-deg. F. and 90-deg. F., unless otherwise permitted by paint manufacturer's printed instructions.

C. Do not apply paint in rain, fog or mist, or when relative humidity exceeds 85-percent, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions.

D. Interior rooms/spaces shall be supplied with 100-percent outside air during painting and for a period of 72-hours following completion of painting. The air leaving the room/space shall be exhausted only to the outside, with no distribution to any occupied spaces during painting and for a period of 72-hours following completion of painting.

1.7 EXTRA MATERIALS

A. In addition to materials for completion of the work, furnish 5-gallons of additional materials for each type and color of opaque paint used.

B. Furnish extra materials from same production lots or color runs used in the work. Furnish in containers factory sealed and labeled. Identify each container with Project name and type of material.

C. Deliver materials and an inventory list just prior to Substantial Completion and store where directed by the District’s Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Material Compatibility: Provide block fillers, primers, finish coat materials, and related materials that are compatible with one another and the substrates indicated under conditions of service and application.

B. Material Quality: Provide best quality grade of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying manufacturer's identification as a standard, best-grade product will not be acceptable.

C. Manufacturer: Dunn-Edwards or approved equal.

2.2 COLORS

A. Colors shall match color chips approved by the District’s Representative. Paint colors shall be selected from manufacturer’s premium color range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which painting is to be applied. Surfaces receiving paint shall be thoroughly dry before paint is applied.
   1. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify District's Representative prior to applying barrier coats.
   2. Clean surfaces before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning.
   3. Start of painting will be construed as the applicator's acceptance of surfaces and conditions within a particular area.

3.2 PROTECTION

A. Protection: Protect work of other Sections against damage by painting and finishing work. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to District's Representative.
   1. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
   2. Remove or protect hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting. Following completion of painting, reinstall removed items.
   3. At completion of work of other Sections, touch-up and restore damaged or defaced painted surfaces.

3.3 SURFACE PREPARATION

A. Concrete and Masonry:
   1. Prepare surfaces to be painted by removing surface contaminates.
      a. Remove efflorescence with stiff bristle brush, wire brushing, wiping, sandblasting or acid washing and rinsing. Allow to dry.
      b. Remove chalk, dust, dirt, asphalt, tar or excessive mortar by scraping or wire brushing.
      c. Remove rust, grease or oil by solvent cleaning or sandblasting.
      d. Treat concrete surfaces which are highly glazed or where traces of form release agents are present with a preparation of one-part concentrated muriatic acid, 4-parts water and one-part detergent or as recommended by parting compound manufacturer. Remove acid with water. Allow to dry.
      e. Remove stains on concrete resulting from weathering or corroded metals, with a solution of 2-oz. sodium methasilicate in one-gallon water. Wet stained areas with water before application of solution. Allow to dry.

B. Plaster:
   1. Clean surfaces free from grit, loose plaster and surface irregularities.
   2. Determine alkalinity and moisture content by performing appropriate tests. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's literature or where pH exceeds 10.

C. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.

   1. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dry.
   2. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
   3. When transparent finish is required, back-prime with spar varnish.
   4. Back-prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
   5. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

D. Ferrous Metal: Clean ungalvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with recommendations of The Society for Protective Coatings (SSPC).
   1. Blast surfaces clean as recommended by the paint system manufacturer and according to requirements of SSPC specification SSPC-SP 10.
   2. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   3. Sand shop-applied prime coats to a smooth surface, ready to receive specified primer and finish coats. Also, cleaning of any rust, welds and prep for paint.
   4. See Section 05 12 13 for preparation of Architecturally Exposed Structural Steel (AESS).

E. Galvanized Metals: Clean with non-petroleum-based solvents so that the surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

F. Gypsum Wallboard: Clean surfaces of dust, dirt, grease, oil and other foreign matter and dust clean.

3.4 MATERIALS PREPARATION

A. Mix and prepare painting materials in accordance with manufacturer's directions.

B. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.

C. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and strain material before using.

D. Use thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.5 APPLICATION

A. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
   1. Provide finish coats compatible with prime coats.
   2. The number of coats required is the same regardless of the application method. Do not apply following coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where required to produce a smooth even surface.
   3. Apply additional coats when undercoats, stains or other conditions show through final coat, until paint film is of uniform finish, color and appearance. Edges, corners, crevices, welds, and exposed fasteners shall receive a dry film thickness equivalent to that of flat surfaces.
   4. Paint surfaces behind movable equipment and furniture.
   5. Paint surfaces behind permanently-fixed equipment or furniture with prime coat before final installation of equipment.
   6. Paint visible surfaces of ducts where visible through registers or grilles with a flat, non-specular black paint.
   7. Paint back sides of access panels, and removable or hinged covers to match exposed surfaces.
   8. Finish interior of wood veneer wall and base cabinets and similar field-finished casework to match exterior.
   9. Finish doors on top, bottom and side edges same as faces. Where openings into rooms have different finishes, finish door edges as directed by the District’s Representative.
   10. Omit primer on metal surfaces that have been shop-primed and touch-up painted, unless otherwise indicated.

B. Scheduling Painting: Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation.
   1. Allow sufficient time between successive coatings to permit proper drying.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's instructions.

1. Brushes: Use brushes best suited for the material applied.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

D. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate.

E. Mechanical and Electrical Work: Painting mechanical and electrical work is limited to items exposed in mechanical equipment rooms and in occupied spaces. Finish to match adjoining wall or ceiling surfaces.
1. Mechanical items to be painted include, but are not limited to, piping, hangers, and supports; heat exchangers; tanks; ductwork; insulation; supports; motors and mechanical equipment; air grilles and diffusers; and accessory items.
2. Electrical items to be painted include, but are not limited to conduit and fittings, panels, and switchgear.

F. Block Filler: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores completely filled flush, free of pinholes. Provide multiple coats if required.

G. Prime Coats: Before applying finish coats, apply a prime coat. Re-coat primed and sealed surfaces where there is evidence of suction spots or unsealed areas to assure a finish coat with no burn-through or other defects.

H. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness and other surface imperfections will not be acceptable.

I. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.

J. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.6 FIELD QUALITY CONTROL

A. The District reserves the right to invoke the following test procedure at any time and as often as the District deems necessary during painting.
1. The District will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
2. The testing laboratory will perform appropriate tests for material analysis, abrasion resistance, reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, re-coating, skinning, color retention, alkali and mildew resistance, and application to specified mil thickness.
3. If test results show material being used does not comply with specified requirements, the Contractor may be directed to stop painting, remove non-complying paint, pay for testing, repaint surfaces coated with rejected material, and remove rejected material from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible.

3.7 CLEANING

A. Clean-Up: During progress of work, remove discarded paint materials, rubbish, cans and rags at end of each work day.

B. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by washing and scraping; do not scratch or damage finished surfaces.

3.8 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal other than AESS, Acrylic Semigloss:

First Coat:	Metal Primer
Second and Third Coats:	Acrylic Semigloss Enamel

A. Ferrous Metal (AESS), Polyurethane/epoxy:

First Coat:	Primer as specified in 05 12 13
Second Coat:	Polyamadoamine Epoxy DFT 2.5
Top Coat:	Aliphatic Acrylic Polyurethane DFT 2.5

B. Galvanized and Zinc Alloy Metal, Acrylic Semigloss:

First Coat:	Metal Primer
Second and Third Coats:	Acrylic Semigloss Enamel

C. Concrete, Plaster, 100% Acrylic Emulsion Flat:

First Coat:	Primer
Second and Third Coats:	Acrylic Emulsion Flat

D. Concrete Block, 100% Acrylic Emulsion Flat:

First Coat:	Acrylic Block Filler
Second and Third Coats:	Acrylic Emulsion Flat

E. Wood, Semi-Transparent Stain:

First and Second Coats:	Alkyd Semi-Transparent Stain

3.9 INTERIOR PAINT SCHEDULE

A. Wood, Low Odor/Zero VOC Acrylic Semigloss:

First Coat:	Acrylic Primer
Second and Third Coats:	Acrylic Semigloss Enamel

B. Wood, Clear Satin Finish:

First, Second & Third Coats:	Clear Satin Waterbased Finish

C. Wood, Stain and Clear Satin Finish:

First Coat:	Wood Stain
Second and Third Coats:	Clear Satin Waterbased Finish

D. Concrete and Plaster, Low Odor/Zero VOC Acrylic Flat:

First Coat:	Primer
Second and Third Coats:	Acrylic Flat Enamel

E. Concrete and Plaster, Low Odor/Zero VOC Acrylic Semigloss:

First Coat:	Primer
Second and Third Coats:	Acrylic Semigloss Enamel

F. Concrete Block, Low Odor/Zero VOC Acrylic Flat:

First Coat:	Acrylic Block Filler
Second and Third Coats:	Acrylic Flat Enamel

G. Concrete Block, Low Odor/Zero VOC Acrylic Semigloss:

First Coat:	Acrylic Block Filler
Second and Third Coats:	Acrylic Semigloss Enamel

H. Gypsum Wallboard, Low Odor/Zero VOC Acrylic Flat:

First Coat:	Primer
Second and Third Coats:	Acrylic Flat Enamel

I. Gypsum Wallboard, Low Odor/Zero VOC Acrylic Eggshell:

First Coat:	Primer
Second and Third Coats:	Acrylic Eggshell Enamel

J. Gypsum Wallboard, Low Odor/Zero VOC Acrylic Semigloss:

First Coat:	Primer
Second and Third Coats:	Acrylic Semigloss Enamel

K. Ferrous Metal other than AESS, Low Odor/Zero VOC Acrylic Semigloss:

First Coat:	Primer
Second and Third Coats:	Acrylic Semigloss Enamel

L. Ferrous Metal (AESS), Waterborne Acrylic Epoxy

First Coat:	Primer as specified in 05 12 13
Top Coat:	Waterborne Acrylic Epoxy DFT 4.0 (not to exceed 250g/l Total VOC)

M. Non-Ferrous Metal, Low Odor/Zero VOC Semigloss:

First Coat:	Primer
Second and Third Coats:	Acrylic Semigloss Enamel

3.10 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Division 01 Section 01 74 00 including, but not limited to:

1. Set aside extra paint for future color matches, or reuse by District. Habitat for Humanity, etc. Where paint recycling is available, collect all waste paint by type and provide for delivery to recycling or collection facility.
2. Close and seal tightly all partly used paint and finish containers and store protected in well-ventilated fire-safe area at moderate temperatures.
3. Place empty containers of solvent based paints in areas designated for hazardous materials.
4. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.

END OF SECTION – 09 91 00

SECTION 09 96 56

EPOXY FLOOR COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Provide a complete epoxy floor system for concrete surfaces that meet the requirements for specific use indicated in the contract documents. Include all applicable substrate testing, surface preparation, and detail work.

1.2 RELATED SECTIONS

A. Section 03 30 00 – Cast-in-Place Concrete.

B. Section 09 00 00 – Finishes.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Submit manufacturer's product data sheets on each product and system to be used including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements.
   3. Installation methods.
   4. Maintenance requirements.

C. Selection Samples: For each system specified, provide two sets of samples and color charts, representing manufacturer's full range of colors and patterns.

1.4 QUALITY ASSURANCE

A. All materials used in the epoxy floor system shall be manufactured and provided by a single manufacturer to ensure compatibility and proper bonding.

B. 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.

C. Contractor shall have a minimum of 3 years experience installing epoxy floor coating similar to that which is required for this project and who is acceptable to the manufacturer.
   1. Applicator shall designate a single individual as project foreman who shall be on site at all times during installation.
   2. Contractor must show and have QCA Qualified Contractor/Applicator paperwork from the manufacturer of the coating system, as required to obtain a long-term jobsite specific warranty.

D. Convene a pre-application meeting before the start of application of coating system. Require attendance of parties directly affecting work of this section, including: Architect, contractor, applicator, and authorized representative of the coating system manufacturer and interfacing trades. Review the following:
   1. Drawings and specifications affecting work of this section.
   2. Protection of adjacent surfaces.
   3. Surface preparation and substrate conditions.

4. Application.
5. Field quality control.
6. Protection of coating system.
7. Repair of coating system.
8. Coordination with other work.

1.5 DELIVERY, STORAGE & HANDLING

A. Delivery: Materials shall be delivered to the job site in sealed, undamaged containers. Each container shall be clearly marked with manufacturer's label showing type of material, color, and lot number.

B. Storage: Store all materials in a clean, dry place with a temperature range in accordance with manufacturer's instructions.

C. Handling: Handle products carefully to avoid damage to the containers. Read all labels and Material Safety Data Sheets prior to use.

1.6 PROJECT SITE CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within the limits recommended by the manufacturer.

B. Concrete shall be tested for moisture before applying seamless coating. Water vapor transmission upwards through on-grade concrete slabs may result in loosening of epoxy floors or improper curing of epoxy materials. If moisture emissions exceed 5 pounds per 1,000 square feet contact the manufacturer before application.

C. Concrete must be at least 2500 psi and feel like 50 or 80 grit sandpaper.

D. Concrete must be cured for minimum of 28 days before coating is applied.

E. Schedule coating work to avoid excessive dust and airborne contaminates. Protect work areas from excessive dust and airborne contaminates during coating application.

F. Before any work is started, the applicator shall examine all surfaces for any deficiencies. Should any deficiencies exist, the architect, owner or general contractor shall be notified in writing and any corrections necessary shall be made.

1.7 WARRANTY

A. Upon completion of the work in this section provide a written warranty from the manufacturer against defects of materials for a period of 1 (one) year. To obtain project specific warranty the coating system applicator must be a Westcoat Qualified Contractor/Applicator and apply for warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturer: Westcoat Specialty Coatings: 770 Gateway Center Drive, San Diego, CA 92102. Telephone 800-250-4519. Fax 619-262-8606. Website: www.westcoast.com.

2.2 MATERIALS

A. As basis of design Westcoat Liquid Granite System (no substitutions will be accepted): 100% solids floor coating system with color chips fully broadcasted into pigmented EC-34 Epoxy Topcoat and sealed with EC-32 Epoxy Clear Topcoat.

2.3 COMPONENTS

A. Liquid Granite System: 100% Solids Epoxy with color chips fully broadcasted into base coat.
   1. Primer: EC-12 Epoxy Primer 250-300 square feet per gallon.
   2. Base Coat: EC-34 Epoxy Topcoat pigmented 175-225 square feet per gallon.
   3. Color Chip Broadcast: TC-60 Color Chips into the wet EC-34 Epoxy Topcoat at a rate of 10 square feet per pound.
   4. Top Coat: EC-32 Clear Epoxy Topcoat 200-250 square feet per gallon.
   5. Optional Top Coat: EC-100 Polyurea Topcoat or EC-95 Polyurethane Topcoat 200-300 square feet per gallon.

2.4 ACCESSORIES

A. Supplemental Materials:
   1. Patching materials shall be EC-72 Epoxy Patch Gel or TC-5 Concrete Patch.
   2. Optional aggregate shall be CA-30 Safe Grip, or other sand designed to meet the owners skid resistance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions.
   1. Inspect all surfaces to receive epoxy flooring. Verify that surfaces are dry, clean, and free of contaminates that would prevent epoxy flooring from properly adhering to the surface.
   2. Conduct calcium chloride testing according to ASTM F1869.
   3. Conduct surface profile inspection according to ICRI Technical Guideline No. 03732.
   4. Before starting work, report in writing to the authority having jurisdiction any unsatisfactory conditions.

3.2 SURFACE PREPARATION

A. Prepare surfaces using methods recommended by the manufacturer for achieving the best results for the substrate under the project conditions.

B. Create a surface profile by shot blasting or mechanically abrading the surface.

C. Clean Surfaces thoroughly prior to installation.

D. Rout and clean moving cracks and joints: fill with manufacturer’s recommended flexible epoxy filler material.

E. Repair any non-moving surface deviations with manufacturer’s recommended patching materials.

3.3 INSTALLATION

A. Install coatings in accordance with manufacturer’s instructions.

B. Mix multi-component materials in accordance with manufacturer’s instructions.

C. Use application equipment, tools and techniques in accordance with manufacturer's instructions.

D. Uniformly apply coatings at spread rates and in number of coats to achieve specified mil thickness recommended by the manufacturer.
   1. Install integral cove base where indicated on the contract drawings and according to manufacturer's instructions.
   2. Key in all drains, edges, and transition points according to manufacturer's instructions.

E. Broadcast aggregates in accordance with the specified system and manufacturer's instructions.

F. Adhere to all limitations, instructions and cautions for epoxy coating as stated in the manufacturer's published literature.

3.4 FIELD QUALITY CONTROL

A. Verify coatings and other materials are as specified.

B. Verify coverage of the system as work progresses. Areas found not to meet the required thickness shall receive additional material until specified thickness is attained.

C. Manufacturer's representative shall provide technical assistance and guidance for surfaces preparation and application of coating systems.

3.5 PROTECTION AND CLEAN-UP

A. Installation areas must be kept free from traffic and other trades during the application procedure and cure time.

B. Protect finish surfaces of coating system from damage during construction.

C. Touch-up, repair or replace damaged flooring system after substantial completion.

D. Clean area and remove all debris upon completion of work. Dispose of empty containers properly according to current Local, State and Federal regulations.

3.6 MAINTENANCE

A. Contractor shall provide to owner, maintenance and cleaning instructions for the floor system upon completion of work. Owner is required to clean and maintain the surfaces to maintain manufacturer's warranty.

END OF SECTION – 09 96 56

SECTION 10 11 00

VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 SUMMARY

A. Porcelain enamel markerboards.

B. Natural cork tackboards.

C. Whiteboard Paint.

D. Dry Erase Wallcoverings

1.2 SUBMITTALS

A. Product Data: Manufacturer's technical data and installation instructions for each material and component part, including data substantiating that materials comply with specified requirements.

B. Shop Drawings: Include sections of typical trim members and dimensioned elevations. Show anchors, grounds, reinforcement, accessories, layout and installation details.

C. Samples: Full range of color samples for each type of markerboard, tackboard, trim and accessory. Furnish 12-inch square samples of sheet materials and 12-inch lengths of trim members for color verification after selections have been made.

D. LEED Submittals:
1. Credit EQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D.
2. Credit EQ 4.4: Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin or binder.

1.3 QUALITY ASSURANCE

A. Manufacturer: Unless otherwise acceptable to District's Representative, furnish markerboards and tackboards by one manufacturer for the entire Project.

B. Installer Qualifications: Engage an experienced installer who is an authorized representative of the manufacturer for both installation and maintenance of sliding units.

C. Comply with ESUHSD Standards and Design Guide.

1.4 ENVIRONMENTAL QUALITY ASSURANCE

A. Adhesives shall comply with South Coast Air Quality Management District (SCAQMD) Rule #1168, VOC content as follows:
1. Panel Adhesives: 50 g/L.
2. Multipurpose Construction Adhesives: 70 g/L.

B. Do not use composite wood and agrifiber products that contain urea-formaldehyde resin.

C. Available LEED Credits:
   1. Credit EQ 4.1 – Low-Emitting Materials, Adhesives & Sealants.
   2. Credit EQ 4.4 – Low Emitting Materials, Composite Wood & Agrifiber.

PART 2 - PRODUCTS

2.1 MARKERBOARDS

A. Porcelain Enamel Markerboards: Provide balanced, high-pressure-laminated porcelain enamel markerboards of 3-ply construction consisting of face sheet, core material, and backing.
   1. Face Sheet: 24-gauge enameling grade steel, exposed face coated with primer, ground coat, and color cover; concealed face coated with primer and ground coat. Cover coat shall be manufacturer's special writing surface with gloss finish intended for use with liquid felt-tipped markers.
   2. Core: 3/8-inch thick particleboard or 1/4-inch thick tempered hardboard.
      a. Particleboard shall comply with ANSI A208.1, Grade 1-M-1, made with binder containing no urea formaldehyde.
   3. Backing Sheet: 0.015-inch thick aluminum sheet.

2.2 TACKBOARDS

A. Natural Cork: Single-layer, 1/4-inch thick, seamless, compressed fine-grain bulletin board quality natural cork sheet, face sanded for natural finish.
   1. Backing: Factory-laminate cork face sheet under pressure to 1/4-inch thick hardboard or 3/8-inch thick fiberboard.
      a. Fiberboard shall comply with ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.

2.3 ACCESSORIES

A. Metal Trim and Accessories: Minimum 0.062-inch thick aluminum. Provide straight, single-length units wherever possible. Miter corners to a neat, hairline closure.
   1. Field-Applied Trim: Manufacturer's standard snap-on trim, with no visible screws or exposed joints.
   2. Chalktray: Manufacturer's standard continuous solid extrusion-type with ribbed section and smoothly curved exposed ends.

B. Finish aluminum trim and accessories with clear anodized finish.

C. Furnish each markerboard with 12 assorted color markers and a felt eraser.

2.4 WHITEBOARD PAINT

A. Ideapaint Pro, or equal, high performance, high durability dry erase coating.
   1. Complete finishing operations, including painting, prior to installation of dry erase coating.
   2. Provide level 4 finish at gypsum wallboard.
   3. Prime as recommended by dry erase coat manufacturer.

2.5 DRY ERASE WALLCOVERING

A. Koroseal “Walltalkers” or approved equal.

2.6 FABRICATION

A. Porcelain Enamel Markerboards: Laminate facing sheet and backing sheet to core material under pressure with flexible, waterproof adhesive.
   1. Adhesive: Mildew-resistant, non-staining adhesive, as recommended by manufacturer.
B. Provide factory-assembled units unless otherwise acceptable to the District's Representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Deliver factory-built units completely assembled in one piece without joints.

B. Install units as indicated and in accordance with manufacturer's instructions. Maintain perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories required for installation.

3.2 ADJUST AND CLEAN

A. Verify that accessories required for each unit have been properly installed and that operating units function properly.

B. Clean units in accordance with manufacturer's instructions.

END OF SECTION – 10 11 00

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 10 13 00

DIRECTORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Main building directory at Lobby.

1.2 PERFORMANCE CRITERIA

A. Directories shall comply with ESUHSD Sign Program requirements.

1.3 RELATED SECTIONS

A. SECTION 10 14 00 – SIGNAGE

1.4 SUBMITTALS

A. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: Provide dimensioned elevations for each type of directory required; include large-scale sections of typical members and other components. Show anchors, grounds, reinforcement and layout, and indicate finishes.
   1. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as a unit of Work in other Sections.

C. Samples: Provide samples of each exposed material, including message strips, letters, and other graphics, for initial selection of colors, patterns, and textures, as required, and for verification of compliance with requirements indicated.

1.5 QUALITY ASSURANCE

A. Directories shall comply with ESUHSD Sign Program requirements.

1.6 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.1 MAIN BUILDING DIRECTORY

A. Comply with ESUHSD Sign Standards
   1. Header Panel: Clear anodized aluminum.
   2. Backer Panel: Acrylic, matte black.
   3. Panel Strips: Clear non-glare acrylic, black vertical stripes.
   4. Copy Strips: Laser print paper inserts, color to be approved by the District’s Representative.
   5. Logo: Type etched in aluminum or frosted acrylic.
   6. Vertical Panels: Clear non-glare acrylic, painted vertical spines.
   7. Fasteners: Hex head, black.

8. Type Face:
   a. Building Name: Futura Bold.
   b. Directory: Berkeley Bold.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units plumb and level, in locations and with mountings shown. Securely attach to the supporting structure with concealed fasteners, in accordance with the manufacturer's installation instructions.

3.2 CLEANING

A. At completion of the installation, clean surfaces in accordance with the manufacturer's instructions.

3.3 PROTECTION

A. Protect installed directories boards from damage until acceptance by the District.

END OF SECTION – 10 13 00

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section describes the requirements for furnishing and installing the following types of signs:
   1. Accessibility entrance signs.
   2. Exterior building identification signs.
   3. Toilet room entry signs.
   4. Room identification signs.
   5. Interior tenant identification signs.
   6. Informational signs.
   7. Directional signs.
   8. Bulletin board signs.
   9. Emergency exit map signs.
   10. International symbol of accessibility signs.

1.2 SUBMITTALS

A. Product Data: Manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.

B. Shop Drawings: Furnish shop drawings for fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, and reinforcement, accessories, layout, and installation details.
   1. Furnish message list for each sign required, including large scale details of wording and layout of lettering.
   2. For signs supported by or anchored to permanent construction, furnish setting drawings, templates, and directions for installation of anchor bolts and other anchors.
   3. Furnish full-size spacing templates for individually mounted dimensional letters and numbers.

C. Samples: Furnish samples of each exposed material, including letters and other graphics, showing finish, color, and qualities of fabrication and design.

1.3 QUALITY ASSURANCE

A. Comply with CBC Section 1143B.

PART 2 - PRODUCTS

2.1 MATERIALS AND FABRICATION

A. Acrylic Sheet: Transparent, clear, semi-matte or non-glare, thickness specified.

B. Aluminum Sheet: Alloy and temper recommended by the aluminum producer or finisher for the type of use and finish indicated and specified.

C. Aluminum Extrusions: Alloy and temper recommended by the aluminum producer or finisher for the type of use and finish indicated and specified.

D. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

E. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors that are recommended by acrylic manufacturer for optimum adherence to acrylic surface and are non-fading for the application intended.

F. Interior Signage:
   1. Signs shall be sign manufacturer's standard one piece acrylic sign face with tactile Braille and letters.

2. Sign materials and fabrication shall comply with applicable California Building Code (CBC) and ADA signage requirements.
3. Thickness: 1/8" minimum plus 1/32 inch raised text/Braille. Thickness shall be increased as required for specified sizes and mounting types. Signs with inserts thickness as specified below.
4. Sign Finish: Eggshell, matte, or non-glare as approved by the District's Representative.
5. Copy: 5/8-inch minimum, 2-inch maximum as recommended by sign manufacturer for required copy or as specified on Drawings.
6. Letters: San Serif, Futura Bold.
7. Braille: Grade 2, integral with sign.
8. Mounting: Vinyl foam tape unless mechanical fasteners are indicated. Provide matching backing plates at installations on glass.

2.2 SIGN SUMMARY

A. Entrance Signs:
1. All building entrances that are accessible to and useable by physically handicapped persons shall be identified with at least one standard accessibility symbol sign and with additional directional signs as required, to be visible to persons along approaching pedestrian ways.
2. Comply with CBC Section 1110B.2.

B. Exterior Building Identification Signs (Letters):
1. General: Comply with ESUHSD Sign Standards, Type Exterior 1.
2. Material: Fabricated aluminum letters, finished with a Kynar coating on exposed faces and sides. Custom accent color as indicated on Drawings.
3. Type Face: Futura Bold.
4. Letter Size: 16 inches high x 3 inch thick at Main Entry, 14 inches high x 3 inches thick Flag mounted to structure. See Drawings.

C. Exterior Address Numbers:
1. General: Comply with ESUHSD Sign Standards, Type Exterior 2.
2. Material: Extruded aluminum numbers, finished with a Kynar coating on exposed faces and sides. Custom color as indicated on Drawings.
3. Type Face: Futura Bold.
4. Number Size: 8 inches high x 1/2 inch thick.
5. Wall Mounted.

D. Interior Signage not requiring inserts:
1. General: Comply with ESUHSD Sign Standards, Informational, Code, or Custom as indicated on Drawings.
2. Sign Panel: Etched transparent acrylic, painted back, color per Drawings.
3. Copy: Raised, painted white.
4. Braille: unpainted.
5. Symbols: Raised, painted white or as required to comply with ADA requirements.
6. Comply with CBC Section 1127B.7 for code required signage.

E. Interior Signage requiring inserts:
1. General: Comply with ESUHSD Sign Standards, Informational, Code, or Custom as indicated on Drawings.
2. Backer Panel: 1/4 inch thick acrylic backer panel, painted face and sides, color black.
3. Header/Footer: 1/8 inch etched acrylic as specified for Interior Signage not requiring inserts, permanently mounted to backer panel flush with edges of backer panel.
4. Copy: Raised, painted white.
5. Braille: Unpainted.
6. Insert Faces: Clear unpainted, non-glare acrylic glued flush to edges of header and footer.
7. Insert material: Paper laser inserts provided by ESUHSD.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate where indicated and as required by applicable codes and secure with specified fasteners.

B. Install level, plumb and at height indicated or required, with surfaces free from distortion or other appearance defects.

C. Where signs are adhesively applied, adhesive shall be spread over full contact area.

3.2 CLEANING AND PROTECTION

A. At completion of installation, clean soiled surfaces in accordance with manufacturer's instructions. Protect units from damage until final acceptance.

END OF SECTION – 10 14 00

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 10 21 13

TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section describes the requirements for furnishing and installing stock, manufactured toilet compartments.
   1. Types of compartments include solid color reinforced composite material.
   2. Styles of toilet compartments include floor-anchored, overhead-braced.
   3. Styles of urinal screens include wall-hung.

B. Related Sections:
   1. Toilet accessories are specified in Section 10 28 13.

1.2 PERFORMANCE REQUIREMENTS

A. Graffiti Resistance: Partition material shall have the following graffiti removal characteristics when tested in accordance with ASTM D6578:
   1. Cleanability: Five required staining agents shall be cleaned off material.

B. Scratch Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D2197:
   1. Scratch Resistance: Maximum Load Value shall exceed 10 kilograms.

C. Impact Resistance: Partition material shall have the following characteristics when tested in accordance with ASTM D2794:
   1. Impact Resistance: Maximum Impact Force value shall exceed 30 inch-lbs.

D. Fire Resistance: Partition material shall comply with the following requirements when tested in accordance with ASTM E84:
   1. Smoke Developed Index: Not to exceed 450.
   2. Flame Spread Index: Not to exceed 75.
   3. Material Fire Ratings:
      a. NFPA: Class B.
      b. ICC: Class B.

1.3 SUBMITTALS

A. Product Data: Manufacturer's technical data for materials, fabrication, and installation, include catalog cuts of anchors, hardware, fastenings, and accessories.

B. Shop Drawings: Furnish for fabrication and erection of assemblies not fully described by product drawings, templates, and installation instructions.

C. Samples: Full range of color samples for each type of unit required. Furnish 6-inch square samples of each color and finish on same substrate to be used in the work, for color verification after selections have been made.

D. LEED Submittals:
   1. Credit MR 4.1 and MR 4.2: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Credit EQ 4.4: Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin or binder.

1.4 QUALITY ASSURANCE

A. Field Measurements: Take field measurements prior to preparation of Shop Drawings and fabrication where possible. Allow for adjustments within specified tolerances wherever taking field measurements before fabrication might delay the work.

B. Coordination: Furnish inserts and anchorages to be built into other work; coordinate delivery to avoid delay.

C. Comply with ESUHSD Standards & Design Guide.

1.5 ENVIRONMENTAL QUALITY ASSURANCE

A. Solid plastic toilet compartments shall include a minimum percentage of recycled content as required by the LEED Credit.

B. Available LEED Credits:
   1. Credit MR 4.1 and MR 4.2 – Recycled Content.
   2. Credit EQ 4.4 – Low-Emitting Materials.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. TBD Bobrick Washroom Equipment Solid Phenolic “DuraLine Series” 1080 / 1180, Gerali Custom Design, Inc. “Privacy Plus Toilet Compartments” or equal.

2.2 MATERIALS

A. General: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, and other imperfections are not acceptable.
   1. Include Privacy Options: Gap-Free Interlocking Panels

B. Solid Color Reinforced Composite Material: Material composed of dyes, organic fibrous material, and polycarbonate/phenolic resins. Material shall have a non-ghosting, graffiti resistant surface integrally bonded to core through a series of manufacturing steps requiring thermal and mechanical pressure. Edges of material shall be the same color as the surface.
   1. Finished Panel Thickness:
      a. Stiles and Doors: 3/4-inch.
      b. Panels: 1/2-inch.
   2. Color: One of manufacturer’s full range of colors in each room as approved by the District’s Representative.

C. Hardware: 18-8 type 304 stainless steel with satin finish.

D. Latch:
   1. Sliding door latch shall be 14-gauge and shall slide on nylon track.
   2. Sliding door latch shall require less than 5-lb. force to operate. Twisting latch operation will not be acceptable.
   3. Latch track shall be attached to door by machine screws into factory installed threaded brass inserts.
   4. Threaded brass inserts shall be factory installed for door hinge and latch connections and shall withstand a direct pull exceeding 1,500-lbs. per insert.
   5. Through-bolted stainless steel, pin-in-head Torx sex bolt fasteners shall be used to latch keeper-to-stile connections and shall withstand direct pull force exceeding 1,500-lbs. per fastener.

E. Hinges:
   1. Hinge shall be 16-gauge continuous piano-hinge.
   2. All doors shall be equipped with self-closing hinges.
   3. Continuous piano-hinge shall be attached to door and stile by theft-resistant, pin-in-head Torx stainless steel machine screws into factory installed, threaded brass inserts.
   4. Fasteners secured directly into the core are not acceptable.
   5. Door shall be furnished with two 11-gauge stainless steel door stop plates with attached rubber bumpers to resist door from being kicked in/out beyond stile.
   6. Door stops and hinges shall be secured with stainless steel, pin-in-head Torx machine screws into threaded brass inserts.
   7. Threaded brass inserts shall withstand a direct pull force exceeding 1,500-lbs. per insert.

F. Clothes Hook:
   1. Clothes hook shall be constructed of stainless steel and shall project no more than 1-1/8-inch from face of door.
   2. Clothes hook shall be secured to door by through-bolted, theft-resistant, pin-in-head Torx stainless steel screws. Through-bolted fasteners shall withstand a direct pull force exceeding 1,500-lbs. per fastener.

G. Mounting Brackets: Through-bolted, stainless steel, pin-in-head Torx sex bolt fasteners shall be used for panel-to-stile connections.
   1. Mounting brackets shall be 18-gauge stainless steel and extend full height of panel.
   2. U-channels shall be used to secure panels to stiles.
   3. Angle brackets shall be used to secure stiles to walls and panels to walls.
   4. Fasteners at locations connecting panels to stiles shall utilize through-bolted, stainless steel, pin-in-head Torx sex bolt fasteners. Through-bolted fasteners shall withstand direct pull force exceeding 1,500-lbs. per fastener.
   5. Wall mounted urinal screen brackets shall be 11-gauge double thickness.

H. Leveling Device: 7-gauge, 3/16-inch hot rolled steel bar; chromate-treated and zinc-plated; through-bolted to base of stile.

I. Stile Shoe: One-piece 4-inch high, type 304, 22-gauge stainless steel with satin finish. Tops shall have 90-degree return to stile. Shoe shall be composed of one-piece of stainless steel and capable of being fastened by clip to stiles starting at wall line.

J. Headrail: Satin-finished, extruded anodized aluminum, .065-inch thick with anti-grip profile.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
1. Comply with manufacturer's recommended procedures and installation sequence.
2. Install partitions rigid, straight, plumb, and level.

3. Provide clearances of not more than 1/2-inch between pilasters and panels, and not more than 1-inch between panels and walls.
4. Secure panels to walls with not less than two stirrup brackets attached near top and bottom of panel.
5. Locate wall brackets so that holes for wall anchors occur in masonry or tile joints.
6. Secure panels to pilasters with not less than two stirrup brackets located to align with stirrup brackets at wall.

B. Overhead-Braced Compartments:
1. Secure pilasters to floor and level, plumb, and tighten installation.
2. Secure overhead-brace to each pilaster with not less than two fasteners.
3. Hang doors and adjust so that tops of doors are parallel with overhead-brace when doors are in closed position.

C. Urinal Screens: Attach with concealed anchoring devices, as recommended by manufacturer. Set units to provide support and to resist lateral impact.
1. Provide 4’ long screens with vertical support to floor.

3.2 ADJUST AND CLEAN

A. Hardware Adjustment:
1. Adjust and lubricate hardware for proper operation.
2. Set hinges on in-swinging doors to hold doors open approximately 30-degrees from closed position when unlatched.
3. Set hinges on out-swinging doors and entrance swing doors to return to fully closed position.

B. Clean exposed surfaces of partitions using materials and methods recommended by manufacturer. Protect as required to prevent damage until final acceptance.

END OF SECTION – 10 21 13

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Toilet Room accessories.

1.2 SUBMITTALS

A. Product Data: Manufacturer's product data and installation instructions for each toilet accessory.

B. Setting Drawings: Furnish setting drawings, templates, instructions, and directions for installation of anchorage devices and cut-out requirements in other work.

1.3 PROJECT CONDITIONS

A. Coordinate accessory locations, installation, and sequencing with other work to avoid interference and to assure proper installation, operation, adjustment, cleaning, and servicing.

B. Ensure wall studs and backing plates are installed as required.

1.4 PROJECT WARRANTY

A. Furnish manufacturer's written 5-year warranty against silver spoilage of mirrors, agreeing to replace any mirrors that develop visible defects within warranty period.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Stainless Steel: AISI 18-8 Type 304, with No. 4 finish.

B. Mirror Glass: Clear tempered float glass with silvering, electro-plated copper coating, and protective coating.

C. Fasteners: Concealed screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed. Exposed face fasteners are not acceptable.

D. Keys: Unless otherwise directed by the District’s Representative, provide universal keys for access to toilet accessory units requiring internal access for servicing. Provide a minimum of six keys.

E. Underlavatory ADA guards: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping – antimicrobial, white molded plastic.

2.2 TOILET ACCESSORY ITEMS

A. See Schedule on Drawings.

PART 3 - EXECUTION

3.1 INSPECTION

A. Check wall openings for correct dimensions, plumbness of blocking or frames, and other preparation that would affect installation of accessories.

B. Check areas to receive surface mounted units for conditions that would affect quality and execution of work.

C. Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories.

3.2 INSTALLATION

A. Install toilet accessory units in accordance with manufacturer's instructions, using tamper-proof fasteners. Finish of exposed fasteners shall match accessory item secured. Install units plumb and level, firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamper-proof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, in accordance with manufacturer's instructions for type of substrate involved.

C. Fit flanges of accessories snug to wall surfaces. Install sanitary sealant in gaps between 90-degree return flanges and finish wall surface after installation.

D. Finish edges of accessories with sealant to avoid water penetration.

3.3 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish exposed surfaces of accessories in accordance with manufacturer's recommendations after removing temporary labels and protective coatings.

END OF SECTION – 10 28 13

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section describes the requirements for furnishing and installing the following:
   1. Fire extinguishers.
   2. Fire extinguisher cabinets.

1.2 SUBMITTALS

A. Product Data: Furnish for each type of product specified. For fire extinguisher cabinets, include rough-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style, door construction, panel style, and materials.

B. Samples: Furnish samples of each type of metal finish required, prepared on metal of same thickness and allow to be used in the final work. Where finishes involve normal color and texture variation, include sample sets showing full range of variations expected.

1.3 QUALITY ASSURANCE

A. Obtain fire extinguishers and cabinets from one source from a single manufacturer.

B. UL-Listed Products: Provide fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher specified.

C. Comply with ESUHSD Campus Standards & Design Guide.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS

A. General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated. Comply with requirements of governing authorities. Fire extinguishers shall be fully charged and tagged in accordance with requirements of the authority having jurisdiction.

B. Portable fire extinguishers shall be Amerex 441 or equal, 10-lb., ABC.

2.2 FIRE EXTINGUISHER CABINETS

A. Tub: Heavy-gauge, white baked enamel. Where fire extinguisher cabinets are installed in fire-rated partitions, provide manufacturer’s UL or Warnock Hersey listed liner for 1- or 2-hour wall systems.

B. Cabinet Type: Semi-Recessed.

C. Trim Style: Exposed trim, either square-edge or rolled-edge as standard with manufacturer for cabinet type and depth.

D. Door Material: Type 302/304 stainless steel, No. 4 finish.

E. Door Style: Solid panel with vertical engraved FIRE EXTINGUISHER letters.

F. Door Hardware: Manufacturer's standard door operating hardware for cabinet type, trim style, and door material and style specified. Provide door pull, exposed or concealed, and friction latch. Provide concealed or continuous type hinge permitting door to open 180-deg.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install items in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

B. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim in compliance with manufacturer's instructions.

C. Securely fasten fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.

END OF SECTION – 10 44 00

SECTION 10 51 10

LOCKERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal lockers.

1.2 SUBMITTALS

A. Manufacturer's data and catalog cuts, showing style, construction, finish, and trim and installation requirements.

B. Complete manufacturer's color palette for color selection by Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Republic; Welded, Ventilated Metal Lockers

B. Or equal.

2.2 MANUFACTURED UNITS

A. Multiple Tier Metal Lockers: Standard duty ventilated, two rows, 6 rows eac 12 inch (W) x 12 inch (D) x 24 inch tall all metal construction with baked enamel finish, Color: To be Selected
   1. 16 gauge body parts and 16 gauge frames.
   2. Diamond openings on doors.
   3. Welded assembly.
   4. Continuous vertical door strikes.
   5. Channel edged doors.
   6. Aluminum number plates.

B. Accessories: Provide all end caps, trim, etc., required for complete, finished appearance.

C. Accessibility: Provide hardware and accessories that comply with ADA and CBC accessibility requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instruction, straight and plumb, permanently secured with all concealed fasteners, all moving parts operating smoothly.

END OF SECTION 10 51 10

THIS PAGE LEFT BLANK INTENTIONALLY

SECTION 10 73 16

CANOPIES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work in this section includes furnishing and installation of roll-formed aluminum overhead hanger rod style canopies as manufactured by Mapes Industries, Inc.

B. Related Items and Considerations.
1. Flashing of various designs may be required. Generic flashing supplied by Mapes. Specialty flashing to be supplied by installer.
2. Determine wall construction, make-up and thickness.
3. Ensure adequate wall condition to carry canopy loads where required.
4. Consider water drainage away from canopy where necessary.
5. Any necessary removal or relocation of existing structures, obstructions or materials.

1.2 QUALITY ASSURANCE

A. Products meeting these specifications established standard of quality required as manufactured by Mapes Industries, Inc., Lincoln, Nebraska 1-888-273-1132.

1.3 FIELD MEASUREMENTS

A. Confirm dimensions prior to preparation of shop drawings when possible.

B. If requested, supply manufacturer’s standard literature and specification for canopies.

C. Submit shop drawings showing structural component location/position, material dimensions and details of construction and assembly.

1.4 PERFORMANCE REQUIREMENTS

A. Canopy must conform to local building codes.

B. PE Stamped calculations are not required.

1.5 DELIVER, STORAGE AND HANDLING

A. Deliver and store all canopy components in protected areas.

PART 2 - PRODUCTS

2.1 Manufacturer

A. Mapes Canopies
Lincoln, Nebraska
Phone: 1-888-273-1132.
Fax: 1-877-455-6572.

2.2 MATERIALS

A. Decking shall consist of an interlocking roll-form 2-1/2 W style pan (.032” aluminum).

B. Intermediate framing members shall be extruded aluminum, alloy 6063-T6, in profile and thickness shown in current Mapes brochures.

C. Hanger rods and attachment hardware shall be a standard finish.

D. Fascia shall be standard extruded 12” Smooth Face style.

2.3 FINISHES

A. Finish type shall be 2-Coat Kynar Finish.

2.4 FABRICATION

A. All Mapes canopies are shipped in preassembled sections for ease of installation.

B. All connectins shall be mechanically assembled utilizing 3/16 fasteners with a minimum shear stress of 350 lbs. Pre-welded or factory-welded connections are not acceptable.

C. Decking shall be designed with interlocking roll-formed aluminum members.

D. Concealed drainage. Water shall drain from covered surfaces into intermediate trough and be directed to downspout from rear gutter.

PART 3 - EXECUTION

3.1 INSPECTION

A. Confirm that surrounding area is ready for the canopy installation.

B. Installer shall confirm dimensions and elevations to be as shown on drawings provided by Mapes Industries.

C. Erection shall be performed by an approved installer and scheduled after all concrete, masonry and roofing in the area is completed.

3.2 INSTALLATION

A. Installation shall be in strict accordance with manufacturer’s shop drawings. Particular attention should be given to protecting the finish during handling and erection.

B. After installation, entire system shall be left in a clean condition.

END OF SECTION – 10 73 16

SECTION 11 40 00

FOODSERVICE EQUIPMENT

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 of furnishing all labor and material required to provide and deliver all food service equipment herein specified into the building, uncrate, assemble, set-in-place, level and completely install, exclusive of final utility connections.

B. Furnish all material and labor required to completely provide, deliver and install all Food Service Equipment as specified herein and as shown on the drawings. This work shall be in strict accordance with the plans and specifications with all dimensions verified in the field prior to any fabrication.

1. Coordinate the Food Service Equipment work with the respective trades performing preparatory work for the installation of the Food Service Equipment.

2. Comply with all Federal, State and Municipal regulations which bear on the execution of this project. Food service aisles shall be a minimum of 36” wide and tray slides shall be mounted at 34” maximum above the finished floor. Food service equipment required to be accessible shall conform to all reach requirements in CDC 1104B-5, 1104B-6 and figures 11B-16 and 11B-17.

C. Work Includes:

1. Materials shown on the Food Service Equipment Schedule.

2. Piping, valves, and plumbing accessories that is integral within the equipment.

3. Furnishing control devices such as solenoid valves that are not integral with the equipment, for installation by Mechanical division 15 and/or Electrical Division 16.

4. Wiring, wiring devices, controls and mechanical accessories that are integral in the equipment.

5. Ventilating ducts, flues, controls and mechanical accessories that are integral in the equipment.

6. Anchors, fasteners, fillers and sealants for mounting equipment securely in place.

7. Cooperation with all other contractors on the job including the furnishing of information in the form of drawings, wiring diagrams and other data.

8. Touch-up painting after the installation of the food service equipment.

D. Related Sections include the following:

1. Division 15 Mechanical

2. Division 16 Electrical

1.3 QUALITY ASSURANCE

A. QUALIFICATIONS:

1. Installer: Regularly engaged in providing food service equipment from manufacturers of this type of equipment a minimum of 5 years with at least 5 installations of this size and type that are at least each 3 years old.

B. STANDARD OF MANUFACTURE

1. Food service equipment that is specified as "custom" having no manufacture name or model number shall be manufactured by a Food Service Equipment Fabricator with at lease five (5) years experience with engineering, design and fabrication of food service equipment. The manufacture shall be subject to the review of the Architect and/or Consultant and shall be approved by the National Sanitation Foundation. All Fabricated equipment shall be constructed in strict compliance with the latest standards of the National Sanitation Foundation and shall bear the mark of the National Sanitation Foundation in full compliance with all applicable codes and ordinances.

2. All electrically heated or operated equipment shall bear the seal of approval of the Underwriters Laboratories, and shall comply with the National Electrical Code and all local Codes and Ordinances.

3. All food service equipment that is specified as "buy-out" having a specific manufacture name and model number shall comply with the latest editions of the National Sanitation Foundation.

4. All Gas heated or operated equipment shall be the seal of approval of the American Gas Association (AGA)

5. All Steam heated or operated equipment shall conform to the standard of the American Society of Mechanical Engineers (ASME) and shall be ASME approved.

6. Food shields and Sneeze guards shall meet all the requirements of National Sanitation Foundation (NSF) Standard 2.

1.4 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. SHOP DRAWINGS / EQUIPMENT BROCHURES

1. No ordering or fabrication of equipment shall take place until such time as the equipment brochures and shop drawings have been reviewed in writing by the Architect and/or Consultant. Receipt of this review shall not relieve the Contractor from the responsibility of verifying all quantities and related dimensions, maintaining the specified quality of equipment, and verifying conditions of the job site.

2. Equipment Brochures; within twenty (20) calendar days after award of the contract, six (6) brochures containing manufacturers specification sheets, dimensioned drawings and/or other pertinent data

describing all items of standard manufacture shall be submitted for review by the Architect and/or Consultant. Sheets with the notation "Fabricated Item" and name of the fabricated item, as well as any required mechanical, plumbing or electrical requirements shall be inserted between the manufacturer's specification sheets describing the "buy-out" equipment; thus giving a complete brochure with all times accounted for. These brochures shall have hard white covers with clear transparent overlays and locking rings. The name of the Contractor, Architect, Consultant and project clearly identified in large readable type. Failure to provide brochures in the manner as described above will be cause for rejection of said brochures.

3. Rough-in and Equipment Location Drawings; within thirty (20) calendar days after award of the contract, six (6) sets of bond prints of complete rough-in and details for electrical and plumbing services with both vertical and horizontal dimensions, from column center-lines or exterior walls for location said connection points and rough-in locations shall be submitted for review by the Architect and/or Consultant. Equipment location plans shall be drawn to scale of not less than 1/4" = 1'-0" and include a schedule of equipment clearly identifying all items. Minimum drawings size shall be 24"x 36".

4. Shop Drawings; within thirty (30) calendar days after award of the contract, six (6) sets of bond prints of shop fabrication drawings shall be submitted for review by the Architect and/or Consultant. Plans shall be drawn to scale of not less than 1/2"=1'-0". Additional plan views, elevations and sections at 3/4"=1'-0" shall be supplied of all counters and tables with complete dimensions. All shop practices regarding joints, gussets, bracing, tie-downs, supports, etc. shall be clearly defined as well as gauges and quality of metals and brands and model numbers of all miscellaneous fittings, plumbing and electrical trim. The drawings shall also show locations of blocking (supplied under another sections) for all wall and ceiling mounted Food Service Equipment. Minimum drawings size shall be 24"x36".

C. SAMPLES

1. Provide all samples if specification requested.

D. SUBSTITUTIONS:

1. Manufacturer's listed in this section are used as standards for quality. All Substitutions shall be approved by the Architect and/or Consultant prior to installation.

2. Refer to Division 1 - General Requirements for procedures governing substitutions

3. Only one substitution for each item will be considered.

4. Installation of any qualified substituted equipment is the Food Service Equipment Contractor's responsibility. Including any mechanical, electrical, structural changes required for the installation of qualified substitution shall be without additional cost to the Owner.

1.5 DISCREPANCIES:

A. In the event of discrepancies within the Contract Documents, the Architect and/or Consultant shall be so notified in sufficient time prior to bid opening, ten (10) days to allow issuance of an addendum.

B. In the event that time does not permit notification or clarification of discrepancies prior to the bid opening, following shall apply: The drawings and drawing schedules shall govern in matters of quantity; the specifications in matter of quality. In the event of conflict within drawings involving quantities, or within the specifications involving quality, the greater quantity and high quality shall apply. Such discrepancies shall be noted and clarified in the contractors bid. No additional allowances will be made because of

errors, ambiguities or omissions which reasonable should have been discovered during the preparation of the bid.

1.6 RESPONSIBILITY:

A. The work as specified in this division shall include assuring that all required submittals conform to the intent and meaning of the documents, conditions at the job site, and all local codes and ordinances.

B. Visit the job site to field check actual wall dimensions and utility rough-ins. Be responsible for furnishing, fabricating, and installing the equipment in accordance with the available space and utility services as they exist on the job site.

C. Check all door openings, passageways, elevators, etc., to verify that the equipment can be transported to its proper location within the building. If necessary check the possibility with the General Contractor of holding wall erection, placement of doorjambs, window, etc. for the purpose of moving equipment to its proper location.

D. Notify the Architect and/or Consultant of any discrepancies between the plans and specification prior to fabrication of any equipment, to actual condition on the job.

E. If any special hoisting equipment and operators are required, include cost as part of the bid for this work.

1.7 DELIVERY AND STORAGE

A. All equipment specified herein shall be delivered to the job site; received and handled by the Contractor or his authorized agent. The Owner shall in no way be expected to store or handle any such equipment.

B. All equipment shall be delivered in such a manner as to protect it against dirt, water, chemical or mechanical injury.

C. Throughout the progress of the work, the Contractor shall keep the working area free of debris of all types resulting from his work.

D. All packing material shall be removed from the project location by the Contractor.

1.8 COORDINATION

A. Coordinate work with mechanical, electrical, plumbing, interiors and other trades whose work is in conjunction with equipment specified herein.

1.9 MEASUREMENTS

A. Verify all dimensions shown on the drawings by taking field measurements at the job site prior to fabrication of equipment or ordering equipment. Proper fit and attachment of all parts is required and is the sole responsibility of the Food Service Contractor. If necessary, all equipment shall be fabricated so that it may be handled through finished door openings.

1.10 GUARANTEE / WARRANTY

A. All work shall be guaranteed by the Foodservice Equipment Contractor against all defects for a term of one (1) year from the date of notice of completion. This guarantee shall cover replacement of defective material at the Foodservice Equipment Contractor expense, including transportation and labor. This

guarantee will not cover any cost for replacement of parts or work made necessary by carelessness or misuse of the equipment by others.

B. The Food Service Equipment Contractor shall provide at his own expense the installation, start-up and service for one (1) year from the date of recording the notice of completion of the project; the replacement of all condensing units and other refrigeration devices supplied under this contract. In addition to this one (1) year free service, the condensing units shall have a five (5) year compressor warranty; said warranty commencing at the date of completion.

PART 2 PRODUCTS

2.1 MATERIALS

A. Metal for construction purposes, where entirely concealed, shall be steel of wrought iron sections galvanized by the hot-drip process after fabrication. Bolts, screws, rivets, and similar attachments to this galvanized work shall be galvanized or brass. Exposed screw and rivet work shall be finished to match adjacent surfaces, flush and buffed smooth. Finished work shall be free of tool or construction marks, dents, or other imperfections; and at the completion of the work, all metal shall be gone over with a portable machine and buffed and dressed to perfect surfaces.

B. All materials shall be new and of first grade. All gauges specified herein shall be minimum and shall be minimum and shall be established after polishing. They shall refer to:

1. U.S. Standard Gauge for sheets and plates.

2. Stainless steel shall be manufactured by one of the following: Allegheny Ludlum Steel Corporation, American Rolling Mills, U.S. Steel Corporation.

C. The Contractor will be required to furnish a certified copy of the mill analysis of materials to the Architect and/or Consultant.

D. Stainless steel sheets shall conform to ASTM A240, Type 304 Condition A, 18-8 having a No. 4 finish. No.2B finish shall be acceptable on surfaces of equipment not exposed to view. All sheets shall be uniform throughout in color, finish and appearance.

E. Stainless steel tubing and pipe shall be Type 304, 18-8, having a No. 4 finish, and shall conform to either ASTM A213 if seamless or ASTM A249 if welded.

F. Galvanized steel shall be approved grade of copper-bearing steel sheets with a minimum copper content of 20%. All sheets to be commercial quality, stretcher leveled, bonderized and re-rolled to insure smooth surface. Galvanized steel shall not be allowed in the construction and fabrication of any “Fabricated Assembly” items.

G. All millwork materials shall be free from defect impairing strength, durability, or appearance; straight and free from warpage; and the best grade for their particular function. All wood shall be well seasoned and kiln dried and shall have an average moisture content of 8%, a maximum of 10%, and a minimum of 5%.

H. Plywood and other woodwork of treatable species, where required by code, shall be fire-retardant treated to result in a flame spread rating of 25 or less with no evidence of significant progressive combustion when tested for 30 minutes duration under ASTM E-84 and shall bear the testing laboratory mark on the surface to be concealed.

I. Concealed softwood or hardwood lumber shall be of poplar, Douglas fir, basswood, red oak, birch, maple, beech or other stable wood and shall be select or better grade, unselected for color and grain, surfaced four sides, square-edged, and straight. Basswood may be used where fire-retardant treated materials are required.

J. Face veneers shall be matched for color and grain to produce balance and continuity of character. Mineral streaks and other discolorations, wormholes, ruptured grain, loose texture, doze or shake will not be permitted. Face veneer leaves on each surface shall be full-length, book matched, center matched and sequence matched. Surfaces shall be sequenced and blueprint matched. Veneers not otherwise indicated shall be plain sliced. Backing veneers for concealed surfaces shall be of a species and thickness to balance the pull of the face veneers.

K. Hardwood plywood for painted surfaces shall conform to U.S. Product Standard PS -51-71, Type I, and shall have sound birch, maple or other approved close grain hardwood faces suitable for paint finish.

L. Plastic laminate surfaces shall be laminated with thermosetting decorative sheets in the color, pattern and style as selected by the Architect. Horizontal surfaces shall be laminated with sheets conforming to Federal Specifications L-P-508F, Style D, Type I (general purpose), Grade HP, Class I, 1/16" thick, satin finish with rough sanded backs. Vertical surfaces shall be laminated with sheets conforming to Federal Specification L-P-598F, Style D, Type II (vertical surface), Grade HP, Class I, conforming, satin finish, 1/32" thick or heavier. Balance sheets for backs in concealed locations shall be .020" thick laminate backing sheets conforming to Federal Specification L-P-00508E, Style ND, Type V (backing sheet), Grade HP.

M. Adhesive for application of plastic laminate to wood surfaces of counter tops shall be phonetic, resorcinol or melamine adhesive conforming to Federal Specification MMM-A-181C and producing a waterproof bond. Adhesive for applying plastic laminate to vertical surfaces shall be either a waterproof type or a water-resistant type such as a modified urea formaldehyde resin liquid glue conforming to Federal Specification MMM-A-188C. Contact adhesive will not be acceptable.

N. Plate glass shall be 1/2" thick safety glass with polished edges.

O. Sealant shall be equal to that manufactured by General Electric. Silicone construction 1200 sealant; in either clear or approved color to match surrounding surfaces.

P. Sound deadening material shall be equal to that manufactured by H.W. Mortell Co., Kankakee, Illinois, and shall be sprayed by use of a mechanical device to a thickness of not less than 1/8" thick.

2.2 FINISHES

A. Paint and coatings shall be of an NSF approved type suitable for use in conjunction with food service equipment. Such paint or coating shall be durable, non-toxic, non-dusting, non-flaking and mildew resistant, shall comply with all governing regulations and shall be applied in accordance with the recommendations of the manufacturer.

B. All exterior, galvanized parts, exposed members of framework where specified to be painted shall be cleaned, properly primed with rust inhibiting primer, degreased, and finished with two (2) coats of epoxy-based grey hammertone paint, unless otherwise specified.

C. Stainless steel, where exposed, shall be polished to a #4 commercial finish. Where unexposed, finish shall be #2B. The grain of polishing shall run in the same direction wherever possible. Where surfaces are disturbed by the fabricating process, such surfaces shall be refinished to match adjacent undisturbed surfaces.

2.3 SHOP FABRICATED EQUIPMENT CONSTRUCTION

A. Leg stands for open base tables or dish tables shall be constructed of 1-5/8" dia. 16 gauge stainless steel tubing, with stringer and cross braces of the same material. Joints between legs and cross braces shall be welded and ground smooth. Flattened ends on tube stretchers are not permitted. Mechanical fittings are also not permitted.

1. Stainless Steel Leg Sockets: Component Hardware Group, Inc. model A18-0206, or accepted equal; weld to underside of counter top framing or at bottom of enclosed cabinet unit, and fastened with flush set screw locking device.

2. Sanitary Type Stainless Adjustable Foot: Component Hardware Group, Inc. model A10-0851, or accepted equal

B. Table tops shall be 14-gauge stainless steel unless otherwise noted, with all shop seams and corners welded, ground smooth and polished. Tops of closed base fixtures shall be reinforced on the underside with a framework of 1-1/2" angles or 16-gauge stainless steel hat section; and on open pipe frames with a 4" channel at each pair of legs. The leg sockets shall be welded to this channel. The channel in turn stud welded to the top. Tops shall be reinforced so that there will be any noticeable deflection. Unless otherwise shown on the detail drawings, metal tops shall be turned down 2", and back at 15 degree angle, with 1-1/8" turn-under, except where adjacent to walls or other pieces of equipment. The wall side shall be turned up 10" and back 2" at a 45-degree angle. Ends of this splash are to be closed. Free corner of tops shall be spherical. All tops shall have 1/8" of sound-deadening material applied to the underside by use of spray equipment in an oven, smooth application for ease in cleaning.

C. Enclosed bases or cabinet bodies shall be of the material and gauge hereinafter specified. They shall be enclosed on the ends and sides as required. The bases shall be reinforced at the top with a framework of 1-1/2" x 1-1/2" x 1/8" stainless steel angles fully welded to the base with the stainless steel angles 36” on center (maximum), with all corners of said framework mitered and fully welded. All vertical joints of the bases shall be fully welded, ground and polished. All free corners of enclosed bases or cabinet bodies and all corners against walls and other fixtures shall be square. In the case of fixtures fitting against or between walls, the bodies shall be set in 1" from the wall line, but the tops shall be extended back to the wall line to permit adjustment to wall irregularities. A flush fitting vertical trim strip (extension of the vertical end mullion without vertical seam of the same material as the body shall be provided at each end of the body, and shall extend 1" to the wall line). These fixtures shall be constructed to set on bases or legs as hereinafter specified, and shall be set in mastic in a vermin-proof manner.

D. Shelves, mullions and aprons shall be fabricated flush with the cabinet body, welded, ground, and polished. Butt joints are not acceptable.

E. Drawers, to be furnished with stainless steel flush pull, Component Hardware Group Inc., model number P63-1012 or equal installed into the 18 gauge double-pan drawer front panel.

1. Stainless steel locks, Component Hardware Group, Inc., model number P30-4781 or equal for each drawer. All drawers are to be keyed alike.

2. Stainless Steel full extension slides, Component Hardware Group, Inc., model no S52-0024 or equal. Provide two (2) per drawer. Slides to be installed so drawer will roll closed when released.

3. Stainless steel removable drawer pan, Component Hardware Group, Inc., model number, S81-1520 or equal one (1) per drawer set loosely in a channel frame so it can be easily lifted out for cleaning. This supporting frame shall be welded stainless steel channel.

4. Drawer face panel to be constructed of 18 gauge stainless steel double pan construction. (Single metal thickness drawer faces are not be expectable.)

F. Hinged doors in base cabinets shall be of double pan construction, insulated and constructed of 18 gauge stainless steel. Doors shall have wire type pull Component Hardware Group Inc., model number P46-1010 or equal installed as shown in elevations. Door pulls to be NSF and ADA compliant.

G. Interior shelves shall be solid, non-removable 16-gauge stainless steel, with ends and backs provided with a 1-1/2" high turn-up against the body of the fixture and welded to the same. Front edge is to be turned down 1-1/2" and under 1/2", at the bottom shelf, beyond the edge of the base to prevent sagging and vermin collection.

H. Under shelves on open tables shall be constructed of 16 gauge stainless steel, flanged down 90 degrees ½". The corners shall be welded to the legs. Under shelves shall be 10" from the floor. Backs shall be turned up 2".

I. Elevated shelves shall be constructed of 16 gauges stainless steel with edges turned down in a square edge, and back 1/8"; except where shelves are adjacent to walls or other fixtures, where they shall be turned up 2". Corners shall be spherical, mounted on 14 gauge stainless steel support brackets.

J. Sinks and drain boards shall be constructed of 14 gauge stainless steel. The working edge of the sink shall be provided with 5/8" radius sanitary rolled edge in one piece with rounded corners. The drain boards shall be made as an integral part of the sink; all vertical and horizontal corners shall be rounded with 5/8" radius; and the working front edges shall be maintained at one level, taking up the pitch of the drain boards by dropping the sink to allow for same. Depth of sink bowl shall be determined from the top bowl. Sinks shall be provided with back and end splashes with top edge flanged back 2-1/4" at 45-degree angle, and attached to the building wall with "zee" clips. Splash back of sinks and drain boards shall be grained in the same direction. Suitable openings shall be cut for hot and cold water supplies and waste outlets. All surface plumbing trim as called for on the drawings and herein specified shall be provided. Bottom of each sink bowl with center drain connection shall be fitted with a 2" lever type action waste valve mounted into the sink and made absolutely watertight. Sink bowls and drain boards shall have 1/8" of sound-deadening material underneath, spray-applied.

K. Rivets, bolts and screws shall not be permitted in any exposed location.

L. All welding shall be of the heliarc method with welding rod of the same composition as the parts welded. Welds shall be complete, strong, and ductile with excess metal ground off and joints finished smooth to match adjoining surfaces. Welds shall be free of mechanical imperfections and shall be continuously welded so that the fixture shall appear as one-piece construction. Butt welds made by spot solder and finished by grinding are not acceptable.

M. All exposed joints shall be ground flush with adjoining material and finished to harmonize therein. Whenever material has been sunk or depressed by welding operation, such depressions shall be suitably hammered and peened flush with the adjoining surface and, if necessary, again ground to eliminate low spots. In all cases, the grain of rough grinding shall be removed by successive fine polishing operations.

N. All exposed welded joints in stainless steel construction shall be suitably coated with an approved metallic-based paint.

O. After galvanized steel members have been welded, all welds and areas where galvanizing has been damaged shall have a zinc dust coating applied.

P. Seams shall be continuous welds flush and ground smooth.

1. Field Joints: Flush welded, ground smooth and polished on the job, solder or rivets not allowed.

2. Counter Tops: Field joints in stainless steel counter tops and drain boards butt welded with welds ground flush and smooth and polished to match original finish.

3. Pass windows: Provide a complete all welded seamless counter from inside area to the outside ledge at each pass window location. Mechanical joints, butt joints or lap joints will not be accepted.

2.4 ELECTRICAL REQUIREMENTS

A. Standard UL listed materials, devices and components shall be selected and installed in accordance with NEMA Standards and recommendations and as required for safe and efficient use and operation of the Food Service Equipment without objectionable noise, vibration, and sanitation problems.

B. Motors up to and including ½ HP are to be wired for 120 volt, single phase. Fixtures totaling more than 1000 watts are to be wired for 208 volt, single phase. Fixtures having multiple number of heating elements, can be wired for three phase with the load balanced as equally as possible within the fixture.

C. Heating elements having a connected load of up to and including 1000 watts are to be wired for 120 volt, single phase. Fixtures totaling more then 1000 watts are to be wired for 208 volt, single phase. Fixtures having multiple number of heating elements can be wired for three phase with the load balanced as equally as possible within the fixture.

D. Equipment where applicable shall be furnished with three-wire cord and plug.

2.5 PLUMBING TRIM, SINKS

A. All vegetable and pot washing sinks or other 14" deep sinks shall have Fisher Mfg. Co. Model 22209 series (2" drain size) quick opening drain. Fisher Mfg. Co. Model 60100 splash mounted faucet shall be mounted over each partition as shown on the drawings.

B. All cook sinks, pantry sinks or other 10" or 12" deep sinks shall have Fisher Mfg. Co. Model 22209 series (2" drain size or as shown on the drawings) quick opening drain. Fisher Mfg Co. Model 57649 faucets mounted as shown on the drawings.

C. All Fisher Mfg., Co. faucets to be furnished as stainless steel to comply with AD1953 Standards and conform to NSF 61 Standard 9.

D. Provide gas pressure regulators for installation by the Plumbing Contractor.

E. FIRE SUPPRESSION GAS SHUT/OFF VALVE: Gas valve to be furnished by the Foodservice Equipment Contractor and furnished to the Plumbing Contractor for installation. Foodservice Equipment Contractor is to verify with plumbing division for gas line size. Valve to be located in an accessible location and if necessary with access panel.

2.6 HARDWARE

A. Elevated shelf brackets shall be as shown on the Drawings.

B. Drawer and door handles shall be as shown on the Drawings.

C. Hinges for all metal doors shall be Klein Hardware Co. 7870 series, finished in satin chrome.

PART 3 INSTALLATION

3.1 POSITIONING OF EQUIPMENT

A. Installation procedure, details and scheduling shall be so arranged that the work of other contractors may progress without unnecessary delay, interference or damage.

B. The Contractor shall do all fitting, joining, fastening, scribing, caulking and adjusting necessary to install any fixed item of equipment in its designated location; and shall locate and/or store portable, non-fixed items as directed by the Architect and/or Consultant with due regard for the security and protection from damage of the items involved.

3.2 WORKMANSHIP

A. Commencement of work shall constitute agreement with and acceptance of all conditions as found.

B. Equipment shall be installed as shown on the plans. Where abutting, curved or irregularly shaped angles or projecting corners of walls occur, equipment shall be made to conform. Where several pieces of equipment are to be assembled in a group, the group shall be complete as whole, with all necessary filler or connecting pieces as may be required to make a complete, sanitary and vermin-proof group.

C. Welded parts shall be non-porous and free of imperfections. Welds on galvanized metal shall be ground smooth, sandblasted and sprayed with molten zinc or 1200 degrees F to a thickness of .004". Tinning of welds will not be acceptable. Welds of stainless steel shall be ground and polished to the original finish and all grained in the same direction.

D. All fixtures, unless made of stainless steel, shall be finished in sprayed lacquer in color as chosen by the architect; or if specifically stated, in “plastic laminate”; in pattern and/or color as selected by the Architect.

3.3 POST INSTALLATION PROCEDURES

A. Prior to being offered for final acceptance, all equipment shall be thoroughly cleaned. This shall include removal of all stains, paint spots, protective wrapping and coatings, tapes, grease, oil, plaster, dust, polishing compounds, etc. and cleaning of floors in food service areas (broom clean) and signed off by the General Contractor with a copy to the Architect and/or Consultant.

B. After installation at least ten (10) days prior to offering for acceptance, all equipment shall undergo a "Start-up" procedure by a Factory Authorized service dealer. Equipment is to be inspected, tested, calibrated and adjusted for normal operation conditions. If inspection or testing indicated defects, such defects shall be corrected and the inspection and test repeated to insure a perfect operation of all equipment, prior to final acceptance and for a period ninety days after final acceptance.

C. Upon completion of the project, the Contractor shall furnish the Owner two (2) sets of dimensional prints, data sheets, spare parts lists and operating manuals for each piece of mechanical equipment; each set shall be neatly bound in a loose leaf binder, each set shall be complete with and index of equipment and with a complete list of service contracts with said agencies to perform these services. In addition to this list. The contractor shall submit for review of the Architect and/or Contractor and submittal to the Owner for his files, copies of service contracts with said agencies to perform these services. It shall be the responsibility of this contractor to fill out forward and all warranty forms as required.

D. This contractor shall arrange demonstrations of the operation and maintenance of all buy-out" equipment by competent instructors. These demonstrations to take place within ten (10) days prior to the acceptance of the kitchen. All instruction periods shall be scheduled with the Architect and/or Consultant fourteen (14) days prior to commencement of same, and at times convenient to the Architect and/or consultant and Owner.

4 ITEMIZED EQUIPMENT SCHEDULE

A. Fabricated Equipment: Wherever the term "Fabricated Assembly" is used within the list noted below and description of Food Service Equipment, it shall be presumed to be followed by the phrase, "constructed to the configuration, dimension, detail and design as shown on the drawings and specifications and with workmanship and materials as specified above" and shall meet the fabrication detail requirements of the latest edition of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA), and National Sanitation Foundation (NSF Standard 2).). Approved Manufactures: American Stainless Steel Corp. (303) 783-0005

B. Walk-in refrigerator / freezers approved manufactures: RMI, Duracold, Thermalrite.

C. Remote refrigeration approved Manufactures: Omni Temp, Cooltec, Airdyne.B.

D. All food service equipment shall be installed per the "Guidelines for Seismic Restraints of Kitchen Equipment" by the Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

E. All food service equipment shall comply with the standards of The California Code of Regulations, Title 24, Part No. 2.

F. All food service equipment shall comply with the current California Energy Commission Appliance Efficiency Regulations.

G. Equipment in the following schedule is listed by Item Numbers shown on Drawings.

SCHEDULED ITEMS:

ITEM 1 - AIR CURTAIN, UNHEATED (1 REQ'D)
Berner Model SLC07-1042A
Sanitation Series Low Profile Air Curtain, 42"L, unheated, (1) 1/5 hp motor, for doors up to 7' high, aluminized steel cabinet, baked-on electrostatic white powdered coated aluminum steel cabinet, interior or exterior mounting, UL listed, EPH listed for NSF 37

Accessories:
1 ea Model A
1 ea Model 91EZN120-BA-M-24-SS Basic Control Package, includes stainless steel enclosure, magnetic reed door switch & 24V remote mounted load center
1 ea White powder coat exterior finish standard

ITEM 2 - WALK-IN FREEZER (1 REQ'D)
ThermalRite Model FABRICATED ITEM
Assembly, shall consist of one (1) Freezer compartment; 13'-6" deep x 13'-0" wide x 8'-0" high clear interior dimensions. Assembly to form the configuration as shown on the drawings. Assembly shall be furnished as herein specified.

A Assemblies shall be N.S.F (Standard 7) approved and formed in the configuration as shown on the contract drawings.

B. Panel Construction: Shall consist of exterior and interior die formed metal panels formed to insure proper size. Section edges must have lineup pines and double row of closed cell gaskets to insure panel alignment and proper seal at each joint. Corner panels to be 90 degree angles 12 inches in each direction. (No Wood Construction will be accepted).

C. Insulation: Walls Ceiling and Floor panels 4" of “foamed-in place urethane insulation shall be used with a thermal conductivity of not more than 0.118 BTU per hour per square foot. U Factor shall not exceed 0.030. The insulation shall be rated self-extinguishing and fire retardant type as specified by UL. Insulation must remain stable at temperatures up t0 260 degrees F.

D. Section Fasteners: All wall, floor and ceiling sections joints shall be fastened together with steel cam action speed locks. These fasteners shall not exceed a 46" on center spacing. All locks shall be actuated from inside with a standard hex type Allen wrench. All socket ports shall be finished off with a ½" diameter snap cover to match the color of the panels.

E. Hinged Walk-In Doors: Doors shall be installed as shown on the drawings. Doors shall be urethane insulated, flush-in fitting type 42" wide x 80" high (as shown on the drawings) with triple pane 1/4" thick plate glass 14”x24” view windows (freezer door to be heated window). Each door shall be furnished with door heater switch and mortise style lock. Doors to be stainless steel finish inside and out.

F. Lights: Each door section shall be equipped with a flush mounted constant burning pilot light and switch on exterior and interior. Each compartment shall be provided with ceiling mounted vapor proof light fixture with clear prismatic injection molded polycarbonate diffuser Kason model 1810L 48” long or equal, see drawings for quantity. Light fixtures shall be factory wired to the light switch at the entrance door. Lighting level shall be a minimum of 10 foot candles measured 30" off the finished floor. Light control with back-up remote notification dry contacts, autolight control including inside illuminated switch/ panic alarm feature & sensor line.

G. Finishes: Refer to drawings for interior and exterior finishes. Interior kitchen finish floor to meet interior floor panel of walk-in at same elevation for an even transition into walk-in.

H. Accessories: Assembly shall be provided with the following accessories.

1. Trim Molding: Where unit abuts the building wall they shall be trimmed with a closure strip to match the exterior walk-in wall finish. Provide removable “drop-in” closure panels at ceiling. Provide vertical closure strips at all building wall junctures.
2. Each compartment shall be provided with a high temperature alarm system, Modular Corporation model No. 75 FLUSH mounted. This unit to be provided complete with built-in N/O & N/C dry contacts and pulse output for remote notification.
3. Dial Thermometer: Provide one (1) 4" dia. built into each walk-in door panel.
4. Pressure Relief Port: One (1) for each compartment Kason No. 1832 heated at freezer only.
5. Strip Curtains: each walk-in door shall have polyester reinforced clear vinyl strip curtains.
6. Entrance Doors: Each door shall have a 1/8" thick sheet aluminum diamond plate kick panel 3'-0" high on the exterior and interior door panels and adjacent door jambs.
7. The wall panels exposed to the kitchen shall have a 16 gauge stainless steel rub rail.
8. Refer to drawings for additional accessories
9. Provide heavy duty stainless steel rub rails on kitchen side entire length of box.
10. Provide exterior kickplate 3/16” Aluminum tread plate, 42” high entire length of box.

I. This assembly shall be installed by factory personal and or factory approved installers with written certification provided by the manufacturer to the Architect and Consultant.

J. Walk-in assembly shall be installed into a recessed area as shown on the drawings. Kitchen Equipment Contractor is to verify finishes and thickness of kitchen floor and allow for proper clearance at walk-in door.

ITEM 2.1 - COLD STORAGE SHELVING (4 REQ'D)

Metro Model A2148NK3

Super Adjustable Super Erecta® Shelf, wire, 48"W x 21"D, Metroseal 3 (corrosion-resistant) finish, corner release system, with Microban® antimicrobial protection, NSF. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

16 ea Model 63PK3 Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

8 ea Model BCSK3 Super Erecta® Intermediate Bracket, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

ITEM 2.2 - COLD STORAGE SHELVING (2 REQ'D)

Metro Model A2160NK3

Super Adjustable Super Erecta® Shelf, wire, 60"W x 21"D, Metroseal 3 (corrosion-resistant) finish, corner release system, with Microban® antimicrobial protection, NSF. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

8 ea Model 63PK3 Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

4 ea Model BCSK3 Super Erecta® Intermediate Bracket, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

ITEM 2.3 - COLD STORAGE SHELVING (2 REQ'D)

Metro Model A2154NK3

Super Adjustable Super Erecta® Shelf, wire, 54"W x 21"D, Metroseal 3 (corrosion-resistant) finish, corner release system, with Microban® antimicrobial protection, NSF. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

8 ea Model 63PK3 Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

4 ea Model BCSK3 Super Erecta® Intermediate Bracket, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

ITEM 2.4 - COLD STORAGE SHELVING (1 REQ'D)

Metro Model A2448NK3

Super Adjustable Super Erecta® Shelf, wire, 48"W x 24"D, Metroseal 3 (corrosion-resistant) finish, corner release system, with Microban® antimicrobial protection, NSF. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

4 ea Model 63PK3 Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

2 ea Model BCSK3 Super Erecta® Intermediate Bracket, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

ITEM 2.5 - COLD STORAGE SHELVING (1 REQ'D)

Metro Model A2436NK3

Super Adjustable Super Erecta® Shelf, wire, 36"W x 24"D, Metroseal 3 (corrosion-resistant) finish, corner release system, with Microban® antimicrobial protection, NSF. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

4 ea Model 63PK3 Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

4 ea Model BCSK3 Super Erecta® Intermediate Bracket, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

ITEM 2.6 - FREEZER COIL (1 REQ'D)

Cooltec Refrigeration Model – LET1408BEK evaporative coils shall be direct expansion type, fabricated of copper tubes with aluminum fins. All evaporative coils shall be provided with solenoid valve, thermostatic expansion valve, and electronic thermostat, piped wan dwired to the junction box for positive pump down.

A. Evaporative coils shall be equipped with energy saving “EC” motors.

ITEM 3 - WALK-IN REFRIGERATOR (1 REQ'D)

ThermalRite Model FABRICATED ITEM

Assembly, shall consist of one (1) Refrigerator compartment; 13'-6" deep x 10'-0" wide x 8'-0" high clear interior dimensions. Assembly to form the configuration as shown on the drawings. Assembly shall be furnished as herein specified under Item 2 Walk-In Freezer.

ITEM 3.1 - COLD STORAGE SHELVING (4 REQ'D)

Metro Model A2148NK3

Super Adjustable Super Erecta® Shelf, wire, 48"W x 21"D, Metroseal 3 (corrosion-resistant) finish, corner release system, with Microban® antimicrobial protection, NSF. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

16 ea Model 63PK3 Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

8 ea Model BCSK3 Super Erecta® Intermediate Bracket, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

ITEM 3.2 - COLD STORAGE SHELVING (2 REQ'D)

Metro Model A2160NK3

Super Adjustable Super Erecta® Shelf, wire, 60"W x 21"D, Metroseal 3 (corrosion-resistant) finish, corner release system, with Microban® antimicrobial protection, NSF. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

8 ea Model 63PK3 Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

4 ea Model BCSK3 Super Erecta® Intermediate Bracket, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

ITEM 3.3 - COLD STORAGE SHELVING (2 REQ'D)

Metro Model A2436NK3

Super Adjustable Super Erecta® Shelf, wire, 36"W x 24"D, Metroseal 3 (corrosion-resistant) finish, corner release system, with Microban® antimicrobial protection, NSF. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

8 ea Model 63PK3 Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

4 ea Model BCSK3 Super Erecta® Intermediate Bracket, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection

ITEM 3.4 - REFRIGERATOR COIL (1 REQ'D)

Cooltec Refrigeration Model – ADT156AEK evaporative coils shall be direct expansion type, fabricated of copper tubes with aluminum fins. All evaporative coils shall be provided with solenoid valve, thermostatic expansion valve, and electronic thermostat, piped wan dwired to the junction box for positive pump down.

B. Evaporative coils shall be equipped with energy saving “EC” motors.

ITEM 4 - DRY STORAGE SHELVING (4 REQ'D)

Metro Model A2154NC

Super Adjustable Super Erecta® Shelf, wire, 54"W x 21"D, chrome-plated finish, corner release system. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

16 ea Model 63P Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", chrome finish

8 ea Model BCS Super Erecta® Intermediate Bracket, chrome

8 ea Model SAFP-2 Super Erecta® Seismic Foot Plate Kit (2) holes in plate, includes: (4) foot plates, fits any size approved seismic unit

ITEM 4.1 - DRY STORAGE SHELVING (3 REQ'D)

Metro Model A2148NC

Super Adjustable Super Erecta® Shelf, wire, 48"W x 21"D, chrome-plated finish, corner release system. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

12 ea Model 63P Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", chrome finish
6 ea Model BCS Super Erecta® Intermediate Bracket, chrome
6 ea Model SAFP-2 Super Erecta® Seismic Foot Plate Kit (2) holes in plate, includes: (4) foot plates, fits any size approved seismic unit

ITEM 4.2 - SPARE

ITEM 4.3 - DRY STORAGE SHELVING (2 REQ'D)

Metro Model A2142NC

Super Adjustable Super Erecta® Shelf, wire, 42"W x 21"D, chrome-plated finish, corner release system. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

8 ea Model 63P Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", chrome finish
4 ea Model BCS Super Erecta® Intermediate Bracket, chrome
4 ea Model SAFP-2 Super Erecta® Seismic Foot Plate Kit (2) holes in plate, includes: (4) foot plates, fits any size approved seismic unit

ITEM 4.4 - DRY STORAGE SHELVING (1 REQ'D)

Metro Model A2136NC

Super Adjustable Super Erecta® Shelf, wire, 36"W x 21"D, chrome-plated finish, corner release system. Shelving to be 4 tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit at front and back. Provide wall mounting angle brackets Model BCS at top of shelving posts as shown.

Accessories:

4 ea Model 63P Super Erecta® SiteSelect™ Post, 62 9/16"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", chrome finish
2 ea Model BCS Super Erecta® Intermediate Bracket, chrome
2 ea Model SAFP-2 Super Erecta® Seismic Foot Plate Kit (2) holes in plate, includes: (4) foot plates, fits any size approved seismic unit

ITEM 5 - SOILED DISHTABLE (1 REQ'D)

Custom Model FABRICATED ITEM

American Stainless Steel Corp. FABRICATED ITEM

Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be fabricated of 14 gauge stainless steel.

A. Work area top to be 14 gauge stainless steel with a 14 gauge stainless steel backsplash 2" thick with a 45 degree top edge to wall, turn down ½" at back and right end. Top to be constructed with a "rolled" edge as shown. Drain boards are to slope per NSF guidelines to dishwasher.
B. Provide and install 16 gauge stainless steel tubular legs, stainless steel welded leg sockets, stainless steel adjustable feet and 16 gauge 1 5/8" dia welded tubular stainless steel undershelf.
C. Scraping Sink Item No. 6 is to be fully welded into this counter top as shown.
D. Approximate size: 30" deep x as shown.

ITEM 6 - SCRAPING SINK W/ LIFT OUT PERF INSERT (1 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp.
Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be fabricated of 14 gauge stainless steel.

A. Sink (1) 14 gauge stainless steel formed and welded sinks 20" x 20" x 12" deep. (Die cast sink bowls are not acceptable) to be welded into dish table as shown. Provide lift out scrap basket fully perforated same size of interior of sink x 10" deep. Provide (2) welded rod handles to lift basket out of sink.

Accessories:

1 ea. Fisher model 22209 DrainKing Waste Valve, with flat strainer, 12 GPM drain rate, cast red brass body.

ITEM 7 - SPLASH MOUNTED PRE-RINSE FAUCET (1 REQ'D)
Fisher Model 2210-WB
Pre-Rinse Assembly, 8" adjustable centers, wall-mounted mixing valve, with spring action flexible gooseneck, with spray head (1.15 gallons per minute @ 60 PSI), with wall bracket

ITEM 8 - VAPOR HOOD (TYPE II) (1 REQ'D)
Streivor Air Systems CH150 964220.5
Vapor Hood with internal baffle to be 18 gauge stainless steel type 304 number 4 finish with removable baffles. This hood shall include two full length hanging brackets with holes pre-punched 6" on centers. The hood shall incorporate a perimeter gutter with a 1/2" drain stub out with 18 gauge stainless steel mounting channels at ceiling, wall and top of unit. Hanger rods to structural ceiling, mounting channels at wall

Accessories:

1 ea Provide 22 Ga. S/S closure skirting form top of hood to finish ceiling all open sides.

ITEM 9 - RACK CONVEYOR WAREWASHER (1 REQ'D)
Hobart Model CL44E+BUILDUP
Conveyor Dishwasher, single tank, 202 racks/hour, insulated hinged doors, .62 gallon/rack, stainless steel enclosure panels, microprocessor controls with low temperature & dirty water indicators, ENERGY STAR®

Accessories:

1 ea Model CL44E-ELE0CD
1 ea Model CL44E-HTEGAS Natural gas
1 ea Model CL44E-ERH30K electric booster
1 ea Model CL44E-DIR0RL Right to left operation
1 ea Model CL44E-HGTHTS Higher than standard
2 ea Model FLGFT-CLE Flanged feet (2 sets required)
1 ea Model WS-80 Water Softening System, 4,818 grains/lb. capacity, 14 gallons regeneration volume, & salt alarm, holds 2 bags of salt, pricing includes standard installation within 50 miles from the local Hobart service office during normal working hours, installation will include final hookups (within 5 feet) to existing utilities
1 ea Model DISHRAK-PEG20 Peg rack
1 ea Model DISHRAK-COM20 Combination rack
1 ea Model SHTPAN-RACK Rack, 6 sheet pan
1 ea Model PRESREG-1/20BR 1/2" brass pressure regulator (is standard with built-in booster heater models)
1 ea Model 1/2INSHK-ABSRBR Water Shock Absorber Kit (Unit w/o booster also needs PRESREG-1/20BR)
1 ea Model CLE/TBL-SWITCH Table LMT switch CLE-Series

2 ea Model CURTAIN-KITHTS KIT CURT'N SPLASH HTS E-SERIES

ITEM 10 - CLEAN DISHTABLE (1 REQ'D)
Custom Model FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. Work area top to be 14 gauge stainless steel with a 14 gauge stainless steel backsplash at back and left end 2" thick with a 45 degree top edge to wall, turn down ½" at back. Top to be constructed with a "rolled" edge as shown. Drain boards are to slope per NSF guidelines to dishwasher.
B. Provide and install 16 gauge stainless steel tubular legs, stainless steel welded leg sockets, stainless steel adjustable feet and stainless steel cross rail bracing.
C. Provide table limit switch for the dishwasher Item #9.

ITEM 11 - POT SINK (1 REQ'D)
Custom Model FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. Work area top to be 14 gauge stainless steel with a 14 gauge stainless steel backsplash at back 2" thick with a 45 degree top edge to wall, turn down ½" at back and ends. Top to be constructed with a "rolled" edge as shown. Drain boards are to slope per NSF guidelines to sinks.
B. Three (3) 14 gauge stainless steel formed and welded sinks 24" x 30" x 12" deep. (Die cast sink bows are not acceptable).
C. Provide and install 16 gauge stainless steel tubular legs, stainless steel welded leg sockets, stainless steel adjustable feet and stainless steel cross rail bracing.
D. Provide 16 gauge stainless steel under shelf with 1 ½" turn down at front and 2" turn up at back.
Accessories:
2 ea Fisher model 60100 3/4" Faucet, 8" Backsplash, with 10" swing spout & elbows, stainless steel.
3 ea DrainKing Waste Valve, with flat strainer, 12 GPM drain rate, cast red brass body

ITEM 12 - WALL SHELF (1 REQ'D)
Custom Model FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. To be 16 gauge stainless steel construction, 1 1/2" turn down in front and 2" turn up at back and right end and left ends. Provide 14 gauge stainless steel wall brackets as shown.
B. Approximate Size: 12" deep x 12'-6 long.

ITEM 13 - WALL MOUNTED POT RACK (1 REQ'D)
Advance Tabco Model SW-36
Pot Rack, wall-mounted, double bar design, 36"W x 12"D, constructed of 1/4" x 2" stainless steel, includes: (12) plated double pot hooks.
Accessories:
2 pk Model TA-89A Pot Hooks, plated, single sided (package of 4)

ITEM 14 - MOBILE POT AND PAN STORAGE SHELVING (1 REQ'D)
Metro Model N556BBR (N556PBR)
Super Erecta® Stem Caster Cart, wire, 48"W x 24"D x 69"H (4) shelves, posts, plastic split sleeves, donut bumper, Super Erecta® Brite Shelves & chrome-plated posts (2) swivel (2) brake resilient rubber casters, 600 lb. capacity, NSF

ITEM 15 - STACKED WASHER/DRYER (1 REQ'D)
Whirlpool Model LTG5243D

ITEM 16 - SPARE NO

ITEM 17 - MOP RACK (1 REQ'D)
Advance Tabco Model K-242
Mop Hanger, 23", accommodates (3) mops.

ITEM 17.1 - MOP DRAINAGE TRAY (1 REQ'D)
Advance Tabco Model K-243
Mop Drainage Tray, stainless steel

ITEM 18 - WALL CABINET (1 REQ'D)
Advance Tabco Model WCH-15-48
Cabinet, wall mount, enclosed design with (2) hinged doors, 48"W x 15"D, with single intermediate shelf, 18/430 stainless steel construction, NSF

ITEM 19 - SPARE NO

ITEM 20 - WALL SHELF (1 REQ'D)
Custom Model FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. To be 16 gauge stainless steel construction, 1 1/2" turn down in front and 2" turn up at back and right end and left ends. Provide 14 gauge stainless steel wall brackets as shown.
B. Approximate Size: 12" deep x 5'-6 long.

ITEM 21 - PREP SINK (1 REQ'D)
Custom Model FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A Work area top to be 14 gauge stainless steel with a 14 gauge stainless steel backsplash at back 2" thick with a 45 degree top edge to wall, turn down ½" at back. Top to be constructed with a "rolled" edge as shown. Drain boards are to slope per NSF guidelines to sinks.
B. Two (2) 14 gauge stainless steel formed and welded sinks 20" x 24" x 12" deep.
(Die cast sink bowls are not acceptable).
C. Legs to be 16 gauge stainless steel tubular, stainless steel welded leg sockets, stainless steel adjustable feet and stainless steel cross rail bracing. Provide 16 gauge stainless steel under shelf as shown.
D. Approximate size: 30" deep x 21'-7" as shown.
Accessories:
1 ea Fisher model 60917 Faucet, 8" backsplash mount, with 10" swing spout, elbows, stainless steel.
2 ea Fisher Model 22209 DrainKing Waste Valve, with flat strainer, 12 GPM drain rate, cast red brass body.

ITEM 22 - SPLASH MOUNT PRE-RINSE (1 REQ'D)
Fisher Model 2210-WB
Pre-Rinse Assembly, 8" adjustable centers, wall-mounted mixing valve, with spring action flexible gooseneck, with spray head (1.15 gallons per minute @ 60 PSI), with wall bracket

ITEM 23 - UTENSIL DRAWER UNIT (1 REQ'D)
Custom Model FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be fabricated of 16 gauge stainless steel complete with the following hardware items.

A. Provide stainless steel flush pull, Component Hardware Group, Inc., model no. P63-1012, installed into the 18 gauge double-pan drawer front panel.
B. Provide stainless steel locks, Component Hardware Group, Inc., model no P30-4781 for each drawer.
C. Provide stainless steel full extension slides, Component Hardware Group, Inc., model No. S52-0024. Provide two (2) per drawer. Slides to be installed so drawer will roll closed when released.
D. Provide stainless steel removable drawer pan. Provide Component Hardware Group, Inc., model No. S81-1520 one (1) per drawer. Pan should be easily lifted out of drawer frame for cleaning.
E. Drawer face panel to be constructed of 16 gauge stainless steel double pan construction. Single metal drawer faces are not be acceptable.

ITEM 24 - WALL SHELF (1 REQ'D)
Custom Model FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. To be 16 gauge stainless steel construction, 1 1/2" turn down in front and 2" turn up at back and right end and left ends. Provide 14 gauge stainless steel wall brackets as shown.
B. Approximate Size: 12" deep x 12'-0 long

ITEM 25 - COUNTER MIXER (1 REQ'D)
Hobart Model HL200-1STD
Bench type mixer; with bowl, beater, & whip; US/EXP configuration Legacy Planetary Mixer, Bench, 20-quart, (3) fixed speeds plus stir speed, gear-driven transmission, 15-minute SmartTimer™, #12 taper hub, manual bowl lift, stainless steel bowl, aluminum "B" beater, stainless steel "D" wire whip, stainless steel bowl guard, 1/2 hp, cord with plug.

Accessories:
1 ea Extended warranty - 1-Year parts and labor performed during the normal business hours of the local service office within the USA (net)

ITEM 26 - COMMERCIAL WASTE CONTAINER (1 REQ'D)
Rubbermaid Model FG262000GRAY
ProSave® BRUTE® Container, without lid, 20 gallon, 19-1/2"D x 22-7/8"H, round, reinforced rims, built in handles, double rimmed base, high-impact plastic construction, gray, NSF

Accessories:
1 ea Model FG261960BLA BRUTE® Container Lid, 19-7/8"D x 1-1/4"H, for 20 gallon trash can, heavy duty plastic, black
1 ea Model FG264000BLA BRUTE® Dolly, 18-1/4"D x 6-5/8"H, heavy duty 3" casters, 250 lb. capacity, for 2620, 2632, 2643, 2655 black

ITEM 27 - MOBILE SLICER TABLE (1 REQ'D)
Lakeside Manufacturing Model 518
Machine Stand, open base, (2) shelf, 24" x 32", 29-3/16"H, stainless steel construction, 4" swivel casters (2) with brakes, NSF

ITEM 28 - FOOD SLICER (1 REQ'D)
Hobart Model HS9-1
Heavy Duty Meat Slicer, automatic, 13" CleanCut™ removable knife with removal tool, anodized finish with (6) interlocks, (3) stroke lengths & (4) stroke speeds, removable meat grip assembly, removable ring guard cover, single action top mounted sharpener with Borazon™ stones, manual lift lever, 1/2 hp motor, 120v/60hz/1-ph NSF cETLus

Accessories:

1 ea Extended warranty - 1-Year parts and labor performed during the normal business hours of the local service office within the USA (net)

ITEM 29 - FLOOR MIXER (1 REQ'D)
Hobart Model HL600-2STD
Mixer; with bowl, beater, “D” whip, & spiral dough arm; US/EXP configuration Legacy Planetary (Floor) Mixer, 2.7 HP, 60-qt. capacity, (4) fixed speeds, gear-driven transmission, 50-Minute SmartTimer™, #12 taper attachment hub, power bowl lift, stainless steel bowl, "B" beater, "D" wire whip, "ED" dough hook, stainless steel bowl guard

Accessories:

1 ea Extended 1-Year warranty - Parts and Labor performed during the normal business hours of the local service office (net)

ITEM 30 - WALL MOUNT HAND SINK (1 REQ'D)
Advance Tabco Model 7-PS-46
Physically Challenged Hand Sink, wall model, 14" wide x 16" front-to-back x 5" deep bowl, 18 gauge 304 series stainless steel, splash mount faucet with wrist handles, deck mounted soap dispenser (pump), undermounted paper towel dispenser, basket drain, wall brackets, NSF, cCSAus

Accessories:

1 ea Note: This faucet complies with 2014 Federal no lead standards
1 ea Model 7-PS-13D Bolted Side Splash, 12" tall, for handicapped hand sinks, in-field installation

ITEM 31 - ICE MAKER W/ BIN (1 REQ'D)
Manitowoc Model IY-1106A
Indigo™ Series Ice Maker, cube-style, air-cooled, self-contained condenser, 30"W x 24-1/2"D x 29-1/2"H, up to 1200-lb approximately/24 hours, DuraTech™ exterior (stainless finish with innovative clear-coat resists fingerprints & dirt), half-dice size cubes, NSF, cULus, CE, ENERGY STAR®

Accessories:

1 ea Model B-570 Ice Bin, 30"W x 34"D, 50"H, with top-hinged front-opening door, approximately 430 lb ice storage capacity, for top-mounted ice maker, stainless steel exterior
1 ea Model 3302593 Ice Scoop, 82 oz., white, for B-320 & up ice bin (each)
1 st Model K-00153 Flanged Foot, 4-5/8", adjustable, stainless steel

ITEM 31.1 - ICEMAKER FILTER SYSTEM (1 REQ'D)
Everpure Model EV932402
INSURICE Twin-i20002 System, 18,000 gallon capacity, 3.34 gpm flow rate, 0.5-micron precoat filtration (2) I20002 Cartridges, with self-contained scale inhibitor feed, for cubers 650 lbs to 1200 lbs/day or flakers up to 2,500 lbs/day, pressure gauge, flushing valve

Accessories:

1 ea Model EV961232 I40002 Replacement Cartridge, 12,000 gallon capacity, 1.67 gpm flow rate, 0.5-micron rating

ITEM 32 - MOBILE WARMING & HOLDING CABINET (2 REQ'D)
Cres Cor Model H-138-S-1834D
Cabinet, Mobile Heated, insulated, top-mount heater assembly, recessed push/pull handle, magnetic latch, channel pan slides hold (32) 18" x 26" pans on 1-1/2" centers, anti-microbial latches, reversible dutch doors, (4) heavy duty 5" swivel casters (2) braked, stainless steel construction, ENERGY STAR®

Accessories:

3 ea 10 ft power cord, , standard
3 ea Right-hand door swing, standard

ITEM 32.1 - MOBILE WARMING & HOLDING CABINET (1 REQ'D) OFCI
This item will be owner furnished and contractor installed. Contractor to verify voltage and plug configuration of these items.

ITEM 33 - CHEFS COUNTER (1 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp. FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be constructed of 14 gauge stainless steel complete with an enclosed base cabinet with stainless steel finished ends and back. Provide accessible work area as shown.

A. Top to be 14 gauge stainless steel complete with 2" turn downs on 4 sides and a working height of 2'-10". Top to be coved at all over shelf uprights per NSF.
B. Base section to be 16 gauge stainless steel formed metal construction complete with 16 gauge stainless steel bottom and mid shelves.
C. Provide (2) Component Hardware Group, Inc., model No. R58-1020 double faced pedestal type electrical outlets with model No. R71-0721 stainless steel face plates.
D. Provide 1 5/8" dia. Stainless steel tube legs with Component Hardware Group, Inc. A10-0851 adjustable foot insert.
E. Provide 18 gauge stainless steel double pan swinging door with recessed pull as shown. All doors to be provided with cylinder locks keyed alick.
F. Approximate Size: 5'-0" deep x 11'-2" long

ITEM 34 - 3-STACK UTENSIL DRAWER UNIT (1 REQ'D)
American Stainless Steel Corp. FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be fabricated of 16 gauge stainless steel complete with the following hardware items.

A. Provide stainless steel flush pull, Component Hardware Group, Inc., model no. P63-1012, installed into the 18 gauge double-pan drawer front panel.

B. Provide stainless steel locks, Component Hardware Group, Inc., model no P30-4781 for each drawer. All drawers are to be keyed alike.
C. Provide stainless steel full extension slides, Component Hardware Group, Inc., model No. S52-0024. Provide two (2) per drawer. Slides to be installed so drawer will roll closed when released.
D. Provide stainless steel removable drawer pan. Provide Component Hardware Group, Inc., model No. S81-1520 one (1) per drawer. Pan should be easily lifted out of drawer frame for cleaning.
E. Drawer face panel to be constructed of 16 gauge stainless steel double pan construction. Single metal drawer faces are not be acceptable.

ITEM 35 - DOUBLE OVERSHELF (1 REQ'D)
Custom Model FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be 16 gauge stainless steel shelf (1) 18" x 11'-0" (1) 18"x 6'-9" long mounted on 1 5/8" dia. 16 gauge stainless steel tubular uprights anchored to bottom of base cabinet Item No. 33. The shelf is to have 1 ½ "turned-down edge on all sides. Counter top of Item No. 33 to be coved up around the tubular uprights where the uprights penetrate the top.

ITEM 36 - INGREDIENT BIN (3 REQ'D)
Cambro Model IBSF27148
Flat Top Ingredient Bin, mobile, 27 gallon capacity, 1-pc seamless polyethylene bin, 2-pc sliding polycarbonate lid, S-hook on front (scoop NOT included), (4) 3" heavy duty casters (2 front swivel, 2 fixed), white with clear cover, NSF

Accessories:
3 ea Model SCP24CW135 Camwear® Scoop, 24 oz., clear, polycarbonate, NSF

ITEM 37 - GAS CONVECTION OVEN (2 REQ'D) OFCI
Montague Company Model 2-115A
Vectaire Convection Oven, gas, double-deck, bakery depth, thermostatic controls, single speed fan, vertical opening doors with windows, stainless steel top, front & sides, 3" high flue deflector with stainless steel front trim, 6" adjustable legs, 115,000 BTU per deck

Accessories:
6 ea Extended one year warranty, per section
3 ea Gas type to be specified
3 ea (2) 3/4 hp, cord with 3-prong plug
3 ea Gas manifold, for single point connection

ITEM 37.1 - GAS CONVECTION OVEN (1 REQ'D)
Montague Company Model 2-115A
Vectaire Convection Oven, gas, double-deck, bakery depth, thermostatic controls, single speed fan, vertical opening doors with windows, stainless steel top, front & sides, 3" high flue deflector with stainless steel front trim, 6" adjustable legs, 115,000 BTU per deck

Accessories:
2 ea Extended one year warranty, per section
1 ea Gas type to be specified
2 ea (2) 3/4 hp, cord with 3-prong plug
1 ea Gas manifold, for single point connection

ITEM 38 - GAS BOILERLESS STEAMER (1 REQ'D)
Groen Model (2)SSB-10GF

SmartSteam™ 100 Convection Steamer, gas, double-stacked, boilerless generator, open leg stand bullet feet, (10) 12 x 20 x 2-1/2" pans capacity per compartment, door, stainless steel interior & exterior, single water connection, 100,000 BTU each

Accessories:

1 ea Gas type to be specified
1 ea Door hinged on left, std.
1 ea SmartSteam water treatment kit Model 149100
1 ea Replacement Filter for SmartSteam water treatment
1 ea. Double Stand Model 145545
1 ea. K-12 Second Year Check-Up

ITEM 39 - GAS RESTAURANT RANGE (1 REQ'D)

Garland/US Range Model GFE24-4L

GFE Starfire Pro Series Restaurant Range, gas, 24", (4) 26,000 BTU open burners, cast iron top & ring grates, electric pilot ignition, space saver oven, 3 position rack guides, (1) oven rack, stainless steel front, sides, plate rail and 10" low profile back guard, 6" stainless steel legs with adjustable feet, 136,000 BTU, CSA, NSF (Garland)

Accessories:

1 ea One Year limited parts and labor warranty.
1 ea Gas type to be specified
1 ea (Electronic ignition) standard
1 ea Stainless Steel High Shelf
1 ea Extra oven rack
1 st Stainless Steel Flanged feet

ITEM 40 - STEAM JACKETED TILT KETTLE (1 REQ'D)

Groen Model DH-60

Tilting Kettle, gas, 60-gallon capacity, crank tilt, 2/3 jacket, 316 stainless steel liner, floor mounted control console supports, stainless steel construction, bullet feet, electronic ignition, 50 PSI, 0 - 2000' elevation, 150,000 BTU

Accessories:

1 ea Gas type to be specified
1 ea Model ELEV0-2000 For elevation between 0 and 2000 (When order is placed, all equipment with elevation specified will be assigned a different Part# by the factory)
1 ea 2" Tangent draw-off (TDO)
1 ea Model 147992 Perforated Disk Strainer, for 3" tangent draw-off, 1/8" hole, for floor model kettles
1 ea Model Z009044 Additional Perforated Disk Strainer, for 2" tangent draw-off, 1/4" hole, for floor model kettles
1 ea Model 104278 Brush Set, 2", includes drain valve brush & paddle, for 2" TDO
1 ea Model 150273 Lip Strainer, for 40 and 60 gallon kettles (DEES-40 & 60)
1 ea Etch Marks, 5 gallon increments
1 ea Model Z001162 Basket Insert, for (Tri-BC) 60 gallon floor model kettles
1 ea Model 155696 Hinged Cover, for 60 gallon tilting kettles
1 ea Model 122891 Pan Carrier, for tilting floor model kettles (not available on DH-20 & DEE-20)
1 ea Model Z091879 Faucet, double pantry with swing spout, for 60 gallon floor model kettles
1 ea Model 159102 Drain cup & 8' hose assembly for TDO
1 st Model 153193 Flanged feet, set of 4

ITEM 40.1 - FLOOR TROUGH (1 REQ'D)

Advance Tabco Model FTG-2496

Floor Trough, 24"W, 96"L, 4"D, 14 gauge 304 series stainless steel, includes stainless steel subway grating constructed from 3/16" x 1" bars, 4" O.D. waste pipe 3"L, pitched towards waste (NOTE:This unit supplied with 2 drain openings)

ITEM 41 - GAS TILT SKILLET (1 REQ'D)

Groen Model BPM-40G

Eclipse™ Ergonomic Braising Pan, gas, 40-gallon capacity, 10" deep pan, 38" pan height, manual tilt, standard etch marks, faucet bracket, round tubular open leg base, stainless steel construction, bullet feet, electric spark ignition, 144,000 BTU/hr

Accessories:

1 ea Model 154581 One year Warranty Extension (US & Canada) (NET)
1 ea K-12 School Two Year Parts and labor warranty
1 ea Gas type to be specified
1 ea Model ELEV0-2000 For elevation between 0 and 2000
1 ea 2" Tangent draw-off with perforated strainer
1 ea Model 159102 Drain cup & 8' hose assembly for TDO
1 ea Model 130834 Additional TDO Strainer
1 ea Model 1502347 Pan Carrier Universay style, fits all size and type braising pans
1 st Model FL FOOTKIT 4 Flanged Feet, for all BPM & BPP models (set of 4)
1 ea Model 146222 Double pantry faucet with swing spout & side mounting.

ITEM 42 - GREASE EXTRACTOR HOOD (TYPE I) 27'-4" (1 REQ'D)

Streivor Air Systems Model SAWCBD

Commercial Kitchen Ventilation Specification

See plans for location and placement of item with reference to adjoining equipment. Furnish and install per Manufacturer's standard specifications and the following:

A. Install in the location as shown on drawings. It is the responsibility of the Installer to verify all clearances and stand offs from the hood to limited combustibles and/or combustible materials. Hood must be installed in accordance with the Manufacturer's specifications. Canopy Hoods to be installed a minimum of 78 inches above the finished floor and level. ADA requires 80 inches minimum above the finished floor.
B. The Hood assembly to be size and shape per the drawings. Hood to be U.L. listed #710, NSF listed and built in compliance with the prevailing NFPA Standard #96. The hood ends shall be fabricated from 16 gauge stainless steel or heavier and have a Performedge shape at the lower most part of the end. The remainder of the hood will be fabricated of material not less than 18 gauge. All exposed surfaces to be fabricated from Type 304 stainless steel with a #4 finish. All exposed welds to be ground smooth and polished to a #4 finish. Exhaust airflow volume and static pressure at the duct collar(s) shall not exceed those shown on the drawings.
C. Stainless steel matching enclosure panels from the top of the Hood to the finished ceiling to be furnished by KEC. (Verify ceiling height with plan.)
D. All electrical connections, materials and labor to connect high and low voltage electrical to the hood lights, temperature monitors, electrical components and/or the Fire Suppression System including micro-switch(es) by other. See fire suppression system for additional detail.
E. Hood Manufacturer to provide engineering and shop drawings for approval prior to fabrication.
F. Exhaust and Supply Fans to be furnished by Mechanical Division in compliance with local and National Codes. See Hood Manufacturer's specification sheets for CFM and static pressure requirements.
G. Duct connections by Mechanical. An air balance test should be performed before cooking start up to insure correct exhaust and supply airflow rates.
H. Hood must be manufactured UL 710 Listed, NFPA 96 compliant and installed in accordance with all prevailing codes and standards 3 Inch Stand Off Back The hood assembly to be per the size and shape shown on the drawing. A 3” standoff (enclosed on all sides) to be included on the entire back

outer perimeter of the hood. Stand off to be fabricated from 18 gauge stainless steel of the same material and with the same finish as the hood. All exposed corners with welded and polished to a #4 finish.

I. Extractor HVC Hood to be fitted with ExtractAire HVC Filters, to be UL1046 Listed, NSF approved high velocity adjustable slot Cartridge Filters. The ExtractAire HVC Cartridge Filters will have an opening at the upper most portion of the cartridge filter to allow air to enter into the cartridge filter. The opening will be located within 5" of the top of the hood. The HVC Cartridge Filters will be fitted with an adjustable air diverter and choke to control airflow through the cartridge. The design of the HVC Cartridge Filter will force the air traveling through the cartridge to change direction a minimum of five times and 180 degrees. The cartridge filter bottom will be entirely open to allow grease to flow freely out of the cartridge and facilitate hand or machine cleaning.
   The HVC Cartridge Filters will have a 55% or higher grease efficiency rating certified by an independent testing laboratory and procedure recognized by ASHRAE TC-510. The cartridge filters will be manufactured of Type 304 stainless steel polished to a #4 finish. The cartridge filters will be easily removable for cleaning.
J. Exposed Canopy Material 304 Stainless Steel Type 304 Stainless Steel (SS) is in the “Austenitic group of SS” comprising approximately 18% chromium and 8% nickel. Type 304’s resistance to corrosive acids makes it ideal for hoods, sinks and tabletops. Type 304 SS is comprised of no more than 0.8% carbon and at least 50% iron. The chromium binds oxygen to the surface of the product to protect the iron from oxidation (rust). Nickel also enhances the corrosion resistance of stainless steel. Therefore, the higher the nickel content, the more resistant the stainless steel is to corrosion. Type 304 SS is nonmagnetic.
K. Non-Exposed Exhaust Plenum Material 304 Stainless Steel Type 304 Stainless Steel (SS) is in the “Austenitic group of SS” comprising approximately 18% chromium and 8% nickel. Type 304’s resistance to corrosive acids makes it ideal for hoods, sinks and tabletops. Type 304 SS is comprised of no more than 0.8% carbon and at least 50% iron. The chromium binds oxygen to the surface of the product to protect the iron from oxidation (rust). Nickel also enhances the corrosion resistance of stainless steel. Therefore, the higher the nickel content, the more resistant the stainless steel is to corrosion. Type 304 SS is nonmagnetic.
L. SmartAire SmartAire-Segmented Air Stream Technology that incorporates two adjustable high velocity low volume streams of air into the lower front edge of a hood which enhance the hood's ability to capture and contain cooking gases and effluents, thus reducing the amount of exhaust air exhausted from the hood by up to 40%. Hood to have a full length internal makeup air plenum in the front of the hood that facilitates an active front edge of the hood, wherein two continuous full length high velocity low volume air streams are incorporated into the inner lower front edge of the hood make up air plenum, one air stream is directed in an inward upward direction and one is directed in a downward inward direction. The air streams will have baffles that are adjustable in individual segments of 18in. or less. The air streams are supplied by an internal hood fan(s) supplied by the Hood manufacturer installed in the makeup air plenum. The internal hood fan will be factory wired to an electrical junction box on top of the hood. The air inlet to the internal make up air fan will be fitted with a UL Listed fire actuated damper and factory ducted to the full length add on plenum.
M. Make Up Air SPD Hood to have a full length add on supply plenum fabricated of 18 gauge stainless steel (material type and finish to be the same as the hood) that facilitates the delivery of downward supply air through a full length perforated metal. (See drawings for location and size). All welds to be polished to a #4 finish. Plenum is to be factory welded to the hood.
N. Lamps Recessed Mounted LED T8 LED, 120vac, UL Listed lamp for exhaust canopy hoods, consumes less than 5.5 Watts per foot (36” lamp uses 26 Watts – 2500 Lumens/ 48” lamp used 44 Watts – 380 Lumens), maximum operating temperature 75 degrees C (167*F). 120 degree Beam angle, rated for 50,000 hour lamp life,
   Mercury free, instant (no ballast), exceeds Federal Energy Act requirement, no ultraviolet light emission.
O. Light Fixture Recessed Mounted LED Hood to be fitted with UL & NSF Listed Recessed Mounted Commercial Kitchen Hood light fixtures. Light fixture to have Stainless Steel faceplate with tempered

prismatic glass diffusor. Light fixture(s) to be prewired to a single connection point for each hood. To be fitted with LED lamps.

P. Balance Aire Exhaust Damper Hood to be fitted with a UL710 Listed, internally adjustable opposed blade variable volume damper(s) per the size and shape of the drawings. The opposed blades to include a positioning bracket that allows the damper blades to be adjusted from 5% to 100% open. Each positioning bracket to have a locking/unlocking fastener on the inside of the damper that is accessible from inside of the hood that locks the damper blade in place. Damper to be manufactured from 18 gauge of the same material type and finish as the hood exhaust plenum.
Q. Auto Fan Start An Auto Fan Start is required for NFPA 96 Section 8.2.3.3. Auto Fan Switches may be located in each hood exhaust collar or the hood canopy. Auto Fan Switches in the canopy have a maximum spacing of 84".
R. Access Enclosure Hood Canopy Mounted Hood Canopy to be fitted with UL 710 listed Access Enclosure(s) size and shape per the drawing with a removable cover plate that protects and allows access to monitoring equipment from inside of the hood canopy. The removable cover to be held in place by stainless steel fasteners. When the Enclosure's cover is removed it allows easy access for installation, adjustments and service to the equipment inside the hood canopy. Access Enclosures to be fabricated from 18 gauge stainless steel of the same material and with the same finish as the hood. All welds to be ground smooth and polished to a #4 finish.
S. Hood Utility Cabinet, Hood Utility Cabinet (HUC) assembly to be per size and shape shown on the drawing. Cabinet constructed with angle iron frame and stainless steel body. All exposed surfaces to be fabricated of 18 gauge Type 304 stainless steel (s/s) with a #4 finish. All exposed welds to be ground smooth and polished to a #4 finish. Cabinet has an open top to enable utility connections from above ceiling and a stainless steel lift out removable door panel. The removable door panel to have a recessed s/s door pull, full grip type. The removable door panel to be held in place by a full length upper and lower channel.
T. Ceiling Enclosure, Stainless steel matching enclosure panels from the top of the Hood to the finished ceiling. (Verify ceiling height with plan.) Ceiling Enclosure panels to be fabricated of 18 gauge stainless steel (material type and finish to be the same as the hood). Any exposed welds to be ground smooth and polished to a #4 finish.

ITEM 42.3 – DEMAND CONTROL KITCHEN VENTILATION (1 REQ'D)
Streivor Air Systems Model DemandAire Gold
Connected to hoods #8, #42L/R, #68, and #80
See plans for location and placement of item with reference to adjoining equipment. See schematics for utility connection and operation. Furnish and install per Manufacturer's standard specifications and the following: Install in the location as shown on drawings. It is the responsibility of the Installer to verify all clearances.

The Demand Control Kitchen Ventilation (DCKV) System is to be compliant with the prevailing ASHRAE/ANSI 90.1 and California Title 24 energy codes.

DCKV Systems are to be UL 508A listed and shall be capable of at least a 50% reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.

DCKV Systems shall provide connections for a run signal for each supply and exhaust fan(s).

DCKV Systems shall include failsafe controls that result in full flow upon a cooking sensor failure, and an adjustable timed override to allow occupants the ability to temporarily override the system to full flow.

DCKV Systems shall include Ambient Temperature Monitoring (ATM) to monitor the temperature of the air in the kitchen space surrounding the hood system.

DCKV Systems shall include Zonal Temperature Monitoring controls that monitor individual cooking appliances below each hood. Temperature monitors are to be installed in the optimal location within the hood canopy with a maximum spacing of 48” to provide the fastest response time to changes in cooking appliance conditions and increase energy efficiency.

DCKV Systems that include temperature monitors which are not accessible from below the hood(s) via UL 710 listed access enclosure(s) are not acceptable.

DCKV systems that only monitor the appliance temperature in the area of the hood exhaust collar(s) are not acceptable.

DCKV Systems shall compare hood canopy temperatures to the ambient temperature of the kitchen space to determine the state of cooking appliances. Power supplied to the exhaust and/or supply fan(s) shall be adjusted to meet the cooking appliance demand using differential controls and an algorithm to optimize energy savings.

DCKV Systems shall include fan and lighting controls, diagnostic tools, system settings, and alarm notifications to be provided by means of a Human Machine Interface (HMI) with color touch screen. The HMI is door mounted to a Type I UL Listed stainless steel enclosure which may be recessed into a wall, surfaced mounted on a wall, or flush mounted on the front of a hood utility cabinet.

DCKV Systems shall include a Programmable Logic Controller (PLC), 24 VDC power supply, relays, terminal blocks, color-coded wiring, housed in a Type I UL Listed stainless steel enclosure which may be hood mounted in a utility cabinet or be wall mounted, recessed.

The HMI shall include manual controls including a 50% exhaust power switch, 100% power switch with timed override, and hood on/off light switch. The HMI shall include diagnostic tools and display screen for hood and ambient temperature status, fan motor status and control history, alarm log with visual and/or audible alarm notification, data logging, energy savings analysis, and fan operation analysis.

The HMI shall include password protected settings for temperature monitor set points, minimum and maximum fan speeds to assist with air balancing, 100% override time, fan off-delay time, energy calculation parameters, alarm triggers and fire suppression system settings.

DCKV Systems shall provide analog output control signals to VFDs, Electronically Commutated (EC) Motors, or BMS (not provided by the manufacturer unless specifically included herein) to control the exhaust and supply fans at variable speeds based on the cooking conditions below each hood based on inputs from hood and ambient temperature monitors, manual controls from the HMI, and fire suppression system actuation.

DCKV Systems shall be capable of providing real time system status such as hood and ambient temperature data, system faults, fan power operating status and other information via Modbus TCP communication.

Hood and ambient temperature monitors shall be stainless steel Platinum 100 3-Wire Resistance Temperature Detectors (RTD).

DCKV Systems shall be engineered with connections for shunting electrical equipment below the hood, electric gas valves, shunting SmartAire Internal Hood Fans (IHF), shunting makeup air, operating exhaust fans at full capacity during a fire suppression system actuation and signaling building alarm system.

DCKV Systems shall have an integrated electric gas valve reset relay that is accessed via the HMI and requires manual reset of the power to the electric gas valve(s) after the fire suppression system has been rearmed following a fire suppression system actuation.

Manufacturer will provide DCKV control schematics, installation and operation manuals, and sequence of operation documents.

Manufacturer will provide pre-installation phone consultation to answer questions regarding the DCKV system.

Manufacturer will provide on-site commissioning support during startup of the hood system(s). See contract for on-site duration allocated for commissioning.

(Manufacturer will not provide) control panel supply power (120VAC, 20 amps), electric gas valve supply power (120VAC, 20 amps), high voltage VFD supply power, VFDs (Variable Frequency Drives), or field wiring between DCKV control panel and RTD temperature monitors, fire suppression system microswitches, HMI, shunt trip breakers, BMS, exhaust and supply fan VFDs, exhaust and supply fan motors, electrical gas valve(s), and hood lights, unless specifically noted herein or any other unspecified materials or labor. The above exclusions, including labor and materials, to be provided by qualified contractor at no expense to Manufacturer.

ITEM 42.1 - FIRE SYSTEM (1 REQ'D)
Streivor Air Systems, Inc. Model Pyro Chem Kitchen Knight II

The fire protection system shall be wet chemical and comply with Standards NFPA 17A, NFPA 96 and UL 300 as well as all prevailing national, state and local codes. System shall provide cooking equipment, hood plenum and duct protection. System piping and conduit shall be concealed where possible. Exposed piping shall be chrome or chrome sleeved with no exposed threads. Provide a manual pull station to be recessed in the wall and installed per the location shown on the drawings at a height between 42” and 48” above the finished floor.
Provide a mechanically operated gas shut off valve (to be installed by the plumber) for the main gas supply to the equipment below the hood. Verify the size with Division 22.
Provide four (4) sets of normally open/closed contact points to be used for signaling a device that will;

A. disconnect all electrical power in the hazard area upon system activation
B. shunt the hood make up air fan upon system activation
C. signal the life safety alarm upon system activation.

Provide System design and drawings, installation, start up and certification. All to be performed by a factory certified Pyro Chem agency.

ITEM 43 - CHEFS COUNTER (1 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp.
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. To be constructed of 14 gauge stainless steel complete with an enclosed base cabinet with stainless steel finished ends and back.
B. Work top to be 14 gauge stainless steel with a 2" turn down on all sides. Counter top to be coved up around the tubular uprights where the uprights penetrate the top.
C. Base section to be 16 gauge stainless steel formed metal construction complete with 16 gauge stainless steel bottom and mid shelves. Back to be finished.
D. Provide 1 5/8” dia. stainless steel tube legs with Component Hardware Group, Inc. A10-0851 adjustable foot insert.
E. Provide (3) stack drawer unit to be part of this counter Item No. 45.
F. Provide (2) ea. Component Hardware Group, Inc., model No. R58-1020 double faced pedestal type electrical outlets with model No. R71-0721 stainless steel face plates.
G. Provide 18 gauge stainless steel double pan swinging door with recessed pull as shown. All doors to be provided with cylinder locks keyed alike.
H. Counter is to come fully pre-wired from the factory complete
I. Provide fully accessible work area with finished stainless steel interior.

J. Approximate size: 5'-0" deep x 20'-10" Long.

ITEM 44 - CHEFS SINK (1 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp.
Sink to be 14-gauge stainless steel formed and welded sinks 24" x 30" x 12" deep. (Die cast sink bows are not acceptable). Sink to be fully welded into counter top item 43.

Accessories:
1 ea Fisher model 57657 Faucet, 8" deck mount, with 10" swing spout stainless steel.
1 ea Fisher model 22209 DrainKing Waste Valve, with flat strainer, 12 GPM drain rate, cast red brass body

ITEM 45 - 3-STACK UTENSIL DRAWER UNIT (2 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp.
Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be fabricated of 16 gauge stainless steel complete with the following hardware items.

A. Provide stainless steel flush pull, Component Hardware Group, Inc., model no. P63-1012, installed into the 18 gauge double-pan drawer front panel.
B. Provide stainless steel locks, Component Hardware Group, Inc., model no P30-4781 for each drawer. All drawers are to be keyed alike.
C. Provide stainless steel full extension slides, Component Hardware Group, Inc., model No. S52-0024. Provide two (2) per drawer. **Slides to be installed so drawer will roll closed when released.**
D. Provide stainless steel removable drawer pan. Provide Component Hardware Group, Inc., model No. S81-1520 one (1) per drawer. Pan should be easily lifted out of drawer frame for cleaning.
E. Drawer face panel to be constructed of 16 gauge stainless steel double pan construction. Single metal drawer faces are not be acceptable.

ITEM 46 - DOUBLE OVERSHELF (1 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp.
Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be 16 gauge stainless steel shelf (1) 16" x 18'-6" and (1) 16" x 12'-3" long mounted on 1 5/8" dia. 16 gauge stainless steel tubular uprights anchored to bottom of base cabinet Item No. 43. The shelf is to have 1 ½ "turned-down edge on all sides. Counter top of Item No. 43 to be "coved" up around the tubular uprights where the uprights penetrate the top.

ITEM 47 - POT RACK, TABLE MOUNT (1 REQ'D)
Eagle Group Model TM84APR
Pot Rack, table mount, 76"W x 20"D, triple-bar design with tubular table supports, constructed of 3/16" x 2" aluminum flat bar, includes (21) double-pronged pot hooks, for 84"W table, NSF

Accessories:
24 ea Model 300696 Pot Hook, stainless steel

ITEM 48 - MOBILE WORK TABLE OPEN BASE (2 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp.
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A Work area top to be 14 gauge stainless steel with 2" turn down on all four sides.

B. Provide and install 16 gauge stainless steel tubular legs, stainless steel welded leg sockets, and fully welded stainless steel cross rail bracing. Provide 16 gauge stainless steel under shelf as shown.
C. Provide swivel expanding stem casters Component Hardware Group, Inc. (4)ea. Model CMS4-4GBN brake model.
D. Provide (1)ea. utensil drawer Component Hardware Group, Inc. Model S90-0020-N drawer mounted to the underside of mobile work table. Provide all necessary hardware mounting angles etc for a complete installation. Drawer to be furnished complete with a stainless steel lift out drawer pan.
E. Approximate size: 3'-0" deep x 6'-7" Long x 30" High.

ITEM 49 - WALL MOUNT HAND SINK (1 REQ'D)
Advance Tabco Model 7-PS-46
Physically Challenged Hand Sink, wall model, 14" wide x 16" front-to-back x 5" deep bowl, 18 gauge 304 series stainless steel, splash mount faucet with wrist handles, deck mounted soap dispenser (pump), undermounted paper towel dispenser, basket drain, wall brackets, NSF, cCSAus

Accessories:
1 ea Note: This faucet complies with 2014 Federal no lead standards
1 ea Model 7-PS-27D Bolted Side Splash, 7-3/4" tall, for handicapped hand sinks, in-field installation (hardware not included)

ITEM 50 - WALL MOUNT HAND SINK (1 REQ'D)
Advance Tabco Model 7-PS-46
Physically Challenged Hand Sink, wall model, 14" wide x 16" front-to-back x 5" deep bowl, 18 gauge 304 series stainless steel, splash mount faucet with wrist handles, deck mounted soap dispenser (pump), undermounted paper towel dispenser, basket drain, wall brackets, NSF, cCSAus

Accessories:
1 ea Note: This faucet complies with 2014 Federal no lead standards
1 ea Model 7-PS-11D Welded Side Splash 12” tall both sides.

ITEM 51 - MOBILE WARMING & HOLDING CABINET (1 REQ'D)
Cres Cor Model H-138-S-1834D
Cabinet, Mobile Heated, insulated, top-mount heater assembly, recessed push/pull handle, magnetic latch, channel pan slides hold (32) 18" x 26" pans on 1-1/2" centers, anti-microbial latches, reversible dutch doors, (4) heavy duty 5" swivel casters (2) braked, stainless steel construction, ENERGY STAR®

Accessories:
1 ea 10 ft power cord, , standard
1 ea Right-hand door swing, standard

ITEM 52 - P.O.S. (4 REQ'D)
Custom Model BY OWNER

ITEM 53 - DRAWER TYPE WARMER (3 REQ'D)
Hatco Model HDW-2N
Warming Drawer Unit, Free Standing, narrow, two drawers, includes (1) standard 6" deep food pan per drawer, stainless steel construction, thermostatic controls, 4" legs

Accessories:
1 ea NOTE: Includes 24/7 parts & service assistance, call 800-558-0607
3 ea 6' cord
3 ea Model HDW-ITC-2 Digital Temperature Control with (LED) display, two drawer (required on all drawers) (Not for retrofit)

ITEM 54 - SERVING COUNTER (1 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp.
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. To be constructed of 14 gauge stainless steel complete with an enclosed base cabinet with stainless steel finished ends and back.
B. Work top to be 14 gauge stainless steel with a 14 gauge stainless steel backsplash 2" thick with a 45 degree top edge to wall, turn down ½" at back. Front edge to be turned down 2", top to extend through each pass window and turn down 2" outside and front, left and right edges. No seams or knuckle joints at pass windows will be allowed. Counter top to be at ADA height.
C. Base section to be 16 gauge stainless steel formed metal construction complete with 16 gauge stainless steel bottom and mid shelves.
D. Provide 1 5/8" dia. S/S tube legs with Component Hardware Group, Inc. A10-0851 adjustable foot insert.
E. Approximate size: 2'-6" deep x length shown.

ITEM 55 - WALL MOUNTED OVERSHELF (1 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp. FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. To be 16 gauge stainless steel construction, 1 1/2" turn down in front and 2" turn up at back and right end and left ends. Provide 14 gauge stainless steel wall brackets as shown.
B. Approximate size to be 12" deep x Length shown

ITEM 56 - REACH-IN REFRIGERATOR (2 REQ'D)
True Food Service Equipment Model STA2R-2S
SPEC SERIES® Refrigerator, Reach-in, two-section, stainless steel front & sides, (2) stainless steel doors with locks, cam-lift hinges, digital temperature control, aluminum interior, (6) chrome shelves, LED interior lights, 5" castors, 1/2 HP, 9' cord, , cULus, NSF, ENERGY STAR®, MADE IN USA

Accessories:
2 ea Left door hinged left, right door hinged right standard
2 ea (3) chrome shelves and shelf supports standard per section
2 st Seismic/flanged legs, 6", set of 4

ITEM 57 - SERVING COUNTER (1 REQ'D)
Multiteria Model ULS96-MOD
Essence series Utility Counter, modified to size and shape as shown on drawing with extended base and lock-n-load open top area for item 58. 1" x 1" 16 gauge tubular stainless steel frame construction with welded joints. Vertical framework at front of counter to incorporate support posts for food shield. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and Tightlink fastening system. Stainless steel apron to be provided on operator side to mount controls.

Accessories:
A. 34" high standard.

B. Countertop, solid surface, make and model to be determined from categories a, b or c, with extended top tray slide, flat, curved front with 1-1/2" turn down edge, and straight segmented back as shown on drawing. Cut-out provided in top for item 59. 6" high end splash provided at wall, shipped loose.
C. Install item 59 into counter as furnished by others and shipped to Multiteria.
D. Food shield, FS-V vertical, 3/8" clear tempered front glass and (2) glass end panels. Approximately 71" long with top to be 60" a.f.f. 1" x 2" supports to be mounted through counter top and into counter vertical framework. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware.
E. Laminate front and end panel shall be ¾" thick MDO with standard laminate, make and model to be determined, and shall have matching vinyl edge banding and laminate liner material for panel backing. Front panel shall be curved and have louvers where required.
F. Gate latch on exposed end of counter for gate from item 65.
G. Stainless steel closure on end at wall.
H. Open on operator side with stainless steel removable undershelf.
I. (2) NEMA 5-15R receptacles for items 58 & 59 wired to J-box with 8' cord with NEMA 5-30P plug.
J. Seismic legs with flanged feet.
K. Kick plate mounted on counter with "L" brackets, removable with tools. Front kick plate to be curved and end kick plate to be straight. Verify brushed stainless steel finish or black powder coat finish.

ITEM 58 - SANDWICH PREP REFRIGERATOR (1 REQ'D)

True Food Service Equipment Model TPP-60

Pizza Prep, 33-41°F pan rail, stainless steel cover, 19.5"D cutting board, stainless steel front, top & sides, (2) full doors, (4) adjustable wire shelves, includes (8) 1/3 size clear polycarbonate insert pans (top), aluminum interior with stainless steel floor, 5" castors, front breathing, 1/3 HP, , 7' cord, NSF 7, cULus, CE, MADE IN USA

Accessories:

1 ea Self-contained refrigeration standard
1 ea Stainless steel interior
1 ea Model 883520 Garnish rack, 58-5/16"L
1 ea Model 915123 Polyethylene Cutting Board, pre-drilled, 60" x 19-1/2" x 1/2" thick
1 ea Model 861273 Condiment Pan Dividers, 1-1/16" x 12-5/8" (top of cabinet)
1 ea Model 865597 Condiment Pan Dividers, 15/16" x 12-5/8" (top of cabinet)
1 ea Model 864266 Condiment Pan Dividers, 27/32" x 12-5/8" (top of cabinet)
1 ea Model 925281 Condiment Pan Dividers, 1" x 12-9/16" (top of cabinet)
1 ea Model 800400FI Exterior round digital temperature display, Fahrenheit (factory install only)
1 st Seismic/flanged legs, 6", set of 4

ITEM 59 - REFRIGERATED SERVICE DROP-IN COUNTER CASE (1 REQ'D)

Structural Concepts Model DGS2430R

Impulse® Service Refrigerated Drop-In Case, 26-1/8"W, tilt out front glass, (2) non-lighted glass shelves, black interior & exterior, black trim, (2) glass ends, Breeze™ with EnergyWise self-contained refrigeration system, cETLus, ETL-Sanitation

Accessories:

1 ea NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
1 ea Extended second year parts & labor warranty (excluding compressor) at time of order
1 ea Breeze with EnergyWise self-contained refrigeration system with evaporator pan (rear access), standard
1 ea cord with
1 ea NOTE: Compressor air intake from below counter & through rear, counter configuration must allow air to be drawn in & discharged out the back
1 ea Stainless steel interior in lieu of standard black

1 ea Stainless steel exterior in lieu of standard black
1 ea Clear glass rear swinging door, standard
1 ea LED Lighted Glass Shelves

ITEM 60 - SNEEZE GUARD (1 REQ'D)
Multiteria Model FABRICATED ITEM
This item to be included with the Serving Counter refer to Item # 57 for specification.

ITEM 61 - OVERHEAD FOOD WARMER (4 REQ'D)
Hatco Model GRAH-36
Glo-Ray infrared food warmer, high wattage, tubular metal heater rod, single heater rod housing, aluminum construction. Furnished and installed in food shields by Multiteria. See items 65, 72, 73 & 75

Accessories:
4 ea Flush mount thermostatic control box with lighted power switch
4 ea Model BLACK Black, designer color
4 ea Remote Control Enclosure (1) infinite Switch.

ITEM 62 - HEATED DROP-IN SHELF (4 REQ'D)
Hatco Model GRSB-36-I
Glo-Ray drop-in heated shelf with recessed top, 37-1/2" x 21", ½" deep recessed surface area, hardcoat aluminum top, control thermostat, illuminated on/off switch. Furnished and installed in counters by Multiteria. See items 65, 72, 73 & 75.

Accessories:
4 ea Thermostat control with lighted rocker switch, standard

ITEM 63 - HOT/COLD DROP-IN UNIT (3 REQ'D)
Low Temp Industries Model QSCHP-3
QuickSwitch™ Hot/Cold/Freeze Food Well, drop-in, 49-1/2"W x 26-3/4"D x 21-16/25"H, accommodates (3) 12" x 20" pan size, wired remote, individual wired remote digital controls for hot or cold operation, manifold drain, stainless steel top & wells, galvanized exterior, cULus, ANSI/NSF 4, ANSI/NSF 7. Furnished and installed in counters by Multiteria. See items 65, 72, & 73. Furnished and installed in counters by Multiteria. See items 65, 72, & 73.

Accessories:
3 ea Fisher Model 3010
3 ea Slim Line Option for QSCHP-3
3 ea Loose Brass Ball Valves

ITEM 64 - DRAWER TYPE WARMER (5 REQ'D) (OFCI)
Alto-Shaam Model 500-3D
Warming Drawer Unit, Free Standing type. These units are existing and are to be reinstalled as shown. Contractor to make modifications to these units as listed below:

Accessories:
20 ea Alto-Shaam Model 5010920 3" Casters

ITEM 65 - SERVING COUNTER AND SNEEZE GUARDS (1 REQ'D)
Multiteria Model ULS96-MOD
Essence series Utility Counter, modified to size and shape as shown on drawing with extended base and lock-n-load solid top area for item 64. 1" x 1" 16 gauge tubular stainless steel frame construction with welded joints. Vertical framework at front of counter to incorporate support posts for food shield. Frame work to incorporate

stainless steel channel at ends and front to accept laminate panels and Tightlink fastening system. Stainless steel apron to be provided on operator side to mount controls.

Accessories:

A. 34” high standard.
B. Countertop, solid surface, make and model to be determined from categories a, b or c, with extended top tray slide, flat, curved front with 1-1/2” turn down edge, and straight segmented back as shown on drawing. Cut-out provided in top for items 62 & 63.
C. Install item 62 into counter with controls mounted in counter apron.
D. Install item 63 into counter with controls mounted in counter apron.
E. Deck mounted single hole single supply sink faucet with 6” swing spout and lever handle mounted in counter at item 63 as shown on drawing. Faucet to meet California codes.
F. Food shield to span item 62, convertible 2-position, operator service to self-service with ease of convertibility by one person, with LED lighting, 3/8” clear tempered glass shelf, front glass and (1) glass end panel. Install item 61 onto food shield located as shown on drawing. 1” x 2” supports to be mounted through counter top and into counter vertical framework. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware. Power switch for lighting mounted in counter apron.
G. Food shield to span item 63, convertible 2-position, operator service to self-service with ease of convertibility by one person, with LED lighting, 3/8” clear tempered glass shelf, front glass and (1) glass end panel. 1” x 2” supports to be mounted through counter top and into counter vertical framework. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware. Power switch for lighting flush mounted in counter apron.
H. Laminate front and end panel shall be ¾” thick MDO with standard laminate, make and model to be determined, and shall have matching vinyl edge banding and laminate liner material for panel backing. Front panel shall be curved and have louvers where required.
I. Swing gate laminated to match counter panels provided as shown on drawing.
J. Stainless steel hinged louvered doors on operator side below item 63. Open storage below item 62 with stainless steel removable undershelf.
K. Electrical receptacles installed in counter base for items 61, 62, 63 & 64 wired to J-box for LED lighting with 8’ cord with NEMA 14-30P plug.
L. Seismic legs with flanged feet.
M. Provisions for bolting to adjacent counter item 67.
N. Kick plate mounted on counter with “L” brackets, removable with tools. Front kick plate to be curved and end kick plate to be straight. Verify brushed stainless steel finish or black powder coat finish.

ITEM 66 - PARTITION SNEEZE GUARD (1 REQ'D)

Multiteria Model FABRICATED ITEM

This item to be included with the Serving Counter refer to Item # 67 for specification.

ITEM 67 - SERVING COUNTER (1 REQ'D)

Multiteria Model ULS90-MOD

Essence series Utility Counter, modified to size and shape as shown on drawing with extended base and lock-n-load open top area for item 70. 1” x 1” 16 gauge tubular stainless steel frame construction with welded joints. Vertical framework at front of counter to incorporate support posts for food shield. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and Tightlink fastening system. Stainless steel apron to be provided on operator side to mount controls.

Accessories:

A. 34” high standard.

B. Countertop, solid surface, make and model to be determined from categories a, b or c, with extended top tray slide, flat, curved front with 1-1/2" turn down edge, and straight segmented back as shown on drawing.
C. Food shield, FS-V vertical, 3/8" clear tempered front glass and (2) glass end panels. Approximately 65" long with top to be 60" a.f.f. 1" x 2" supports to be mounted through counter top and into counter vertical framework. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware.
D. Laminate front panel shall be ¾" thick MDO with standard laminate, make and model to be determined, and shall have matching vinyl edge banding and laminate liner material for panel backing. Front panel shall be curved.
E. Lock-n-load open top area for item 70 provided with clearance for gas lines as shown on drawing.
F. Open on operator side with stainless steel removable undershelf.
G. Electrical receptacle for item 70 with 8' cord with NEMA 5-15P plug.
H. Seismic legs with flanged feet.
I. Provisions for bolting to adjacent counters items 65 & 72.
J. Kick plate mounted on counter with "L" brackets, removable with tools. Front kick plate to be curved. Verify brushed stainless steel finish or black powder coat finish.

ITEM 68 - EXHAUST HOOD (TYPE I) (84"x60") (1 REQ'D)

Streivor Air Systems Model ICBD-CR325

Commercial Kitchen Ventilation Specification

See plans for location and placement of item with reference to adjoining equipment. Furnish and install per Manufacturer's standard specifications and the following:

A. Install in the location as shown on drawings. It is the responsibility of the Installer to verify all clearances and stand offs from the hood to limited combustibles and/or combustible materials. Hood must be installed in accordance with the Manufacturer's specifications. Canopy Hoods to be installed a minimum of 78 inches above the finished floor and level. ADA requires 80 inches minimum above the finished floor.
B. The Hood assembly to be size and shape per the drawings. Hood to be U.L. listed #710, NSF listed and built in compliance with the prevailing NFPA Standard #96. The hood ends shall be fabricated from 16 gauge stainless steel or heavier and have a Performedge shape at the lower most part of the end. The remainder of the hood will be fabricated of material not less than 18 gauge. All exposed surfaces to be fabricated from Type 304 stainless steel with a #4 finish. All exposed welds to be ground smooth and polished to a #4 finish. Exhaust airflow volume and static pressure at the duct collar(s) shall not exceed those shown on the drawings.
C. Stainless steel matching enclosure panels from the top of the Hood to the finished ceiling to be furnished by KEC. (Verify ceiling height with plan.)
D. All electrical connections, materials and labor to connect high and low voltage electrical to the hood lights, temperature monitors, electrical components and/or the Fire Suppression System including micro-switch(es) by other. See fire suppression system for additional detail.
E. Hood Manufacturer to provide engineering and shop drawings for approval prior to fabrication.
F. Exhaust and Supply Fans to be furnished by Mechanical Division in compliance with local and National Codes. See Hood Manufacturer's specification sheets for CFM and static pressure requirements.
G. Duct connections by Mechanical. An air balance test should be performed before cooking start up to insure correct exhaust and supply airflow rates.
F. Hood must be manufactured UL 710 Listed, NFPA 96 compliant and installed in accordance with all prevailing codes and standards.
H. Extractor, HVC Hood to be fitted with ExtractAire HVC Filters, to be UL1046 Listed, NSF approved high velocity adjustable slot Cartridge Filters. The ExtractAire HVC Cartridge Filters will have an opening at the upper most portion of the cartridge filter to allow air to enter into the cartridge filter. The opening will be located within 5" of the top of the hood. The HVC Cartridge Filters will be fitted with an

adjustable air diverter and choke to control airflow through the cartridge. The design of the HVC Cartridge Filter will force the air traveling through the cartridge to change direction a minimum of five times and 180 degrees. The cartridge filter bottom will be entirely open to allow grease to flow freely out of the cartridge and facilitate hand or machine cleaning. The HVC Cartridge Filters will have a 55% or higher grease efficiency rating certified by an independent testing laboratory and procedure recognized by ASHRAE TC-510. The cartridge filters will be manufactured of Type 304 stainless steel polished to a #4 finish. The cartridge filters will be easily removable for cleaning.

I. Exposed Canopy Material, 304 Stainless Steel Type 304 Stainless Steel (SS) is in the “Austenitic group of SS” comprising approximately 18% chromium and 8% nickel. Type 304’s resistance to corrosive acids makes it ideal for hoods, sinks and tabletops. Type 304 SS is comprised of no more than 0.8% carbon and at least 50% iron. The chromium binds oxygen to the surface of the product to protect the iron from oxidation (rust). Nickel also enhances the corrosion resistance of stainless steel. Therefore, the higher the nickel content, the more resistant the stainless steel is to corrosion. Type 304 SS is nonmagnetic.
   Non-Exposed Exhaust Plenum Material, 304 Stainless Steel Type 304 Stainless Steel (SS) is in the “Austenitic group of SS” comprising approximately 18% chromium and 8% nickel. Type 304’s resistance to corrosive acids makes it ideal for hoods, sinks and tabletops. Type 304 SS is comprised of no more than 0.8% carbon and at least 50% iron. The chromium binds oxygen to the surface of the product to protect the iron from oxidation (rust). Nickel also enhances the corrosion resistance of stainless steel. Therefore, the higher the nickel content, the more resistant the stainless steel is to corrosion. Type 304 SS is nonmagnetic.
J. Make Up Air, SPD Hood to have a full length add on supply plenum fabricated of 18 gauge stainless steel (material type and finish to be the same as the hood) that facilitates the delivery of downward supply air through a full length perforated metal. (See drawings for location and size). All welds to be polished to a #4 finish. Plenum is to be factory welded to the hood.
K. Lamps, Recessed Mounted LED T8 LED, 120vac, UL Listed lamp for exhaust canopy hoods, consumes less than 5.5 Watts per foot (36” lamp uses 26 Watts – 2500 Lumens/ 48” lamp used 44 Watts – 380 Lumens), maximum operating temperature 75 degrees C (167*F). 120 degree Beam angle, rated for 50,000 hour lamp life, mercury free, instant (no ballast), exceeds Federal Energy Act requirement, no ultraviolet light emission.
L. Light Fixture, Recessed Mounted LED Hood to be fitted with UL & NSF Listed Recessed Mounted Commercial Kitchen Hood light fixtures. Light fixture to have Stainless Steel faceplate with tempered prismatic glass diffusor. Light fixture(s) to be prewired to a single connection point for each hood. To be fitted with LED lamps.
M. Balance Aire Exhaust Damper Hood to be fitted with a UL710 Listed, internally adjustable opposed blade variable volume damper(s) per the size and shape of the drawings. The opposed blades to include a positioning bracket that allows the damper blades to be adjusted from 5% to 100% open. Each positioning bracket to have a locking/unlocking fastener on the inside of the damper that is accessible from inside of the hood that locks the damper blade in place. Damper to be manufactured from 18 gauge of the same material type and finish as the hood exhaust plenum.
N. Auto Fan Start, An Auto Fan Start is required for NFPA 96 Section 8.2.3.3. Auto Fan Switches may be located in each hood exhaust collar or the hood canopy. Auto Fan Switches in the canopy have a maximum spacing of 84".
O. Access Enclosure Hood Canopy Mounted, Hood Canopy to be fitted with UL 710 listed Access Enclosure(s) size and shape per the drawing with a removable cover plate that protects and allows access to monitoring equipment from inside of the hood canopy. The removable cover to be held in place by stainless steel fasteners. When the Enclosure's cover is removed it allows easy access for installation, adjustments and service to the equipment inside the hood canopy. Access Enclosures to be fabricated from 18 gauge stainless steel of the same material and with the same finish as the hood. All welds to be ground smooth and polished to a #4 finish.
P. Ceiling Enclosure Stainless steel matching enclosure panels from the top of the Hood to the finished ceiling. (Verify ceiling height with plan.) Ceiling Enclosure panels to be fabricated of 18 gauge

stainless steel (material type and finish to be the same as the hood). Any exposed welds to be ground smooth and polished to a #4 finish.

ITEM 68.1 - FIRE SYSTEM (1 REQ'D)
Streivor Air Systems, Inc. Model Pyro Chem Kitchen Knight II

The fire protection system shall be wet chemical and comply with Standards NFPA 17A, NFPA 96 and UL 300 as well as all prevailing national, state and local codes. System shall provide cooking equipment, hood plenum and duct protection. System piping and conduit shall be concealed where possible. Exposed piping shall be chrome or chrome sleeved with no exposed threads. Provide a manual pull station to be recessed in the wall and installed per the location shown on the drawings at a height between 42” and 48” above the finished floor.
Provide a mechanically operated gas shut off valve (to be installed by the plumber) for the main gas supply to the equipment below the hood. Verify the size with Division 22.
Provide four (4) sets of normally open/closed contact points to be used for signaling a device that will;

A. disconnect all electrical power in the hazard area upon system activation
B. shunt the hood make up air fan upon system activation
C. signal the life safety alarm upon system activation.

Provide System design and drawings, installation, start up and certification. All to be performed by a factory certified Pyro Chem agency.

ITEM 69 - GRIDDLE COOKTOP (1 REQ'D)
Wolf Model ASA24
Heavy Duty Griddle, countertop, gas, 24" W x 24" D cooking surface, 1" thick polished steel griddle plate, (2) burners, 4" back & tapered side splashes, (1) mechanical snap action thermostat per burner with temperature adjustment, pilot safety, manual ignition, (1) 6 quart grease drawer, stainless & aluminized steel chassis frame, 11" low profile cooking height on 4" adjustable legs, 54,000 BTU, CSA, NSF

Accessories:
1 ea Gas type to be specified
1 ea 10” Splashes with tapered sides
1 ea Cool bullnose under 130 degrees F when plate is 450 degrees F
1 ea Model CUTBD-24 Cutting Board with Sani-Tuff

ITEM 70 - ACHIEVER COLD REFRIGERATED BASE (1 REQ'D)
Vulcan Model ARS60
Achiever Refrigerated Base, 60", self-contained, one-section, (2) drawers, marine top, stainless base, top, front, sides, interior, galvanized back, 3" heavy duty casters, magnetic drawer gasket, 1/3 hp

Accessories:
1 ea Compressor on left, standard
1 st Leg set

ITEM 71 - 6-BURNER COOK TOP (1 REQ'D)
Wolf Model AHP636
Achiever Hotplate, gas, 36" W, 180,000 BTU total, (6) 30,000 BTU (27,500 BTU/hr for LP) open burners with lift-off burner heads, protected standing pilots, cast iron grates, manual gas valve controls, stainless steel front, sides & backsplash, aluminized pull out crumb tray, 4" adjustable legs, CSA, NSF

Accessories:
1 ea Gas type to be specified
1 ea Optional extended Warranty
1 ea Model CUTBD-36 Cutting Board with Sani-Tuff

ITEM 72 - SERVING COUNTER AND SNEEZE GUARDS (1 REQ'D)
Multiteria Model ULS96-MOD
Essence series Utility Counter, modified to size and shape as shown on drawing with extended base and lock-n-load solid top area for item 64. 1" x 1" 16 gauge tubular stainless steel frame construction with welded joints. Vertical framework at front of counter to incorporate support posts for food shield. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and Tightlink fastening system. Stainless steel apron to be provided on operator side to mount controls.

Accessories:

A. 34" high standard.
B. Countertop, solid surface, make and model to be determined from categories a, b or c, with extended top tray slide, flat, curved front with 1-1/2" turn down edge, and straight segmented back as shown on drawing. Cut-out provided in top for items 62 & 63.
C. Install item 62 into counter with controls mounted in counter apron.
D. Install item 63 into counter with controls mounted in counter apron.
E. Deck mounted single hole single supply sink faucet with 6" swing spout and lever handle mounted in counter at item 63 as shown on drawing. Faucet to meet California codes.
F. Food shield to span item 62, convertible 2-position, operator service to self-service with ease of convertibility by one person, with LED lighting, 3/8" clear tempered glass shelf, front glass and (1) glass end panel. Install item 61 onto food shield located as shown on drawing. 1" x 2" supports to be mounted through counter top and into counter vertical framework. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware. Power switch for lighting mounted in counter apron.
G. Food shield to span item 63, convertible 2-position, operator service to self-service with ease of convertibility by one person, with LED lighting, 3/8" clear tempered glass shelf, front glass and (1) glass end panel. 1" x 2" supports to be mounted through counter top and into counter vertical framework. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware. Power switch for lighting flush mounted in counter apron.
H. Laminate front and end panel shall be ¾" thick MDO with standard laminate, make and model to be determined, and shall have matching vinyl edge banding and laminate liner material for panel backing. Front panel shall be curved and have louvers where required.
I. Gate latch on exposed end of counter for gate from item 73.
J. Stainless steel hinged louvered doors on operator side below item 63. Open storage below item 62 with stainless steel removable undershelf.
K. Electrical receptacles installed in counter base for items 61, 62, 63 & 64 wired to J-box for LED lighting with 8' cord with NEMA 14-30P plug.
L. Seismic legs with flanged feet.
M. Provisions for bolting to adjacent counter item 67.
N. Kick plate mounted on counter with "L" brackets, removable with tools. Front kick plate to be curved and end kick plate to be straight. Verify brushed stainless steel finish or black powder coat finish.

ITEM 73 - SERVING COUNTER AND SNEEZE GUARDS (1 REQ'D)
Multiteria Model ULS96-MOD
Essence series Utility Counter, modified to size and shape as shown on drawing with extended base and lock-n-load solid top area for item 64. 1" x 1" 16 gauge tubular stainless steel frame construction with welded joints. Vertical framework at front of counter to incorporate support posts for food shield. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and Tightlink fastening system. Stainless steel apron to be provided on operator side to mount controls.

Accessories:

A. 34" high standard.

B. Countertop, solid surface, make and model to be determined from categories a, b or c, with extended top tray slide, flat, curved front with 1-1/2" turn down edge, and straight segmented back as shown on drawing. Cut-out provided in top for items 62 & 63.
C. Install item 62 into counter with controls mounted in counter apron.
D. Install item 63 into counter with controls mounted in counter apron.
E. Deck mounted single hole single supply sink faucet with 6" swing spout and lever handle mounted in counter at item 63 as shown on drawing. Faucet to meet California codes.
F. Food shield to span item 62, convertible 2-position, operator service to self-service with ease of convertibility by one person, with LED lighting, 3/8" clear tempered glass shelf, front glass and (1) glass end panel. Install item 61 onto food shield located as shown on drawing. 1" x 2" supports to be mounted through counter top and into counter vertical framework. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware. Power switch for lighting mounted in counter apron.
G. Food shield to span item 63, convertible 2-position, operator service to self-service with ease of convertibility by one person, with LED lighting, 3/8" clear tempered glass shelf, front glass and (1) glass end panel. 1" x 2" supports to be mounted through counter top and into counter vertical framework. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware. Power switch for lighting flush mounted in counter apron.
H. Laminate front and end panel shall be ¾" thick MDO with standard laminate, make and model to be determined, and shall have matching vinyl edge banding and laminate liner material for panel backing. Front panel shall be curved and have louvers where required.
I. Swing gate laminated to match counter panels provided as shown on drawing.
J. Stainless steel hinged louvered doors on operator side below item 63. Open storage below item 62 with stainless steel removable undershelf.
K. Electrical receptacles installed in counter base for items 61, 62, 63 & 64 wired to J-box for LED lighting with 8' cord with NEMA 14-30P plug.
L. Seismic legs with flanged feet.
M. Provisions for bolting to adjacent counter item 75.
N. Kick plate mounted on counter with "L" brackets, removable with tools. Front kick plate to be curved and end kick plate to be straight. Verify brushed stainless steel finish or black powder coat finish.

ITEM 74 - SNEEZE GUARD (1 REQ'D)
Multiteria Model FABRICATED ITEM
This item to be included with the Serving Counter refer to Item # 75 for specification.

ITEM 75 - SERVING COUNTER (1 REQ'D)
Multiteria Model ULS96-MOD
Essence series Utility Counter, modified to size and shape as shown on drawing with extended base and lock-n-load solid top area for (2) items 64. 1" x 1" 16 gauge tubular stainless steel frame construction with welded joints. Vertical framework at front of counter to incorporate support posts for food shield. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and Tightlink fastening system. Stainless steel apron to be provided on operator side to mount controls.

Accessories:
A. 34" high standard.
B. Countertop, solid surface, make and model to be determined from categories a, b or c, with extended top tray slide, flat, curved front with 1-1/2" turn down edge, and straight segmented back as shown on drawing. Cut-out provided in top for item 62 and grommet hole as shown on drawing. 6" high end splash provided at wall, shipped loose.
C. Install item 62 into counter with controls mounted in counter apron.
D. Food shield to span item 62, convertible 2-position, operator service to self-service with ease of convertibility by one person, with LED lighting, 3/8" clear tempered glass shelf, front glass and (1)

glass end panel. Install item 61 onto food shield located as shown on drawing. 1” x 2” supports to be mounted through counter top and into counter vertical framework. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware. Power switch for lighting mounted in counter apron.

E. Laminate front panel shall be ¾” thick MDO with standard laminate, make and model to be determined, and shall have matching vinyl edge banding and laminate liner material for panel backing. Front panel shall be curved.
F. Stainless steel closure on end at wall.
G. Open storage below item 62 with stainless steel removable undershelf.
H. Electrical receptacles installed in counter base for items 61, 62, (2) 64 & (2) 65 wired to J-box for LED lighting with 8’ cord with NEMA 14-30P plug.
I. Seismic legs with flanged feet.
J. Provisions for bolting to adjacent counter item 73.
K. Kick plate mounted on counter with “L” brackets, removable with tools. Front kick plate to be curved. Verify brushed stainless steel finish or black powder coat finish.

ITEM 76 - HEATED DISPLAY CASE (2 REQ'D)
Hatco Model GRPWS-2418D
Glo-Ray® Pizza Warmer, Counter Top, Pass-Thru, double slant shelf, 24" x 18" deep, stainless steel & aluminum construction

Accessories:
2 ea Stainless steel is standard
2 ea 1 Year Warranty Standard
2 ea (4) Halogen bulbs in liew of standard display lights

ITEM 77 - WALL MOUNTED HAND SINK (1 REQ'D)
Advance Tabco Model 7-PS-46
Physically Challenged Hand Sink, wall model, 14" wide x 16" front-to-back x 5" deep bowl, 18 gauge 304 series stainless steel, splash mount faucet with wrist handles, deck mounted soap dispenser (pump), undermounted paper towel dispenser, basket drain, wall brackets, NSF, cCSAus

Accessories:
1 ea Note: This faucet complies with 2014 Federal no lead standards
1 ea Model 7-PS-27D Bolted Side Splash, 7-3/4" tall, for handicapped hand sinks, in-field installation

ITEM 78 - REACH-IN REFRIGERATOR (1 REQ'D)
True Food Service Equipment Model STA2R-2S
SPEC SERIES® Refrigerator, Reach-in, two-section, stainless steel front & sides, (2) stainless steel doors with locks, cam-lift hinges, digital temperature control, aluminum interior, (6) chrome shelves, LED interior lights, 5" castors, 1/2 HP, 9' cord, , cULus, NSF, ENERGY STAR®, MADE IN USA

Accessories:
1 ea Left door hinged left, right door hinged right standard
1 ea (3) chrome shelves and shelf supports standard per section
1 st Seismic/flanged legs, 6", set of 4

ITEM 79 - MOBILE UTILITY RACK (2 REQ'D)
Metro Model RD13N
Tray Rack, mobile, end load, single section, pass-thru, 21-1/4"W x 68-1/4"H, 26-1/2"D, pass-thru, open sides with slides for (40) 18"x26" pans, slides on 1-1/2" centers, riveted aluminum construction

Accessories:

2 ea Model A37 Mobile Tray Rack Corner Bumper Set, gray, adds 1/2" to overall width & 1" to overall depth of rack
2 ea Model B5DNB Super Erecta® Dolly Plate Caster, brake, 5" diameter, 1-3/8" wide face, donut neoprene, 225 lb. capacity (foot operated brake)

ITEM 80 - GREASE EXTRACTOR HOOD (TYPE 1) (96”x63”) (1 REQ'D)
Streivor Air Systems Model ISPC-CR200
Commercial Kitchen Ventilation Specification
See plans for location and placement of item with reference to adjoining equipment. Furnish and install per Manufacturer's standard specifications and
the following:

A. Install in the location as shown on drawings. It is the responsibility of the Installer to verify all clearances and stand offs from the hood to limited combustibles and/or combustible materials. Hood must be installed in accordance with the Manufacturer's specifications. Canopy Hoods to be installed a minimum of 78 inches above the finished floor and level. ADA requires 80 inches minimum above the finished floor.
B. The Hood assembly to be size and shape per the drawings. Hood to be U.L. listed #710, NSF listed and built in compliance with the prevailing NFPA Standard #96. The hood ends shall be fabricated from 16 gauge stainless steel or heavier and have a Performedge shape at the lower most part of the end. The remainder of the hood will be fabricated of material not less than 18 gauge. All exposed surfaces to be fabricated from Type 304 stainless steel with a #4 finish. All exposed welds to be ground smooth and polished to a #4 finish. Exhaust airflow volume and static pressure at the duct collar(s) shall not exceed those shown on the drawings.
C. Stainless steel matching enclosure panels from the top of the Hood to the finished ceiling to be furnished by KEC. (Verify ceiling height with plan.)
D. All electrical connections, materials and labor to connect high and low voltage electrical to the hood lights, temperature monitors, electrical components and/or the Fire Suppression System including micro-switch(es) by other. See fire suppression system for additional detail.
E. Hood Manufacturer to provide engineering and shop drawings for approval prior to fabrication.
F. Exhaust and Supply Fans to be furnished by Mechanical Division in compliance with local and National Codes. See Hood Manufacturer's specification sheets for CFM and static pressure requirements.
G. Duct connections by Mechanical. An air balance test should be performed before cooking start up to insure correct exhaust and supply airflow rates.
H. Hood must be manufactured UL 710 Listed, NFPA 96 compliant and installed in accordance with all prevailing codes and standards.
I. 3 Inch Stand Off, Back The hood assembly to be per the size and shape shown on the drawing. A 3” stand off (enclosed on all sides) to be included on the entire back outer perimeter of the hood. Stand off to be fabricated from 18 gauge stainless steel of the same material and with the same finish as the hood. All exposed corners with welded and polished to a #4 finish.
J. Extractor, HVC Hood to be fitted with ExtractAire HVC Filters, to be UL1046 Listed, NSF approved high velocity adjustable slot Cartridge Filters. The ExtractAire HVC Cartridge Filters will have an opening at the upper most portion of the cartridge filter to allow air to enter into the cartridge filter. The opening will be located within 5" of the top of the hood. The HVC Cartridge Filters will be fitted with an adjustable air diverter and choke to control airflow through the cartridge. The design of the HVC Cartridge Filter will force the air traveling through the cartridge to change direction a minimum of five times and 180 degrees. The cartridge filter bottom will be entirely open to allow grease to flow freely out of the cartridge and facilitate hand or machine cleaning. The HVC Cartridge Filters will have a 55% or higher grease efficiency rating certified by an independent testing laboratory and procedure recognized by ASHRAE TC-510. The cartridge filters will be manufactured of Type 304 stainless steel polished to a #4 finish. The cartridge filters will be easily removable for cleaning.

K. Exposed Canopy Material 304 Stainless Steel Type 304 Stainless Steel (SS) is in the “Austenitic group of SS” comprising approximately 18% chromium and 8% nickel. Type 304’s resistance to corrosive acids makes it ideal for hoods, sinks and tabletops. Type 304 SS is comprised of no more than 0.8% carbon and at least 50% iron. The chromium binds oxygen to the surface of the product to protect the iron from oxidation (rust). Nickel also enhances the corrosion resistance of stainless steel. Therefore, the higher the nickel content, the more resistant the stainless steel is to corrosion. Type 304 SS is nonmagnetic.

L. Non-Exposed Exhaust Plenum Material, 304 Stainless Steel Type 304 Stainless Steel (SS) is in the “Austenitic group of SS” comprising approximately 18% chromium and 8% nickel. Type 304’s resistance to corrosive acids makes it ideal for hoods, sinks and tabletops. Type 304 SS is comprised of no more than 0.8% carbon and at least 50% iron. The chromium binds oxygen to the surface of the product to protect the iron from oxidation (rust). Nickel also enhances the corrosion resistance of stainless steel. Therefore, the higher the nickel content, the more resistant the stainless steel is to corrosion. Type 304 SS is nonmagnetic.

M. Make Up Air, SPD Hood to have a full length add on supply plenum fabricated of 18 gauge stainless steel (material type and finish to be the same as the hood) that facilitates the delivery of downward supply air through a full length perforated metal. (See drawings for location and size). All welds to be polished to a #4 finish. Plenum is to be factory welded to the hood.

N. Lamps, Recessed Mounted LED T8 LED, 120vac, UL Listed lamp for exhaust canopy hoods, consumes less than 5.5 Watts per foot (36” lamp uses 26 Watts – 2500 Lumens/ 48” lamp used 44 Watts – 380 Lumens), maximum operating temperature 75 degrees C (167*F). 120 degree Beam angle, rated for 50,000 hour lamp life, mercury free, instant (no ballast), exceeds Federal Energy Act requirement, no ultraviolet light emission.

O. Light Fixture, Recessed Mounted LED Hood to be fitted with UL & NSF Listed Recessed Mounted Commercial Kitchen Hood light fixtures. Light fixture to have Stainless Steel faceplate with tempered prismatic glass diffusor. Light fixture(s) to be prewired to a single connection point for each hood. To be fitted with LED lamps.

P. BalanceAire Exhaust Damper, Hood to be fitted with a UL710 Listed, internally adjustable opposed blade variable volume damper(s) per the size and shape of the drawings. The opposed blades to include a positioning bracket that allows the damper blades to be adjusted from 5% to 100% open. Each positioning bracket to have a locking/unlocking fastener on the inside of the damper that is accessible from inside of the hood that locks the damper blade in place. Damper to be manufactured from 18 gauge of the same material type and finish as the hood exhaust plenum.

Q. Auto Fan Start An Auto Fan Start is required for NFPA 96 Section 8.2.3.3. Auto Fan Switches may be located in each hood exhaust collar or the hood canopy. Auto Fan Switches in the canopy have a maximum spacing of 84".

R. Access Enclosure Hood Canopy Mounted Hood Canopy to be fitted with UL 710 listed Access Enclosure(s) size and shape per the drawing with a removable cover plate that protects and allows access to monitoring equipment from inside of the hood canopy. The removable cover to be held in place by stainless steel fasteners. When the Enclosure's cover is removed it allows easy access for installation, adjustments and service to the equipment inside the hood canopy. Access Enclosures to be fabricated from 18 gauge stainless steel of the same material and with the same finish as the hood. All welds to be ground smooth and polished to a #4 finish.

S. Hood Utility Cabinet, Hood Utility Cabinet (HUC) assembly to be per size and shape shown on the drawing. Cabinet constructed with angle iron frame and stainless steel body. All exposed surfaces to be fabricated of 18 gauge Type 304 stainless steel (s/s) with a #4 finish. All exposed welds to be ground smooth and polished to a #4 finish. Cabinet has an open top to enable utility connections from above ceiling and a stainless steel lift out removable door panel. The removable door panel to have a recessed s/s door pull, full grip type. The removable door panel to be held in place by a full length upper and lower channel.

T. Ceiling Enclosure, Stainless steel matching enclosure panels from the top of the Hood to the finished ceiling. (Verify ceiling height with plan.) Ceiling Enclosure panels to be fabricated of 18 gauge

stainless steel (material type and finish to be the same as the hood). Any exposed welds to be ground smooth and polished
to a #4 finish.

ITEM 80.1 - FIRE SYSTEM (1 REQ'D)
Streivor Air Systems, Inc. Model Pyro Chem Kitchen Knight II

The fire protection system shall be wet chemical and comply with Standards NFPA 17A, NFPA 96 and UL 300 as well as all prevailing national, state and local codes. System shall provide cooking equipment, hood plenum and duct protection. System piping and conduit shall be concealed where possible. Exposed piping shall be chrome or chrome sleeved with no exposed threads. Provide a manual pull station to be recessed in the wall and installed per the location shown on the drawings at a height between 42" and 48" above the finished floor.
Provide a mechanically operated gas shut off valve (to be installed by the plumber) for the main gas supply to the equipment below the hood. Verify the size with Division 22.
Provide four (4) sets of normally open/closed contact points to be used for signaling a device that will;

A. disconnect all electrical power in the hazard area upon system activation
B. shunt the hood make up air fan upon system activation
C. signal the life safety alarm upon system activation.

Provide System design and drawings, installation, start up and certification. All to be performed by a factory certified Pyro Chem agency.

ITEM 81 - CONVEYOR OVEN (2 REQ'D)
Lincoln Foodservice Model 1450-000-U/1012 Double stack
Lincoln Impinger® I Conveyor Pizza Oven, Natural Gas, double deck, s conveyor belt, solid door, glass access window included, NSF/CSA, 120,000 BTU

Accessories:
1 ea Model 1009 Oven top (1 required) (for Lincoln Impinger® I (1400 Series) ovens)
1 ea Model 1011 low stand with casters- Impinger I (1400 Series) ovens

ITEM 82 - PIZZA PREPARATION REFRIGERATOR (1 REQ'D)
True Food Service Equipment Model TPP-60
Pizza Prep, 33-41°F pan rail, stainless steel cover, 19.5"D cutting board, stainless steel front, top & sides, (2) full doors, (4) adjustable wire shelves, includes (8) 1/3 size clear polycarbonate insert pans (top), aluminum interior with stainless steel floor, 5" castors, front breathing, 1/3 HP, , 7' cord, NSF 7, cULus, CE, MADE IN USA

Accessories:
1 ea Self-contained refrigeration standard
1 ea Alternative hinging available, please contact factory
1 st Seismic/flanged legs, 6", set of 4

ITEM 83 - WORK COUNTER W/ SINK (1 REQ'D)
Custom Model FABRICATED ITEM
American Stainless Steel Corp.
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. To be constructed of 14 gauge stainless steel complete with an enclosed base cabinet with stainless steel finished ends and back.
B. Work top to be 14 gauge stainless steel with a 14 gauge stainless steel backsplash 2" thick with a 45 degree top edge to wall, turn down ½" at back. Front, left and right edge to be turned down 2". 14

gauge stainless steel formed and welded sink 21" x 24" x 12" deep. (Die cast sink bowls are not acceptable). Provide 16 gauge stainless steel waste valve handle support bracket as shown at drain.

C. Base section to be 16 gauge stainless steel formed metal construction complete with 16 gauge stainless steel bottom and mid shelves. Provide 18 gauge stainless steel double pan hinged door at sink area.
D. Provide 1 5/8” dia. S/S tube legs with Component Hardware Group, Inc. A10-0851 adjustable foot insert.
E. Approximate size: 3’-0” deep x length shown.

Accessories:

1 ea. Fisher Model 13242 Faucet, wall/backsplash mount, 8" C.C., 8" long swing spout, 1/2" inlets.
1 ea. Fisher Model 22209 Drain King Waste Valve, with flat strainer, 12 GPM drain rate, dual Teflon seals, stainless steel ball, cast red brass body

ITEM 84 - WALL MOUNTED OVERSHELF (1 REQ'D)

Custom Model FABRICATED ITEM
American Stainless Steel Corp. FABRICATED ITEM
Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

A. To be 16 gauge stainless steel construction, 1 1/2" turn down in front and 2" turn up at back and right end and left ends. Provide 14 gauge stainless steel wall brackets as shown.
B. Approximate size to be 12" deep x length shown on plan.

ITEM 85 - MOBILE WARMING & HOLDING CABINET (1 REQ'D)

Cres Cor Model H-138-S-1834D
Cabinet, Mobile Heated, insulated, top-mount heater assembly, recessed push/pull handle, magnetic latch, channel pan slides hold (32) 18" x 26" pans on 1-1/2" centers, anti-microbial latches, reversible dutch doors, (4) heavy duty 5" swivel casters (2) braked, stainless steel construction, ENERGY STAR®

Accessories:

1 ea 10 ft power cord, , standard
1 ea Right-hand door swing, standard

ITEM 86 - WALL MOUNTED HAND SINK (1 REQ'D)

Advance Tabco Model 7-PS-46
Physically Challenged Hand Sink, wall model, 14" wide x 16" front-to-back x 5" deep bowl, 18 gauge 304 series stainless steel, splash mount faucet with wrist handles, deck mounted soap dispenser (pump), undermounted paper towel dispenser, basket drain, wall brackets, NSF, cCSAus

Accessories:

1 ea Note: This faucet complies with 2014 Federal no lead standards
1 ea Model 7-PS-27D Bolted Side Splash, 7-3/4" tall, for handicapped hand sinks, in-field installation

ITEM 87 - AIR CURTAIN TYPE REFRIGERATOR (4 REQ'D)

True Food Service Equipment Model TAC-48-LD
Vertical Air Curtain Merchandiser, 48"L, 80-5/8"H, (4) white PVC-coated shelves, vinyl exterior, white aluminum interior with stainless steel floor/deck pans, LED interior lighting, leg levelers, 1 HP, , 6.5' cord, cULus, CE, NSF, MADE IN USA

Accessories:

4 ea 3-Year Warranty parts and labor
4 ea 5 Year compressor warranty
4 ea Self-contained refrigeration standard

4 ea Exterior: Permanent Non-Peel Non-chip black vinyl
4 ea Interior: black aluminum with black shelves
4 ea Model S-SSS Sign “Self Serve” Silver graphic in lieu of standard
4 ea Model 917921FI Night Shade for TAC-48
4 ea TAC Condensate Heater Pan

ITEM 88 - REFRIGERATED SALAD BAR COUNTER (2 REQ'D)
Multiteria Model ULS96-MOD
Essence series Utility Counter, modified to size and shape as shown on drawing with extended bases, 1” x 1” 16 gauge tubular stainless steel frame construction with welded joints. Vertical framework at front of counter to incorporate support posts for food shield. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and Tightlink fastening system. Stainless steel apron to be provided on operator side to mount controls.

Accessories:
A. 34” high standard.
B. Countertop, solid surface, make and model to be determined from categories a, b or c, with extended top tray slide, flat, curved on all sides with 1-1/2” turn down edge as shown on drawing. Cut-out provided in top for item 89.
C. Install item 89 (curved cold pan) into counter.
D. Food shield to span item 89 in 3 straight segments to allow for NSF coverage over curved cold pan, FS-DS double sided, self-service, with LED lighting, 3/8” clear tempered glass shelf, front glass and (2) glass end panels. Verify brushed stainless steel finish or black powder coat finish on all posts, brackets and hardware. Power switch for lighting mounted in counter apron behind doors.
E. Laminate panels shall be ¾” thick MDO with standard laminate, make and model to be determined, and shall have matching vinyl edge banding and laminate liner material for panel backing with louvers where required. Panel shall be curved on all sides, but straight segmented at hinged doors. Hinged doors with tab pull door handles.
F. Electrical receptacle installed in counter base for item 89 wired to J-box for LED lighting with 8’ cord with NEMA 5-15P plug.
G. Seismic legs with flanged feet.
H. Kick plate mounted on counter with “L” brackets, removable with tools. Kick plate to be curved. Verify brushed stainless steel finish or black powder coat finish.

ITEM 89 - DROP-IN COLD PAN (2 REQ'D)
Delfield Model N8194-BR
Drop-In Curved Mechanically Cooled Cold Pan, 5-pan size, thermostat for temperature control, stainless steel holding clip & louver, push in perimeter gasket, 1" drain, 1/3 HP, , cUL, UL, NSF

Accessories:
2 ea 5 Year Compressor Extended Warranty.
2 ea 1 Year parts and labor warranty
2 ea Fan assist Package

ITEM 90 - SNEEZE GUARD (2 REQ'D)
Multiteria Model FABRICATED ITEM
This item to be included with the Serving Counter refer to Item # 88 for specification.

ITEM 91 - REFRIGERATED DISPLAY CASE (4 REQ'D)
True Food Service Equipment Model GDM-33CPT-54-LD

Convenience Store Cooler, Pass-thru, two-section, (3) white shelves, laminated vinyl exterior, white interior with stainless steel floor, (2 front/2 back) Low-E thermal glass sliding doors, LED interior lights, 1/3 HP, 9' cord, , cULus, NSF, MADE IN USA

Accessories:

4 ea Self-contained refrigeration standard
4 ea Exterior: Permanent non-peel non-chip black vinyl, standard
4 ea Interior: White aluminum, standard
4 ea Decal: S-TS-01 "TRUE Stripe" graphic, standard
4 st Seismic/flanged legs, 6", set of 4

ITEM 92 - COUNTER TOP REFRIGERATOR (4 REQ'D)

True Food Service Equipment Model GDM-05PT-LD

Countertop Pass-thru Refrigerated Merchandiser, (2) shelves, laminated vinyl exterior, white aluminum interior with stainless steel floor, (1 fr/1 bk) Low-E thermal glass hinged door, LED interior lighting, sign decal, leg levelers, 1/5 HP, 9' cord, , cULus, NSF, MADE IN USA

Accessories:

4 ea Self-contained refrigeration standard
4 ea Exterior: Permanent non-peel non-chip black vinyl, standard
4 ea Illuminated sign decal: S-TS-01 "TRUE Stripe" graphic, standard

ITEM 93 - P.O.S. (4 REQ'D) (OFCI)

BY OWNER

ITEM 94 - CASHIER COUNTER (4 REQ'D)

Multiteria Model CS36-MOD

Essence series Cashier Counter, modified to size and shape as shown on drawing, 1” x 1” 16 gauge tubular stainless steel frame construction with welded joints. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and Tightlink fastening system. Stainless steel apron to be provided on operator side to mount controls.

Accessories:

A. 34” high standard.
B. Countertop, solid surface, make and model to be determined from categories a, b or c, with 1-1/2” turn down edge as shown on drawing. Grommet hole provided in top.
C. Laminate panels shall be ¾” thick MDO with standard laminate, make and model to be determined, and shall have matching vinyl edge banding and laminate liner material for panel backing with louvers where required. Hinged door with tab pull door handle.
D. Cashier drawer assembly with insert tray and to have 18 gauge stainless steel drawer face with lock and keys, and removable 3" deep ABS drawer liner, mounted on stainless steel roller bearing slides in counter apron.
E. Electrical receptacle mounted in laminate panel for item 91 and (2) electrical receptacles mounted in counter base for items 92 & 93 wired to J-box with 8’ cord with NEMA 5-30P plug.
F. Empty data cabling box mounted in counter base.
G. Seismic legs with flanged feet.
H. Kick plate mounted on 3 sides of counter as shown on drawing with “L” brackets, removable with tools. Verify brushed stainless steel finish or black powder coat finish.

ITEM 95 - CONDIMENT COUNTER (1 REQ'D)

Multiteria Model ULS96W-MOD

Essence series Utility Counter Wall Unit, modified to size and shape as shown on drawing, 1" x 1" 16 gauge tubular stainless steel frame construction with welded joints. Frame work to incorporate stainless steel channel at ends and front to accept laminate panels and Tightlink fastening system. Stainless steel apron to be provided on operator side to mount controls.

Accessories:

A. 34" high standard.
B. Countertop, solid surface, make and model to be determined from categories a, b or c, with 1-1/2" turn down edge as shown on drawing. 6" high back splash provided on back.
C. Laminate panels shall be ¾" thick MDO with standard laminate, make and model to be determined, and shall have matching vinyl edge banding and laminate liner material for panel backing with louvers where required. Hinged doors with tab pull door handles.
D. Back of counter to be closed in stainless steel.
E. Seismic legs with flanged feet.
F. Kick plate mounted on 3 sides of counter as shown on drawing with "L" brackets, removable with tools. Verify brushed stainless steel finish or black powder coat finish.

ITEM 96 - REMOTE REFRIGERATION UNIT (1 REQ'D)

Cooltec Refrigeration Model CRS-4 REMOTE REFRIGERATION SYSTEM

Remote refrigeration systems as manufactured by Cooltec Refrigeration Corp. Custom Multi-Circuited refrigeration package shall be furnished as complete refrigeration systems to service walk-in freezer item #2 and walk-in refrigerator Item #3 as shown.

Contractor shall furnish and install, where shown on plans, U.L." Air-cooled Remote Refrigeration Package as shown on drawings. Refrigeration system shall be housed in a weather protected enclosure. The frame, enclosure, and panels shall be fabricated of galvanized steel. Entire frame shall be pre-assembled, welded, cleaned, and painted with a prime coat of zinc chromate then finished with a coat of baked enamel epoxy based paint. The condenser shall be sectional, removable multi-circuited with rifled tube slotted finned and shall be designed for 20ºFTD. Condenser fan motors shall be mounted on the top of the enclosure.

1. REFRIGERATION UNITS

   A. Air-cooled condensing units shall be hermetic/glacier scroll type (Copeland). Each unit shall be equipped with high-low pressure control, liquid drier, sight glass & head pressure control, time clocks and pump down solenoids.

   B. All compressor units shall be new factory assembled to operate with the refrigerant specified in the engineering summary sheet. Refrigerant R-404a shall be used on all commercial temperature units and low temperature units.

2. PRE-PIPING

   A. All refrigerant lines shall be extended to right side of the package in a neat and orderly manner. Suction lines must be insulated with Armaflex (1" thick forlow temp, ¾" thick for medium temp).

   B. All tubing shall be securely supported and anchored with clamps.

   C. Silver solder and/or sil-fos shall be used for all refrigerant piping. Soft solder is not acceptable.

D. All piping to be pressure tested with nitrogen at 300 PSI. After the condensing unit and coil have been connected, the balance of the system shall be leak tested with all valves open.

3. CONTROL PANEL

A. The package shall have factory mounted and pre-wired control panel complete with main disconnect breaker switch, compressor circuit breakers, fuses, contactors and time clocks wired for single point connection.

B. Electrical contractor shall provide and install main power lines to panel and provide wire harness wiring for control and defrost heater between and the defrost clock and the refrigerant fixtures, all in accordance with the wiring diagram and local codes.

4. SAFETY CAUTION

A. Each system and evaporator is shipped under nitrogen pressure. Use caution and exercise safety at all times when preparing for final hook-up.

5. EVAPORATOR COIL

A. Evaporator coils shall be direct expansion type fabricated of copper tubes with aluminum fins. All evaporator coils shall be provided with solenoid valve, thermostatic expansion valve, and electronic thermostat, piped and wired to the junction box for positive pump down.

B. Evaporative coils shall be equipped with energy saving “EC” motors.

CONSTRUCTION NOTES FOR TRADES

1. CONTRACTOR

A. Contractors shall verify all dimensions and coordinate with other trades.

B. Contractor shall prepare and weather proof the platform and curbed openings for refrigeration piping and electrical conduit.

C. Contractor to provide underground trenching including all backfill for conduits.

2. REFRIGERATION CONTRACTOR

A. Contractor shall use only clean dehydrated, sealed refrigeration grade A.C.R. copper tubing. Use only long radius elbows to reduce flow resistance and line breakage. Do not use 45 degree elbows at all.

B. Silver solder and/or sil-fos shall be used on all refrigerant piping. Soft solder is not acceptable. Use minimum 35 % silver solder for dissimilar metals.

C. All piping must be supported with hangers that can withstand the combined weight of tubing, insulation, valves, and fluid in the tubing.

D. Use dry hydrogen in the copper tubing during brazing to prevent formation of copper oxides. Liquid and suctions lines must be free to expand independently of each other. Do not exceed 100 feet without a change in direction or an offset. Plan proper pitching, expansion allowance, and p-Traps at the base of all suctions risers and at every 15 feet of every vertical rise. Install service valves at several locations for ease of maintenance. These valves must be approved for 450 PSI working pressure.

E. All piping to be pressure tested with nitrogen at 300 PSI with all valves open and held for 12 hours. Electronic leak detectors shall be used to locate all leaks.

F. Complete system shall be evacuated to 500 microns with vacuum pump before charging the system.

G. Once system is charged and running, adjust all controls including pressure controls, expansion valves, thermostats, and time clocks. Return after 24 hours to verify proper operation of systems.

H. Refrigeration contractor to provide and install drain line heater with insulation in freezer to be connected by the electrical contractor.

I. Refrigerant suction lines outside of refrigerated compartments, not run in conduit, shall be insulated back to compressor with Armstrong Arma-Flex AP-25/50 foamed plastic insulation or equal in accord with direction of the manufacturer. Minimum thickness shall be ¾" inch for commercial temperature and 1" inch for low temperature. Seal all joints with Armstrong 520 adhesive, or equal. Insulation exposed to the weather shall be finished with two coats of Armstrong white Armaflex finish, or equal. Apply insulation in strict accordance with manufacturer's recommendations.

3. ELECTRICAL CONTRACTOR

A. Electrical contractor provide power for refrigeration package and connect control and defrost system as called for in the wiring diagram.

B. Electrical contractor to provide 5-wire color-coded service from the time clock at the refrigeration package to blower coil in fixture for automatic defrost.

C. Electrical contractor to connect drain-line heater in freezer.

D. All electrical wiring and installation shall be in accordance with the wiring diagram and local codes.

4. PLUMBING CONTRACTOR

A. Plumbing contractor to provide type "M" copper drain lines for walk-in refrigerator and freezer, pitched 1/2" per foot of run. In freezer, heated drain line must be insulated to prevent freezing. Trap drain lines outside of refrigerated space to avoid entrance of warm and moist air.

B. Plumbing contractor to provide individual drain line for each evaporator unless otherwise called for in the plans.

C. All plumbing installation shall be in accordance with local codes.

1. Factory personnel shall install this assembly with written certification provided by the manufacture to the Architect and Consultant.
2. Condensing units shall be air cooled semi-hermetic compressors.
3. Unit evaporators shall be sized and furnished as part of this item.
4. The system shall be provided with a weather cover and mounting channel unit and shall be completely treated with a rust preventative and two coats of baked enamel paint in color as selected by the Architect and where required shall be removable.
5. The condensing units shall be factory installed and factory wired to a common load center panel for one point field electrical connection. All wiring from the condensing units to the load center shall be through an electrical raceway.
6. The load center control panel shall be U.L listed and N.E.C approved and weatherproof with individual breakers for each condensing unit and time clocks. All contractors, time clocks, relays, automatic starting switches and any necessary electrical components shall be installed with the load center panel.
7. All condensing units shall be manufactured by Copeland.
8. The system shall incorporate the following items:

    a. Flexible vibration eliminator in the suction line.
    b. Liquid line sight glass.
    c. Liquid line dehydrator filter of ample capacity.
    d. Suction line filter of ample capacity.
    e. Thermal expansion valve for evaporator.
    f. Heat exchanger for evaporator.
    g. Refrigeration lines, hard copper Type “L” with “Silfos” brazed joints.
    h. Defrost timers and interlock relays as required.
    I. Winter control package.
9. Circuit breakers, automatic starting switch, motor protectors and pressure limit switches, all enclosed with interconnecting wires installed in a control panel ready for final connection by the Electrical Contractor.
10. Drain line heaters with insulated covers for all drain lines from unit evaporators to nearest indirect waste (floor sink).
11. Start-up, adjustment, and one year parts and labor warranty. Five-year warranty on motor compressors.

5. REFRIGERATION PIPING:

A. Copper tubing shall conform to ASTM B88, piping shall be type ‘L’ ARC, refrigerant piping shall be exposed to view as required by the American Standard Safety Code for Mechanical Refrigeration.

B. Suction lines shall be sized to give a minimum pressure drop from evaporator to machine of 2 lbs. For high temperature systems and 1 lbs. for low temperature systems and shall allow gas velocities of not less that 750 FPM in horizontal runs and 1500 FPM in vertical risers. Liquid lines shall be sized to give maximum pressure drop of 3 lbs. from receiver to evaporator.

C. Tubing shall be graded to prevent trapping of oil.

D. Refrigerant piping shall be properly secured with 'Uni-Strut' clamps located to conform to proper refrigerant piping practice.

E. Insulation of refrigerant lines.

F. Refrigerant suction lines outside of refrigerated compartments, not run in conduit shall be insulated with Armstrong FR/ARMAFLEX22. Minimum thickness of ½" for medium temperatures and ¾" for low temperature units. Slitting of insulation shall not be permitted. Seal all joints with Armstrong 520 adhesive, or equal. Insulation exposed to the weather shall be finished with two coats of Armstrong white Armaflex finish, or equal. Apply insulation in strict accordance with manufacturer's recommendations.

6. TESTING and DEHYDRATING:

A. Pressurized systems with nitrogen to 300 PSI, test for leaks, after with each system shall be subjected to a vacuum to 100 microns for a period of 24 hours.

7. CHARGING SYSTEM:

A. Provide refrigerant and oil, charge all systems and run an operational check for three (3) days duration.

B. Work by other trades: Final wiring of connections, inter wiring of time clocks and defrost relays, drain tubing from unit evaporators to nearest indirect drain, building sleeves, penetrations, conduit and/ or pull boxes provided under applicable General, Plumbing and or Electrical Sections.

C. Unit evaporators and condensing units as shown on the drawings and as specified are intended as a guide only and shall be verified and installed under the supervising of a competent refrigeration engineer.

D. Provide a metal backed baked (black and white) enamel wiring diagram for the system mounted on the outside panel of the unit evaporator and condensing unit.

E. Provide shop drawings and brochures for review, showing exact overall dimensions and weights, utility requirements, all accessories and piping diagrams, all conforming to all applicable codes and regulations.

Please note that the location of the condensing units are to be outside and are to be complete with "winter controls and covers". The location of these condensing units will not exceed a distance of more than 100 feet from the walk-in. Location to be on roof of kitchen building as shown. Verify with General Contractor. This unit to comply with all codes and standards of NSF, UL, ICI30, Class I material. Factory Mutual Insurance System. Provide and extended warranty of all refrigeration systems. Installer to furnish a complete operational system including crane if necessary to complete installation.

ITEM 97 - POWER DRIVE FOR GRINDER OR SLICER (1 REQ'D)
Hobart Model PD-35
Power Drive Unit, 1/2-HP, table model, 350-RPM drive, stainless steel finish

ITEM 98 - WALL CAPS (2 REQ'D)

Custom Model FABRICATED ITEM

ITEM 99 - TABLE MOUNT POT RACK (1 REQ'D)
Eagle Group Model TM60APR
Pot Rack, table mount, 52"W x 20"D, triple-bar design with tubular table supports, constructed of 3/16" x 2" aluminum flat bar, includes (15) double-pronged pot hooks, for 60"W table, NSF

END OF SECTION

SECTION 11 52 13

PROJECTION SCREENS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish and install the following:
   1. Electric and Manual ceiling recessed projection screens.
   2. All fittings, mounting brackets, anchorages, controls, and accessories for complete and operating front projection screen.

1.2 SUBMITTALS

A. Product Data: Manufacturer's specifications and installation instructions for each type of projection screen. Include wiring diagrams for electrically operated screens.

B. Shop Drawings: Show location of screen centerline, location of wiring connections, seams in viewing surfaces, connections to suspension systems for pendant-mounted and recess-mounted screens, anchorage details, and accessories.

1.3 QUALITY ASSURANCE

A. Provide each type of projection screen as a complete unit produced by a single manufacturer, including necessary mounting brackets, accessories, fitting, and fastenings.

B. Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partitions.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Do not deliver projection screens until building is enclosed and ready for screen installation. Protect screens from damage during delivery, handling, storage, and installation.

PART 2 - PRODUCTS

2.1 FRONT PROJECTION SCREENS

A. Tensioned electric screen
   1. 4:3 video format, 87” x 116” viewing area
   2. Motor: Silent operation with integrated low voltage control.
   3. Controls: Wall mounted, 3 position control switch for UP, DOWN, and STOP functions. Provide switch with hinged, key-locked, stainless steel cover plate.
   4. Location: TBD

B. Manual screens
   1. 4:3 video format, 69” x 92” viewing area
   2. Location: TBD

C. Extruded aluminum screen cases, ceiling recessed with doors.
   1. Finish: White, baked enamel paint.

D. Seamless fabric with black borders

E. Gain: To SMPTE RP-200, 1.5

F. Viewing Surface: High contrast matte white, flame-retardant, mildew resistant, vinyl coated fiberglass screen.

G. Masking: Black masking borders.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install projection screens and accessories in accordance with manufacturer's instructions.

B. Install projection screens with screen cases securely anchored to supporting substrate, in a manner that produces a smoothly operating screen with plumb and straight vertical edges and plumb and flat viewing surfaces when lowered.

C. Test electrically-operated units to verify that screen, controls, limit switches, closure and other operating components are functioning properly.

3.2 PROTECTION AND CLEANING

A. Protect projection screens after installation from damage. If damage occurs, remove and replace or restore to original undamaged condition.

END OF SECTION – 11 52 13

SECTION 12 48 00

FLOOR GRATES AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes
   1. Floor Grids and Frame Assemblies

B. Related Sections
   1. Section 03 30 00 - Cast-In-Place Concrete: For concrete floor slab recess, and grouting frames into recess.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. ASTM B 221-93 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B. American Architectural Manufacturers Association (AAMA)
   1. AAMA 606.1 Voluntary Guide Specifications and Inspection Methods for Integral Color Anodic Finishes for Architectural Aluminum
   2. AAMA 607.1 Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.

1.3 SUBMITTALS

A. Product Data: Manufacturers product specifications, installation and maintenance instructions.

B. Shop Drawings: Show layout and types of grates and frames not less than half-scale sections of typical installations, details of patterns or designs, anchors, and accessories, and field measurements of slab recess to receive frames grates (if applicable).

C. Samples for Selection Purposes: Actual sections of grate and frame material in a convenient but representative size showing full range of colors, textures, finishes and patterns available for each type of floor grate and frame specified.

D. Samples for Verification Purposes: Not less than 6 inch square sections of grate material and 6 inch (152 mm) length of frame material in selected colors and finishes for each type of grate and frame specified.

E. Installation, Operations and Maintenance data.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain floor grates and frames from one source and from a single manufacturer
   1. Rolling Load: 350 pounds per wheel.
   2. Uniform Load: 300 lbs per square foot

1.5 SUBSTITUTIONS

A. Proposals for substitution products shall be accepted only from bidding contractors and not less than (10) working days before bid due date. Contractor guarantees that proposed substitution shall meet the performance and quality standards of this specification.

1.6 PROJECT CONDITIONS

A. If product is to be recessed, coordinate with concrete work so that products are available for placing integrally with floor slabs.

1.7 WARRANTY

A. Floor mats and frames shall be fabricated free of defects in materials and workmanship in accordance with the General Conditions, and the manufacturer shall offer a 2 year warranty against defects in materials and workmanship.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Babcock-Davis
9300 73rd Avenue North
Brooklyn Park, MN 55428
PH: 888.412.3726
FX: 888.312.3726

2.2 MATERIALS

A. Entrance System Floor Grate
1. Rail: Aluminum Rail: ASTM B221, alloy 6063-T6
2. Rail Finish: Rail finish shall be supplied in mill (standard) or one of 10 optional colors as offered by manufacturer. (Call factory for custom colors).
3. Rail Spacing: Spaced 2" (50.8MM) on center
4. Fasteners: Non-corrosive screws and anchors for securing frames together and to floors.
5. Construction: Flexible low-density polyethylene hinge retained in a captive aluminum tread port. Tread cushions spaced 24" (610 mm) o.c.
6. Rolling Load: 350-pounds per wheel.
7. Uniform Load: 300 lbs per square foot
8. Tread Inserts
a. **MatDesign™ Roll up Mat** with Premium Carpet tread insert: Carpet fibers are 3700 denier solution-dyed woven nylon, and shall include a minimum of 100, 10 mil monofilament fibers per square inch. Available in one of 13 standard colors offered by manufacturer. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous spliced-free lengths Fibers shall be treated with anti-stain, anti-static and anti-microbial additives. Carpet weight shall be 33 oz. /yd.

2.3 ENTRANCE SYSTEM FLOOR GRATE FRAME **(CALL FACTORY FOR CUSTOM COLORS).**

A. Aluminum Frame: ASTM B221, alloy 6063-T5

B. Frame Finish: Finish shall be supplied in mill (standard) or one of 5 optional colors as offered by manufacturer. **(CALL FACTORY FOR CUSTOM COLORS).**

C. Mounting:

1. **LBM, Level Bed, mechanically attached tapered angle frame**, shall 7/16” (11.1 mm) deep with 1/8" (3.2mm) exposed surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Products must be placed on a flat and level substrate. Substrate shall meet tolerance of 1/8" (3.2mm) over 10 feet (3.28M) in accordance with ACI 302.

B. Examine the substrates and conditions under which the work is to be performed, and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install products in accordance with manufacturer’s instructions, at locations shown and with top of products level with adjoining finished flooring where applicable.

B. Coordinate top of product surfaces with swinging doors to provide under-door clearance.
   1. Provide necessary shims, spacers, and anchorages for proper location and secure attachment of frames to concrete.
   2. For installation in terrazzo flooring, contact manufacturer.

3.3 PROTECTION

A. Upon completion of frame installations, provide temporary filler of plywood or fiberboard in grate recesses, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near time of Substantial Completion.

B. Install product when no further wheeled construction traffic will occur and wet type operations including painting and decorating are complete.

END OF SECTION – 12 48 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 21 00 00

FIRE SUPPRESSION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. Pipe, fittings, and specialties
2. Fire protection valves
3. Hose connections
4. Pressure gauges

1.2 APPLICABLE DOCUMENTS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. The current edition of these publications at the time of invitation for bid shall apply. For the purposes of this specification, NFPA appendices which are sometimes presented as recommendations shall be considered mandatory requirements.

1. ASME International (ASME)
2. ASME B16.3 (1998) Malleable Iron Threaded Fittings
3. ASME B16.1 (1998) Cast Iron Pipe Flanges and Flanged Fittings
4. ASME B16.4 (1998) Cast Iron Threaded Fittings, Class 125 and 250
5. ASME B16.5 (1996) Steel Pipe Flanges and flanged Fittings

B. ASTM International (ASTM)
1. ASTM A 135 (2001) Electric- Resistance Welded Steel Pipe
2. ASTM A 53 (2004) Pipe, Steel, Black and Hot – Dipped, Zinc-Coated, Welded and Seamless
3. ASTM A 795 (2000) Pipe, Steel, Black and Hot – Dipped, Zinc-Coated, Welded and Seamless Steel Pipe for Fire Protection Use.

C. Building Codes:
1. CBC/ California Building Code, 2013 Edition
2. CBC/FIRE CODE, 2013 Edition
3. SBCCI Standard building Code (International Building Code), 2013 Editions

D. National Fire Protection Association (NFPA)
1. NFPA 13, - Installation of Sprinkler System (2013) Edition
2. NFPA 14, - Installation of Standpipe and Hose Systems (2013) Edition
3. NFPA 20, - Installation of Fire Pumps (2013) Edition
4. NFPA 24, - Installation of Private Fire Service Mains (2013) Edition

1.3 DESCRIPTION

A. The requirements of this section apply to all work of this division, where applicable. The materials, equipment and methods herein are generally common to the various sections of this division of the Specification. Materials that apply to only one section are generally included in that section. Where items specified in other sections of this division conflict with requirements of this section, the former shall take precedence.

B. The Contractor shall acquaint himself with the work of all other crafts whose work abuts, adjoins or is in any manner affected by the work under this section and shall coordinate such, so as to avoid omissions and delays.

C. Automatic Sprinkler. Water supply pressure to be maintained and shall be capable of supplying water demand as required by NFPA 13.

1.4 PERFORMANCE REQUIREMENTS

A. Equipment and Accessories

1. Standard- Pressure Piping System Component:
2. Listed for 175 psig minimum working pressure.

B. Design

1. Design Automatic Sprinkler system per NFPA 13, including comprehensive engineering analysis by a qualified professional engineer or registered fire protection engineer, using performance requirements and design criteria indicated.

2. Automatic Sprinkler system design shall be approved by AHJ (authorities having jurisdiction) for location and for valve placement accessibility.

3. Minimum Flow Rate Automatic Sprinkler: Hydraulic calculations and pipe size for fire protection system shall be based on providing required density over the 1500sq.ft. at the hydraulically most remote area(s). Utilize NFPA 13 for hydraulic calculations (Light Hazard 0.10gpm/sq.ft., Ordinary Grp I 0.15gpm/sq.ft., Ordinary Grp II 0.20gpm/sq.ft.) and include the appropriate hose demand (Light Hazard 100gpm, Ordinary Grp I or II 250gpm).

4. Seismic Performance: Fire Sprinkler and standpipe system shall withstand the effects of earthquake motions determined according to NFPA 13, 2013 Edition. Brace assemblies, couplings, or other fittings shall be employed to prevent damage to all fire sprinkler piping, equipment and appurtenances due to the effects of seismic activity. The ability of the fire sprinkler system to withstand these effects shall be evaluated and documented by the structural engineer of record for this project

1.5 SUBMITTALS

A. Product Data

1. For each type of product indicated include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Piping schedules shall be also be submitted.

B. Shop Drawings

1. Plans must be in AutoCAD format for fire suppression standpipe system and fire sprinkler system. Include plans, elevations, sections, details, and attachments to other work. Include layout and details of seismic bracing assemblies.

2. Submittals shall be prepared and stamped by a licensed FPE or a certified sprinkler contractor licensed in the state of California to provide the prescribed work.

C. Hydraulic Calculations:

1. Hydraulic calculations shall be prepared as outlined in NFPA 13, 2013 editions using software specifically intended for fire protection system design. Hand calculations will not be acceptable. Software which uses k- factor for typical branch lines is not acceptable.

2. Calculations must include current water supply information no more than one year old. Water supply curves and system requirements shall be plotted to show system demand. Elevations of all hydraulic reference points (nodes) shall show true elevations above finish floor.

3. Documentation shall identify each pipe individually and the nodes connected thereto. The diameter, length, flow, velocity, friction loss, number and type fittings, total friction loss in the pipe, equivalent pipe length and Hazen-Williams coefficient shall be indicated for each pipe.

4. Fire suppression standpipe demand shall be calculated independently of the sprinkler system demand.

D. Seismic Calculations:

1. Fire Sprinkler Contractor shall provide calculation sheets following the format provided in NFPA 13 and shall be submitted for review of the structures ability to withstand the load applied at the point of attachment.

2. Review shall be made by the structural engineer of record that holds a current professional registration in the State of California. Seismic design parameters used in the calculations shall be listed and shall conform to the 2013 edition of NFPA 13 Annex E (SEI/ASCE 7).

3. Seismic coefficient shall be verified by longitudinal and lateral coordinates of the project and/or the project address with the US Geological Survey.

E. Coordination Drawings

1. All fire suppression systems shall be drawn to scale, on which the following items are to be shown and coordinated with other trades.

a. Structural Features
b. Finished ceiling penetrations
c. Lighting fixtures
d. Air outlets and inlets
e. Architectural & structural features
f. Plumbing, Mechanical and Electrical systems.

F. Approved Piping Drawings

1. Working plans, prepared according to NFPA 13, NFPA 20 and NFPA 24. Plans shall include:

a. Pipe hanger locations per NFPA 13.
b. Seismic bracing types and locations.
c. Typical elevation details for any pipe drops used and any ceiling elevations where found to be different from architectural design drawings.
d. Details for supports, Hangers, and seismic bracing.
e. Hydraulic nodes corresponding to those used in hydraulic calculations.

1.6 OPERATION AND MAINTENANCE DATA

A. Furnish one complete package prior to the time that final acceptance test are performed, and furnish the remaining before the contract is completed. On the cover: the words “OPERATION AND MAINTENANCE MANUAL”, the location of the building, the name of the Contractor, system manufacturer and the contractor number.

B. Furnish one copy of as-built drawings which depict all post approval changes to the fire protection plans.

C. Furnish one copy of NFPA 25, safety precautions, test procedures, performance data, and parts list for repair.

1.7 QUALITY ASSURANCE

A. Installer Qualifications

1. Installing Contractors Responsibility

2. Design, fabricate, and install fire sprinkler system and provide professional engineering services needed to assume engineering responsibility. Calculations shall follow the requirements of NFPA 13 and this Section.

B. Engineering Responsibility

1. Subcontractor shall be responsible for the preparation of working plans, calculations, and field test reports by a qualified professional engineer or registered fire protection engineer and seismic calculations which shall only be prepared by a qualified professional engineer.

C. Welding Qualifications

1. Qualify procedure and operators according to ASTM 53

2. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:

3. NFPA 14, “Installations of Standpipe and Hose Systems”

4. NFPA 13, “Installation of Automatic Sprinkler Systems”

5. NFPA 20, “Installations of Fire Pumps”

6. NFPA 24, “Installation of Private Fire Service Mains and Their Appurtenances.”

PART 2 - PRODUCTS

2.1 MATERIALS

A. PIPE, FITTINGS, VALVES

1. All pipe, fittings, couplings, and related appurtenances shall be UL or FM listed for use in fire protection applications and shall have a minimum working pressure of 175 psig. Above ground piping shall conform to the requirements of NFPA 13, NFPA 14, and applicable codes. All manufacturers suggested in this section may be substituted for approved equal.

2. Pipe and fittings

a. Standard Weight, Black Steel Pipe; ASTM A 53/ A 53M. Pipe ends may be factory or field formed to match joining method.

b. Pipe in exposed areas shall be Black Steel Pipe; ASTM A53/A 53M

c. Pipe in ordinary hazard occupancy areas shall be black steel pipe; ASTM A53/A 53M

d. All pipe, fittings and sprinkler heads shall be protected from corrosive atmospheres where exposed to such areas. Sprinkler heads in these areas shall be supplied with a corrosive resistant coating from the manufacturer.

3. Pipe joining methods.

a. Schedule 40 or 30, Black Steel Pipe; ASTM a 135; ASTM A 795/ A795M. All Schedule 40 or 30 pipe may be joined using cut/roll grooved or threaded ends and fittings. Pipe 1” and smaller must be schedule 40 or 30 threaded ends and fittings.

b. Schedule 40 or 30, Black Steel Pipe; ASTM a 135; ASTM A 795/ A795M. Pipe 1 1/4” and larger may be joined using cut/roll grooved or threaded ends and fittings.

c. Schedule 10 or 7, Black Steel Pipe; ASTM a135; ASTM A795/A795M. All Schedule 10 or 7 pipe may be joined using roll grooved ends only.

4. Threaded Fittings: ASTM B16.4, Class 125, standard pattern

a. Cast –Iron, Ductile Iron and Malleable Fittings are acceptable and shall meet ASME 16.1, Class 125 specifications

b. Grooved-Joint, Steel- Pipe Appurtenances

c. 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.
   - Victaulic Company
   - Anvil International, Inc.
   - Or approved equal

5. Pressure Ratings: 175 psig minimum

6. Grooved – End Fittings for Steel Piping: ASTM A - 536, malleable- Iron. UL listed or FM approved Ductile, Cast or Malleable Iron fittings may be used.

7. Pipe joining materials

   a. Pipe – Threaded ASTM B16.4 Piping Schedules:

   b. Class125, cast – Iron threaded fittings

   c. Class 125, Cast Iron Flange and Ring type gasket.

   d. Metal, Pipe Welding: ASTM A53.

   e. UL Listed or FM Approved CPVC fittings.

8. Hose Connections

   a. Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
      - Elkhart Brass MFG. Company,
      - Potter Roemer
      - Tyco Fire Building Products LP

   b. Standard: UL 668 Hose Valve

   c. Pressure Rating: 300 psig minimum

   d. Material: Brass or Bronze

   e. Size: NPS 2 ½”

   f. Inlet: Female pipe threads.

   g. Outlet: Male hose threads with lugged cap, gasket, and chain. Include hose valve threads according to NFPA 14, and matching local fire- department threads.

   h. Pattern: Angle

i. Style: Non-rising stem/ adjustable valve connection

9. Fire protection valves

a. General Requirements:

1) Valves shall be UL listed or FM approved.

2) Minimum Pressure Rating for Standard – Pressure Piping: 175 psig.

b. Check Valves:

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
- Anvil International, Inc.
- Victaulic Company
- Tyco Fire & Building Products LP
- Reliable
- Viking Corporation
- Or approved equal

2) Standard: UL 312

3) Pressure Rating: 175 psig Minimum

4) Type: Swing Check

5) Body Material: Cast Iron

6) End Connection: Flanged or grooved

c. Bronze OS&Y Gate Valve:

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.
- NIBCO Inc.
- Kennedy Valve
- Tyco Fire & Building Products LP
- United Brass Works, Inc.
- Or approved equal

d. Iron OS&Y Gate Valve:

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
- NIBCO Inc.
- Kennedy Valve
- Tyco Fire & Building Products LP
- United Brass Works, Inc.
- Mueller Co.; Water Products Division

- Or approved equal

e. Indicating – Type Butterfly Valve:

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
   - Tyco Fire & Building Products LP
   - Victaulic Company
   - Reliable
   - Kennedy Valve
   - NIBCO Inc.
   - Or approved equal

2) Pressure Rating: 175 psig Minimum

3) Standard: UL 1091

4) Valves NPS 2 and Smaller:

5) Valve type: Ball or Butterfly

6) Body Material: Bronze

7) End Connection: Threaded

f. Valves NPS 2 1/2” and larger:

1) Valve type: Butterfly

2) Body Material: cast or ductile Iron

3) End Connection: Flanged, Grooved, or Wafer

4) Valve Operation: Integral Electrical, pre-wired, supervisory switch and visual

5) Indicating device. Coordinate with fire alarm system.

10. TRIM AND DRAIN VALVES

a. General Requirements:

1) Standard: UL listed and FM approved.

2) Pressure Rating: 175 psig minimum.

b. Angle Valves:

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
   - NIBCO Inc
   - United Brass Works, Inc.
   - Kennedy Valve

- AGF Manufacturing, Inc.
- Or approved equal

c. Ball Valves:

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
   - NIBCO Inc.
   - United Brass Works, Inc.
   - Kennedy Valve
   - AGF Manufacturing, Inc.
   - Or approved equal

d. Globe Valves:

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
   - NIBCO Inc.
   - United Brass Works, Inc.
   - Kennedy Valve
   - Or approved equal

11. FIRE – DEPARTMENT CONNECTIONS

1) Exposed-Type, Fire – Department Connection:

2) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
   - Elkhart Brass Mfg. Company, Inc.
   - Tyco Fire & Building Products LP
   - AFAC Inc.
   - Powhatan
   - Potter Roemer
   - Or approved equal

3) Standard: UL 405

4) Type: Exposed, projecting, for wall mounting.

5) Pressure Rating: 175 psig minimum.

6) Body material: Corrosion – Resistant metal

7) Inlets: Brass with threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.

8) Caps: Brass, lugged type, with gaskets and chain.

9) Escutcheon Plate: Round, brass, wall type.

10) Number of Outlets: Two.

11) Escutcheon Plate Marking: “AUTO SPRINKLER”

12) FINISH: Rough brass or bronze.

13) Outlet Size: 2 ½”

12. SPECIALTY PIPE FITTINGS

a. Branch Outlet Fittings:

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
- Victaulic Company
- Tyco Fire & Building Products LP
- Anvil International, Inc.
- Merit Welded / Fitting
- Or approved equal

2) Pressure Rating: 175 psig

3) Standard: UL 213

4) Body Material: Ductile-Iron housing with EPDM seals and bolts and nuts.

5) Type: Mechanical – T and Cross Fittings

6) Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.

7) Branch Outlets: Grooved, plan-end pipe, or threaded.

b. Flow Detection and Test Assemblies:

1) Manufactures: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
- Victaulic Company
- Tyco Fire & Building Products LP
- Reliable Automatic Sprinkler Co. Inc.
- AGF Manufacturing Inc.
- Or approved equal

c. Standard: UL’s “Fire Protection Equipment Directory” Listing or Approval Guide,” Published by FM Global, listing.

1) Pressure Rating : 175 psig

2) Body Material: Cast- or ductile- iron housing with orifice, sight glass, and

3) Integral test valve.

4) Size: Same as connected piping

5) Inlet and Outlet: threaded.

13. ALARM DEVICES

a. Alarm – device type shall match piping and equipment connections.

b. Water – Flow Indicators:

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
- Potter Electric Signal Company
- System Sensor
- Viking Corporations
- Or approved equal

2) Standard: UL 346

3) Water-Flow Detector: Electrically supervised.

4) Type: Paddle Operated

5) Pressure Rating: 350 psig

6) Design Installation: Horizontal or Vertical.

c. Pressure Switches:

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
- Potter Electric Signal Company
- System Sensor
- Viking Corporations
- Or approved equal
- Standard: UL 346

2) Type: Electrically supervised water-flow switch with retard feature.

3) Type: E

4) Design Operation: Rising pressure signals water flow.

5) Valve Supervisory Switch:

6) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
- Potter Electric Signal Company
- System Sensor
- Fire-Lite Alarms, Inc.: Honeywell Company
- Or approved equal

7) Standard: UL 346

8) Type: Electrically supervised

d. Design Operation: Signals that controlled valve is in other that fully open position.

14. GAUGES

1) Manufacturers: Subject to compliance with requirements, available manufactures offering products that may be incorporated into the Work include, but are not limited to, the following.
- Brecco Corporation
- Ashcroft, Inc
- AMETEK; US. Gauge
- Or approved equal

2) Standard: UL 393

3) Dial Size: 3 ½" to 4 ½" inch diameter.

4) Pressure Gauge Range: 0 to 250 psig.

15. SLEEVES

a. Steel Pipe in concrete deck penetrations: Schedule 40 or 10 Galv. / ASTM A 53

b. UL Listed / FM Approved sleeves

1) Approved manufacturers
- HILTI
- Other approved equal

16. FIRESTOP SEALANT

a. All penetrations through rated construction must be sealed using a UL listed fire stop assembly or a fire rating greater than or equal to that of the penetrated wall.

2.2 INSTALLATION

A. PIPE INSTALLATION

1. Locations and arrangements of sprinkler systems piping shall be in accordance with the shop drawings submitted by a qualified designer as outlined in this section and shall be fully coordinated with other trades.

2. Deviations from approved working plans for piping require approval from FPE from the sprinkler contractor and must be shown on as-built drawings for record.

3. Piping Standard: Comply with requirements of NFPA 13, NFPA 14 for installations of fire standpipe and wet sprinkler system.

4. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installations in NFPA 13, 2013

5. Use listed fittings or welded outlets to make changes in directions, branch takeoffs from mains, and reduction in pipe sizes.

6. Install drain valves on standpipes. Extend drain piping to floor drain at bottom of stairwell.

7. Install couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2 ½" and larger end connections.

8. Install automatic ball drip at each check valve for fire department connections. Route all drains piping to the exterior of the building away from walkways and provide splash block beneath discharge.

9. Install alarm devices in piping systems according to the requirements of NFPA 13, 2013.

10. Install hangers and supports for standpipe system according to NFPA 14. Comply with requirements in NFPA 13 for hangers materials.

11. Install pressure gages on riser and at the top of each standpipe. Include pressure gages with connection not less that NPS ¼" (DN 8) and with soft-metal seated globe valve, arranged for draining pipe.

B. JOINT CONSTRUCTION

1. Install couplings, flanges, flanged fittings, unions, nipples, cast iron fittings and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

2. Install unions adjacent to each valve in pipe NPS 2" and smaller.

3. Install flanges, flanged fittings, or couplings for grooved-end pipe on valves, apparatus, and equipment NPS 2 ½" and larger end connections.

4. Ream ends of pipe and tubes and remove burrs. Bevel plain ends of steel pipe.

5. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

6. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9

7. Threaded Joints: Threaded pipe with tapered pipe threads according to ASTM B16.4.

8. Cutting threads full and clean using sharp dies. Threaded pipe ends and remove burrs and restore full ID.

9. Steel- Piping, Cut-Grooved Joints: Cut groove end of pipe according to AWWA C606. Assemble couplings with housing, gasket, lubricant if needed, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel – pipe grooved joints.

C. VALVE AND SPECIALTIES INSTALLATION

1. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13, and AHJ.

2. Install check valve in each water supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.

D. HOSE CONNECTION INSTALLATION

1. Install hose connection adjacent to standpipe.

2. Install 2 ½" hose connection shall have external National Hose Standard (NHS) threads, in accordance with NFPA 1963, Standard for Fire Hose Connections.

3. Install wall-mounted type hose connection in cabinets. Hose valve cabinets shall be flush mounted to wall at a height such that the hose connection is located at 4' feet above finished floor.

E. SLEEVE INSTALLATION

1. General Requirements: Install sleeves for pipe and tubes passing through rated penetrations in floors, walls, Roofs, Partitions.

2. Sleeves are not required for core-drilled holes.

3. For interior wall penetrations: provide a rated fire assembly listed to meet the requirement of rated wall.

4. For exterior wall penetrations: provide a rated fire assembly listed to meet the requirement of rated wall.

F. SLEEVE SEAL INSTALLATION

1. Install sleeve seals in sleeves in exterior concrete wall at water service piping entries into building.

G. IDENTIFICATION

1. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 14 standpipe, and NFPA 13 for wet sprinkler system.

H. FIELD QUALITY CONTROL

1. Perform test and inspection.

2. Test and Inspections:

a. Leak Test: Hydrostatic air test or 2 hours – per NFPA 13 and NFPA 14.

b. Test and adjust controls and safeties

c. Flush, test, and inspect standpipe system according to NFPA 14, NFPA 13,

d. Coordinate with all trades for testing of fire sprinkler systems.

e. Verify that equipment hose threads are same as local fire-department equipment.

f. Prepare and submit all test and inspection reports.

END OF SECTION 210000

SECTION 22 00 50

BASIC PLUMBING MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electric motors.

B. Motor starters.

C. Valves and fittings.

D. Strainers.

E. Valve boxes.

F. Gauges.

G. Thermometers.

H. Access Doors.

I. Expansion loops.

J. Flexible joints.

K. Insulation.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This Section is a part of each Division 22 Section.

1.3 ADDITIONAL REQUIREMENTS

A. Furnish and install any incidental work not shown or specified which is necessary to provide a complete and workable system.

B. Make all temporary connections required to maintain services serving other buildings during the course of this Contract without additional cost to the Owner. Notify the Owner seven days in advance before disturbing any service.

1.4 REFERENCED STANDARDS

A. Where material or equipment is specified to conform to referenced standards, it shall be assumed that the most recent edition of the standard in effect at the time of bid shall be used.
1. CSA – Canadian Standards Association International.
2. ANSI - American National Standards Institute.

3. ASTM - American Society for Testing and Materials.
4. CCR - California Code of Regulations.
    a. Title 8 - Division of Industrial Safety, Subchapter 7; General Industry Safety Orders, Articles 31 through 36.
5. NCPWB - National Certified Pipe Welding Bureau.
6. CEC - California Electrical Code.
7. NEMA - National Electrical Manufacturers' Association.
8. NFPA - National Fire Protection Association.
9. OSHA - Occupational Safety and Health Act.
10. UL - Underwriters' Laboratories, Inc.

1.5 DRAWINGS

A. Examine Contract Documents prior to bidding of work and report discrepancies in writing to Architect.

B. Contractor shall visit Project site and examine existing conditions in order to become familiar with Project scope. Verify dimensions shown on Drawings at Project site. Bring discrepancies to the attention of Architect. Failure to examine Project site shall not constitute basis for claims for additional work because of lack of knowledge or location of hidden conditions that affect Project scope.

C. Drawings showing location of equipment and materials are diagrammatic and job conditions will not always permit installation in location shown. The Plumbing Drawings show general arrangement of equipment and materials, etc., and shall be followed as closely as existing conditions, actual building construction, and work of other trades permit.
    1. Architectural and Structural Drawings shall be considered part of the Work. These Drawings furnish Contractor with information relating to design and construction of the Project. Architectural Drawings take precedence over Plumbing Drawings.
    2. Because of the small scale of Plumbing Drawings, not all offsets, fittings, and accessories required are shown. Investigate structural and finish conditions affecting the Work and arrange Work accordingly. Provide offsets, fittings, and accessories required to meet conditions. Inform Architect immediately when job conditions do not permit installation of equipment and materials in the locations shown. Obtain the Architects approval prior to relocation of equipment and materials.
    3. Minor changes in locations of equipment, piping, etc., from locations shown shall be made when directed by the Architect at no additional cost to the Owner providing such change is ordered before such items of work, or work directly connected to same are installed and providing no additional material is required.
D. Execute work mentioned in Specifications and not shown on Drawings, or vice versa, the same as if specifically mentioned or shown in both.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

A. The publications listed below form part of this specification; comply with provisions of these publications except as otherwise shown or specified.
    1. California Building Code, 2013.
    2. California Electrical Code, 2013.
    3. California Energy Code, 2013.
    4. California Fire Code, 2013.
    5. California Green Building Standards Code, 2013.
    6. California Mechanical Code, 2013.
    7. California Plumbing Code, 2013.

8. California Code of Regulations, Title 24.
9. California Health and Safety Code.
10. CAL-OSHA.
11. California State Fire Marshal, Title 19 CCR.
12. National Fire Protection Association.
13. Occupational Safety and Health Administration.
14. Other applicable state laws.

B. Nothing in Drawings or specifications shall be construed to permit work not conforming to these codes, or to requirements of authorities having jurisdiction. It is not the intent of Drawings or specifications to repeat requirements of codes except where necessary for clarity.

C. Comply with State of California 2013 Energy Code for all systems, equipment, and construction.

D. When Contract Documents differ from governing codes, furnish and install larger size or higher standards called for without extra charge.

E. No material installed as part of this Work shall contain asbestos.

1.7 FEES AND PERMITS

A. Prior to the start of construction, contact local gas company representative and coordinate location of gas meter and piping. In addition, coordinate time required for installation, in order to avoid delay to the Project.

1.8 FRAMING, CUTTING AND PATCHING

A. Special framing, recesses, chases and backing for Work of this Section, unless otherwise specified, are covered under other Specification Sections.

B. Contractor is responsible for placement of pipe sleeves, hangers, inserts, supports, and location of openings for the Work.

C. Cutting, patching, and repairing of existing construction to permit installation of equipment, and materials is the responsibility of Contractor. Repair or replace damage to existing work with skilled mechanics for each trade.

D. Cut existing concrete construction with a concrete saw. Do not utilize pneumatic devices.

E. Core openings through existing construction for passage of new piping and conduits. Cut holes of minimum diameter to suit size of pipe and associated insulation installed. Coordinate with building structure, and obtain Structural Engineer's approval prior to coring through existing construction.

1.9 SUBMITTALS

A. Submittal packages may be submitted via email as PDF electronic files, or as printed packages. PDFs shall be legible at actual size (100 percent). Provide seven copies of printed submittal packages.

B. Provide submittal of materials proposed for use as part of this Project. Product names in Specifications and on Drawings are used as standards of quality. Furnish standard items on specified equipment at no extra cost to the Contract regardless of disposition of submittal data. Other materials or methods shall not be used unless approved in writing by Architect. Architect's review will be required even though "or equal" or synonymous terms are used. Refer to Division 01 for complete instructions.

1. Partial or incomplete submittals will not be considered.
2. Quantities are Contractor's responsibility and will not be reviewed.
3. Provide materials of the same brand or manufacturer for each class of equipment or material.
4. Identify each item by manufacturer, brand, trade name, number, size, rating, or other data necessary to properly identify and review materials and equipment. Words "as specified" are not sufficient identification.
5. Identify each submittal item by reference to items' Specification Section number and paragraph, by Drawing and detail number, and by unit tag number.
6. Organize submittals in same sequence as in Specification Sections.
7. Show physical arrangement, construction details, finishes, materials used in fabrications, provisions for piping entrance, access requirements for installation and maintenance, physical size, mechanical characteristics, foundation and support details, and weight.

    a. Submit Shop Drawings, performance curves, and other pertinent data, showing size and capacity of proposed materials.
    b. Specifically indicate, by drawn detail or note, that equipment complies with each specifically stated requirement of Contract Documents.
    c. Drawings shall be drawn to scale and dimensioned (except schematic diagrams). Drawings may be prepared by vendor but must be submitted as instruments of Contractor, thoroughly checked and signed by Contractor before submission to Architect for review.
    d. Catalog cuts and published material may be included with supplemental scaled drawings.

C. Review of submittals will be only for general conformance with design concept and general compliance with information given in Contract Documents. Review will not include quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with work of other trades, or construction safety precautions, which are sole responsibility of Contractor. Review of a component of an assembly does not indicate acceptance of an assembly. Deviations from Contract Documents not clearly identified by Contractor are Contractor's responsibility and will not be reviewed by Architect.

D. Within reasonable time after award of contract and in ample time to avoid delay of construction, submit to Architect Shop Drawings or submittals on all items of equipment and materials provided. Provide submittal in at least seven copies and in complete package.

1. Shop Drawings and submittals shall include Specification Section, Paragraph number, and Drawing unit symbol or detail number for reference. Organize submittals into booklets for each Specification section and submit in loose-leaf binders with index. Deviations from the Contract Documents shall be prominently displayed in the front of the submittal package and referenced to the applicable Contract requirement.

E. Furnish to the Project Inspector complete installation instructions on material and equipment before starting installation.

F. Product Data for California Green Building Standards Code Compliance: For adhesives and sealants, including primers, documentation of compliance including printed statement of VOC content and chemical components.

G. Provide product data for insulation products, including insulation, insulation facings, jackets, adhesives, sealants, and coatings, indicating compliance with requirement that these products contain less than 0.1 percent (by mass) polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations.

H. LEED Submittals:
1. Product Data for Credit EQ 4.1: For adhesives and sealants, documentation of compliance including printed statement of VOC content and chemical components.

I. Pipe, pipe or plumbing fittings, fixtures, solder and flux installed in a system providing water for human consumption shall comply with lead free requirements of the California Health and Safety Code Section 11 68 75. Provide submittal information for products third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

J. Delegated-Design Submittal: For seismic supports, anchorages, and restraints indicated to comply with performance requirements and design criteria.
1. Calculations performed for use in selection of seismic supports, anchorages, and restraints shall utilize criteria indicated in Structural Contract Documents.
2. Supports, anchorage and restraints for piping, ductwork, and equipment shall be an OSHPD pre-approved system such as Tolco, Afcon, ISAT, Badger, Mason, or equal. Pipes, ducts and equipment shall be seismically restrained in accordance with requirements of current edition of California Building Code. System shall have current OPM number and shall meet additional requirements of authority having jurisdiction. Provide supporting documentation required by the reviewing authority and the Architect and Engineer. Provide layout drawings showing piping, ductwork and restraint locations.

    a. Bracing of Piping and Equipment: Specifically state how bracing attachment to structure is accomplished. Provide shop drawings indicating seismic restraints, including details of anchorage to building. In-line equipment must be braced independently of piping, and in conformance with applicable building codes. Provide calculations to show that pre-approval numbers have been correctly applied in accordance with general information notes of pre-approval documentation. Gas pipe bracing shall be designed in accordance with California Building Code Section 1615A.1.22 and ASCE 7- Section 13.6. Coefficient I_p = 1.0 shall be used for gas piping bracing calculations.

3. In lieu of the above or for non-standard installations not covered in the above pre-approved systems, Contractor shall provide layout drawings showing piping, ductwork, and restraint locations, and detail supports, attachments and restraints, and furnish supporting calculations and legible details sealed by a California registered structural engineer, in accordance with 2013 California Building Code
4. Additional Requirements: In addition to the above, conform to all state and local requirements.

1.10 SUBSTITUTIONS

A. Refer to Division 01 for complete instructions. Requirements given below are in addition to or are intended to amplify Division 01 requirements. In the case of conflict between requirements given herein and those of Division 01, Division 01 requirements shall apply.

B. It is the responsibility of Contractor to assume costs incurred because of additional work and or changes required to incorporate proposed substitute into the Project. Refer to Division 01 for complete instructions.

C. Substitutions will be interpreted to be all manufacturers other than those specifically listed in the Contract Documents by brand name, model or catalog number.

D. Only one request for substitution will be considered for each item of equipment or material.

E. Substitution requests shall include the following:

1. Reason for substitution request.
2. Complete submittal information as described herein; see “Submittals.”
3. Coordinated scale layout drawings depicting position of substituted equipment in relation to other work, with required clearances for operation, maintenance and replacement.
4. List optional features required for substituted equipment to meet functional requirements of the system as indicated in Contract Documents.
5. Explanation of impact on connected utilities.
6. Explanation of impact on structural supports.

F. Installation of reviewed substitution is the Contractors’ responsibility. Any mechanical, electrical, structural, or other changes required for installation of reviewed substituted equipment or material must be made by the Contractor without additional cost to the Owner. Review by the Architect of the substituted equipment or material, including dimensioned Drawings will not waive these requirements.

G. Contractor may be required to compensate the Architect for costs related to substituted equipment or material.

1.11 OPERATION AND MAINTENANCE MANUAL

A. Furnish three complete sets of Operation and Maintenance Manual bound in hardboard binder, and one compact disc containing complete Operation and Maintenance Manual in searchable PDF format. Provide Table of Contents. Provide index tabs for each piece of equipment in binder and disc. Start compiling data upon approval of submittals.
1. Sets shall incorporate the following:

a. Service telephone number, address and contact person for each category of equipment or system.
b. Complete operating instructions for each item of plumbing equipment.
c. Copies of guarantees/warrantees for each item of equipment or systems.
d. Test data and system balancing reports.
e. Typewritten maintenance instructions for each item of equipment listing lubricants to be used, frequency of lubrication, inspections required, adjustment, etc.
f. Manufacturers' bulletins with parts numbers, instructions, etc., for each item of equipment.
g. Control diagrams and literature.
h. A complete list or schedule of all scheduled valves giving the number of the valve, location and the rooms or area controlled by the valve. Identify each valve with a permanently attached metal tag stamped with number to match schedule. Post list in frame under plastic on wall in mechanical room or where directed by Architect.
i. Check test and start reports for each piece of plumbing equipment provided as part of the Work.
j. Commissioning and Preliminary Operation Tests required as part of the Work.

B. Post service telephone numbers and/or addresses in an appropriate place as designated by the Architect.

1.12 SITE CONDITIONS

A. Information on Drawings relative to existing conditions is approximate. Deviations from Drawings necessary during progress of construction to conform to actual conditions shall be approved by the Architect and shall be made without additional cost to the Owner. The Contractor shall be

held responsible for damage caused to existing services. Promptly notify the Architect if services are found which are not shown on Drawings.

1.13 EXISTING MATERIALS

A. Remove existing equipment, piping, wiring, construction, etc., which interferes with Work of this Contract. Promptly return to service upon completion of work in the area. Replace items damaged by Contractor with new material to match existing.

B. Removed materials which will not be re-installed and which are not claimed by Owner shall become property of Contractor and shall be removed from Project site. Consult Owner before removing any material from Project site. Carefully remove materials claimed by Owner to prevent damage and deliver to Owner-designated storage location.

C. Existing piping and wiring not reused and are concealed in building construction may be abandoned in place and all ends shall be capped or plugged. Remove unused piping and wiring exposed in Equipment Rooms or occupied spaces. Material shall be removed from Project premises. Disconnect power, water, gas, pump or any other active energy source from piping or electrical service prior to abandoning in place.

D. Existing piping, ductwork, and equipment modified or altered as part of this Work shall comply with the most recent applicable code requirements.

1.14 WARRANTY

A. Refer to Division 01 for warranty requirements, including effective date of warranty. Refer to specific items of equipment specified herein for warranty duration if different from that specified in Division 01.

B. Repair or replace defective work, material, or part that appears within the warranty period, including damage caused by leaks.

C. On failure to comply with the above warranty within a reasonable length of time after notification is given, the Architect/Owner shall have the repairs made at the Contractor's expense.

1.15 RECORD DRAWINGS

A. Refer to Division 01, Record Documents, for requirements governing Work specified herein.

B. Upon completion of the work, deliver to Architect the following:
1. Originals of drawings showing the Work exactly as installed.
2. One complete set of reproducible drawings showing the Work exactly as installed.
3. One compact disc with complete set of drawings in PDF format showing the Work exactly as installed.

C. Provide Contractor’s signature, verifying accuracy of record drawings.

D. Obtain the signature of the Project Inspector for all record drawings.

1.16 DELIVERY AND STORAGE

A. Protect equipment and piping delivered to Project site from weather, humidity and temperature variations, dirt, dust and other contaminants.

1.17 COORDINATION

A. General:

1. Coordinate Work in this Section with trades covered in other Specifications Sections to provide a complete, operable and sanitary installation of the highest quality workmanship.

B. Electrical Coordination:
1. Refer to the Electrical Drawings and Specifications, Division 26, for service voltage and power feed wiring for equipment specified under this section. Contractor has full responsibility for the following items of work:

    a. Review the Electrical Drawings and Division 26 Specifications to verify that electrical services provided are adequate and compatible with equipment requirements.
    b. Prior to proceeding with installation of additional electrical work, submit detailed drawings indicating exact scope of additional electrical work.

C. Mechanical Coordination:
1. Arrange for pipe spaces, chases, slots and openings in building structure during progress of construction, to accommodate mechanical system installation.
2. Coordinate installation of supporting devices. Set sleeves in poured-in-place concrete and other structural components during progress of construction.
3. Coordinate requirements for access panels and doors for mechanical items requiring access where concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section “Access Doors and Frames.”

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials or equipment of the same type shall be of the same brand wherever possible. All materials shall be new and in first class condition.

B. All sizes, capacities, and efficiency ratings shown are minimum, except that gas capacity is maximum available.

C. Refer to Sections 22 10 00 and 23 80 00 for specific system piping materials.

2.2 VALVES AND FITTINGS FOR POTABLE WATER SYSTEMS

A. General:
1. Provide valves and fittings conforming to lead-free requirements of California Health and Safety Code Section 11 68 75.

    a. Provide valves listed to NSF/ANSI 61-G or NSF/ANSI 372 for valve materials for potable-water service.

1) Exception: Main distribution gate valves above 1-1/2 inches located underground outside building are not required to conform lead-free requirements of California Health and Safety Code Section 11 68 75.

B. Gate Valves:
1. General: Furnish valves in copper lines with adapters to suit valve/line requirements.
2. 1-1/2 inches and smaller: Minimum 200 psi CWP, bronze body, threaded bonnet, rising or non-rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Milwaukee UP148, UP149, Nibco T-113-LF, S-113-LF, or equal.
3. 2 inches through 3 inches: Minimum 200 psi CWP, bronze body, threaded bonnet, non-rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Nibco T-113-LF, S-113-LF, or equal.
4. Main distribution gate valves underground outside building above 1-1/2 inches:

a. Underground valves 2 inches thru 12 inches: 250 psi, iron body, Non-rising stem, bolted bonnet, resilient wedge valves, conforming to AWWA C509, equipped with operating nuts, Mueller Series 2360, Nibco F-619-RW-SON, or equal.

1) Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.

2) Furnish and deliver to Owner one wrench of each size required for operating underground valves.

C. Ball Valves:
1. 2 inches and smaller: 600 psi CWP, cast bronze or brass body, full port, two piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco T-685-80-LF, Milwaukee UPBA400, Apollo 77C-LF10, Kitz 868, or equal.
2. 2-1/2 inches: Apollo 77C-LF10, or equal.

D. Swing Check Valves:
1. Minimum 200 psi CWP, bronze or brass body, suitable for regrinding, threaded ends, conforming to MSS SP-80. Milwaukee UP509, Nibco T-413LF, Kitz 822T, or equal.

E. Butterfly Valves:
1. General: Tight closing, full lug type, with resilient seat suitable for minimum working pressure of 200 psig, conforming to MSS SP-67. Bi-direction dead end service with downstream flange removed.
2. Provide valves with the following:

a. Seats: suitable for 40 degrees F for cold water service and 250 degrees F for hot water service. Seats shall cover inside surface of body and extend over body ends.
b. Bodies: ductile iron or cast iron.
c. Discs: Bronze or stainless steel.
d. Stems or Shafts: Stainless steel. Install valves with stems horizontal.
e. Control Handles: Suitable for locking in any position or with 10 degree or 15 degree notched throttling plates to hold valve in selected position. Provide extended necks to compensate for insulation thickness. Provide gear operator for valves 5 inches and larger.

3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

a. 2 through 12 inches: Watts Regulator Co., model DBF-03.

F. Silent Check Valves (for use on pump discharge):

1. General: Provide spring loaded check valves at pump discharge of all pumps.

    a. 2 inches and smaller: Minimum 300 psi CWP, bronze body, Apollo 61LF, Milwaukee UP548-T, or equal.
    b. 2-1/2 inches and larger: Class 250, cast iron body, suitable for regrinding, Mueller 103MAP, or equal.

G. Calibrated Balancing Valves:

1. General: Calibrated orifice ball type rated for 400 psig maximum operating pressure and 250 degrees F. maximum operating pressure.

    a. Body: Brass.
    b. Ball: 304 Stainless Steel.
    c. Seat: Glass and Carbon filled TFE.
    d. End Connections: Threaded.
    e. Pressure Gage connections: Integral capped readout valves with internal check valves and drain port, for use with portable pressure differential meter.
    f. Handle Style: Dial, with memory stops to retain set position.

2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. 1 inch and smaller: Bell & Gossett model CB, “LF” series.

2.3 VALVES AND FITTINGS FOR NON-POTABLE WATER, COMPRESSED AIR, AND GAS SYSTEMS

A. Gate Valves:

1. 2-1/2 inches and smaller: Class150, bronze body, union bonnet, rising stem, solid wedge, threaded or solder ends, conforming to MSS SP-80. Hammond IB641, IB648, Nibco T-134, S-134, Milwaukee 1151, 1169, or equal.
2. 3 inches and larger: Class 125, iron body, bronze mounted, bolted bonnet, non-rising stem, solid wedge, flanged ends, conforming to MSS SP-70. Hammond IR-1138, Nibco F619, Milwaukee F2882A, Stockham G-612, or equal.
3. Underground valves 2 inches thru 12 inches: 250 psi, iron body, Non-rising stem, bolted bonnet, resilient wedge valves, conforming to AWWA C509, equipped with operating nuts, Mueller Series 2360, Nibco F-619-RW-SON, or equal.

    a. Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.
    b. Furnish and deliver to Owner one wrench of each size required for operating underground valves.

B. Ball Valves:

1. 2 inches and smaller: 600 psi CWP, 150 psi SWP, cast bronze body, full port, two piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco T585-70, Milwaukee BA-400, Stockham T-285, or equal.
2. 2-1/2 inches and larger: Class 150, carbon steel body, full port, two piece, stainless steel vented ball, flanged ends, and reinforced PTFE seal, conforming to MSS SP-72. Nibco F-515-CS-F-66-FS, Milwaukee F20-CS-15-F-02-GO-VB, or equal.
3. Compressed Air Services: 600 psi CWP, 150 psi SWP, bronze body, full port, three piece, threaded ends, and reinforced PTFE seal, conforming to MSS SP-110. Nibco Model T-595-Y, Milwaukee BA-300, or equal.

C. Swing Check Valves: Class 125 or 150, bronze body, suitable for regrinding, threaded ends, conforming to MSS SP-80. Stockham B-321, Milwaukee 509, Nibco T-433, or equal.

D. Butterfly Valves:
1. General: Tight closing, full lug type, with resilient seat suitable for minimum working pressure of 200 psig, conforming to MSS SP-67. Bi-direction dead end service with downstream flange removed.
2. Provide valves with the following:

    a. Seats: Suitable for 40 degrees F for cold water service and 250 degrees F for hot water service. Seats shall cover inside surface of body and extend over body ends.
    b. Bodies: Ductile iron or cast iron.
    c. Discs: Bronze or stainless steel.
    d. Stems or Shafts: Stainless steel.
    e. Control Handles: Suitable for locking in any position or with 10 degree or 15 degree notched throttling plates to hold valve in selected position. Provide extended necks to compensate for insulation thickness. Provide gear operator for valves 5 inches and larger.

3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. 2 through 12 inches: Milwaukee Valve, CL series, Nibco, Inc., Model LD2000-3, or equal.

E. Silent Check Valves (for use on pump discharge):

1. General: Provide spring loaded check valves at pump discharge of all pumps.
2. 2 inches and smaller: 250 psi CWP, bronze body, Nibco Model T-480, Milwaukee 548-T, or equal.
3. 2-1/2 inches and larger: Class 250, cast iron body, wafer style, suitable for regrinding. Nibco Model F960, Milwaukee 1400, Mueller 103MAP, or equal.

F. Calibrated Balance Valves (Symbol CBV): Provide globe style valves for precision regulation and control rated 175 psi for sizes 2-1/2 inches through 12 inches and rated 240 psi for bronze sizes 2 inches and below. Each valve shall have two metering/test ports with internal check valves and protective caps. All valves must be equipped with visual position readout and concealed memory stops for repeatable regulation and control.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. Bell & Gossett Circuit Setter Plus.
    b. Armstrong CBV.
    c. Flow Design Inc. Accusetter.
    d. Tour & Andersson.
    e. Circuit Sensor with butterfly valve above 3 inches.
    f. Illinois Series 5000 through 2 inches.

G. Flow Control Valve: Automatic pressure compensating flow control valves shall be Griswold, Flow Design, Inc., or equal.

H. Building Gas Shut-Off Valve:

1. 2 inches and smaller: Provide 175 psi SWP ball valve, CSA listed, full port, lockwing type, with AGA painted grey finish. Jomar 175-LWN, or equal.
2. Above 2 inches: Provide ReSun D-126, Key Port, or equal, lubricated plug cock, CSA listed, rectangular port, full pipe area, 125 psi SWP, flanged ends. Provide T-Handle socket wrench and adapter fittings as required for operation of valves. Provide one package of spare lubricant sticks, sizes as required for valve sizes. Lubricant shall be the product recommended by valve manufacturer for use with type of gas conveyed by the piping system.
3. Provide valves same size as upstream piping. Make any reduction in size of gas piping downstream of shutoff valves.

I. Gas Shut-off Valve Above Grade:
1. 2 inches and smaller: Provide Milwaukee BB2-100, Jomar T-100NE, or equal, ball valve, CSA listed, full port.
2. Above 2 inches: Provide ReSun D-126, Key Port, or equal, CSA listed, rectangular port, full pipe area, 125 psi SWP, flanged ends. Provide T-Handle socket wrench and adapter fittings as required for operation of valves. Provide one package of spare lubricant sticks, sizes as required for valve sizes. Lubricant shall be the product recommended by valve manufacturer for use with type of gas conveyed by the piping system.
3. Provide valves same size as upstream piping. Make any reduction in size of gas piping downstream of shutoff valves.

J. For Gas Service Below Grade:
1. Lubricated plug cocks: ReSun Model D-126, Key Port, or equal, lubricated plug cock, CSA listed, rectangular port, full pipe area, 125 psi SWP, flanged ends. Provide extended lubrication stem, arranged to allow for lubrication of the valve from grade. The extension must be constructed to allow for lubrication of the valve and for operation of the valve from grade. Provide T-Handle socket wrench and adapter fittings as required for operation of valves. Provide one package of spare lubricant sticks, sizes as required for valve sizes. Lubricant shall be the product recommended by valve manufacturer for use with type of gas conveyed by the piping system.

    a. Provide flanged ends on valves installed below grade. Connect to polyethylene piping with flanges and stainless steel bolts.
    b. Anchor each valve flange to valve box with welded angle iron, or provide vertical stiff leg, minimum 18 inches into earth.
    c. Provide Central Double O Seal Transition Fittings, or equal, flanged style for connection between valve and piping system.
    d. Wrap valve, flanges and exposed pipe with Pabco, or equal tape wrap, installed in accordance with requirements listed under “Pipe Protection”.

2. Molded polyethylene body ball valve: Nordstrom Valves - Polyvalve II for sizes 1-1/4 inches to 2 inches, and Polyvalve for sizes 2 inches and larger, or equal. Valves 1 inch and smaller shall be listed lubricated plug cocks, with transition fittings..

    a. Provide stub ends to match SDR of the piping, arranged for butt fusion welding. Provide valve body material to suit the adjacent piping system.
    b. Provide wrench to suit the valve operator.

K. Seismic Gas Shut-Off Valve: Certified by State of California and compliant with ASCE 25. Provide standard or high pressure model as required to match site gas pressure. Provide unit arrangement per Drawings schedule and details.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Little Firefighter Corporation, models NAGV, VAGV, and AGV.
b. Seismic Safety Products, LLC, Northridge series.

L. Quick Coupling Valve:
1. Provide quick coupling valves, heavy duty brass construction with yellow thermoplastic rubber cover, stainless steel internal valve spring, one piece body.

2.4 JOINING MATERIALS

A. Refer to Division 22 and 23 piping sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated

a. Full-Face Type: For flat-face, Class 125, cast iron and cast bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast iron and steel flanges.

2. AWWA C111, rubber, flat face, 1/8-inch (3.2mm) thick, unless otherwise indicated; and full-face or ring type, unless other indicated.
3. Flange Bolts and Nuts: AWWA C111, carbon steel, unless otherwise indicated.
4. Plastic, Pipe-Flange Gasket, Bolts and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, 100 percent lead free alloys. Include water-flushable flux according to ASTM B813.

D. Brazing Filler Metals: AWS A5.8, BCup-5 Series, copper-phosphorus unless otherwise indicated. Sil-Fos 15, or equal.

E. Welding Filler Metals: Comply with ASME B31.1 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

F. Solvent Cements for Joining CPVC Piping: ASTM F 493.
1. CPVC solvent cement shall have VOC content of 490 g/L or less.
2. Adhesive primer shall have VOC content of 550 g/L or less.
3. Solvent cement and adhesive primer shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.
4. Solvent cement and adhesive primer shall comply with testing and product requirements of California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

G. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
1. PVC solvent cement shall have VOC content of 510 g/L or less.
2. Adhesive primer shall have VOC content of 550 g/L or less.
3. Solvent cement and adhesive primer shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.
4. Solvent cement and adhesive primer shall comply with testing and product requirements of California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 STRAINERS FOR POTABLE WATER SYSTEMS

A. Strainers: Full line size, conforming to lead-free requirements of California Health and safety Code Section 11 68 75. "Y" pattern, 125 psi SWP minimum, with 304 stainless steel screens. Install all strainers with a blow-off hose valve with hose adapter. Strainer shall have gasketed cover with straight thread.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

      a. 3 inches and smaller: bronze or brass body, threaded ends, with 20 mesh screen. Watts LF777SI, Wilkins SXL.
      b. 4 inches and larger: Cast iron body, flanged ends, 1/16 inch or 1/8 inch screen as normally supplied for each size. Watts 77F-DI-125, Mueller 758.

2.6 STRAINERS FOR NON-POTABLE WATER SYSTEMS

A. Charles M. Bailey #100A, Armstrong, Muessco, or equal, Fig. 11 "Y" pattern, 125 psi WP minimum, with monel screens with 20 square mesh for 2 inches and smaller and 3/64 inch perforations for 2-1/2 inches and larger. Install all strainers with a blow-off hose valve with hose adapter. Strainer shall have gasketed cover with straight thread.

2.7 VALVE BOXES

A. General:
   1. Where several valves or other equipment are grouped together, provide larger boxes of rectangular “vault” type adequately sized for condition and similar in construction to those specified above.
   2. Provide valve box extensions as required to set bottom of valve box tight up to top of piping in which valve is installed.
   3. Provide a tee handle wrench for each size, Alhambra Foundry Co. #A-3008, or equal.

B. Valve Boxes in Traffic Areas: Provide Christy No. G5 traffic valve box, Brooks, or equal, 10-3/8 inches inside diameter with extensions to suit conditions, with cast iron or steel locking cover. Provide Owner with set of special wrenches or tools as required for operation of valves.

C. Valve Boxes in Non-Traffic Areas: Provide Christy No. F22, Brooks, or equal, 8 inches inside diameter by 30 inches long, with cast iron or steel locking cover. Provide Owner with set of special wrenches or tools as required for operation of valves. Cut bottom of plastic body for operation of valves.

D. Valve Box (Rectangular Vault Type): Precast concrete or cast iron with cast iron or steel locking type covers lettered to suit service – Brooks No. 3-TL, Christy No. B3, Fraser No. 3, Alhambra A-3004 or A-3005, Alhambra E-2202, or E-2702, or equal, with extension to suit conditions.

2.8 GAUGES

A. Marsh "Series J", U.S. Gage, Danton 800, or equal, with bronze bushed movement and front recalibration. Dials shall be white with black numerals, 3-1/2 inch dial face. Normal reading shall be at mid-scale. Provide a needle valve on each gauge connection. Supply a gauge piped with branch isolation valves across the inlet and outlet of each pump and where shown on the Drawings.

B. Provide Pete's Plug II, Sisco P/T, or equal, test plug with Nordel core {and gasketed cap}, on inlet and outlet of each coil, boiler, condenser, chiller and heat exchanger and where shown on Drawings.

2.9 THERMOMETERS

A. Marsh, Taylor, Palmer, or equal, 5 inch diameter bimetal dial, adjustable from face, with adjustable positioner, located to be easily read from normal personnel approach. Normal reading shall be at mid-scale.

1. Provide extension for insulation.
2. Provide thermometers with steel bulb chambers and brass separable sockets.

B. Provide Pete's Plug II, Sisco P/T, or equal, test plug with Nordel core, on inlet and outlet of each coil, boiler, and heat exchanger and provide two digital electronic test thermometers for each range of fluid temperature and where shown on Drawings.

2.10 ACCESS DOORS

A. Where floors, walls, or ceilings must be penetrated for access to mechanical equipment, provide access doors, 14 inch by 14 inch minimum size in usable opening. Where entrance of a serviceman may be required, provide 20 inch by 30 inch minimum usable opening. Locate access doors/panels for non-obstructed and easy reach.
1. All access doors less than 7'-0" above floors and exposed to public access shall have keyed locks.

B. Access doors shall match those supplied in Division 08 in all respects, except as noted herein.

C. Provide stainless steel access doors for use in toilet rooms, shower rooms, kitchens and other damp areas. Provide steel access doors with prime coat of baked-on paint for all other areas.

D. Do not locate access doors in highly visible public areas such as lobbies, waiting areas, and primary entrance areas. Coordinate with the Architect when access is required in these areas.

E. Where specific information or details relating to access panels different from the above is shown or given on the Drawings or other Divisions of work, then that information shall supersede this specification.

F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products which may be incorporated into the Work include Milcor, Karp, Nystrom, or Cesco, equal to the following:
1. Milcor

a. Style K (plaster).
b. Style DW (gypsum board).
c. Style M (Masonry).
d. Style "Fire Rated" where required.

2.11 EXPANSION LOOPS

A. Manufactured assembly consisting of inlet and outlet elbow fittings, two sections of flexible metal hose and braid, and 180-degree return bend or center section of flexible hose. Flexible hose shall consist of corrugated metal inner hose and braided outer sheath.

B. Provide expansion loops listed for 4 inches of movement for use in natural or propane gas piping systems.

C. Where used in potable water systems, provide expansion loops of all stainless steel construction.

D. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Metraflex Inc., Metraloop series.
2. Unisource Manufacturing, Inc., V series.

2.12 FLEXIBLE JOINTS

A. Where indicated on Drawings, provide Metraflex Metrasphere, Style R, Mason Industries, or equal, Spherical Expansion Joints. Provide control units at each expansion joint, arranged to limit both expansion and compression.

B. Flexible joints at entry points to building shall be Barco Ductile iron, Advanced Thermal Systems, or equal, threaded style with stainless ball and mineral filled seal.

2.13 PIPE GUIDES

A. Where flexible connections are indicated on Drawings, provide Metraflex style IV, B-Line, or equal, pipe guides in locations recommended by manufacturer. Maximum spacing from flexible connection to first pipe guide is 4 pipe diameters, and maximum spacing from second pipe guide is 14 pipe diameters.

2.14 EQUIPMENT IDENTIFICATION

A. Identify each piece of equipment with a permanently attached engraved bakelite plate, 1/2 inch high white letters on black background.

2.15 PIPE IDENTIFICATION

A. Identify each piping system and indicate the direction of flow by means of Seton, Inc., Marking Services Inc., Reef Industries, Inc., or equal, pre-tensioned, coiled semi-rigid plastic pipe labels formed to circumference of pipe, requiring no fasteners or adhesive for attachment to pipe.
B. The legends and flow arrows shall conform to ASME A13.1.

2.16 INSULATION WORK

A. General:
1. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).
2. Adhesives and sealants shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.
3. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
4. The term "piping" used herein includes pipe, valves, strainers and fittings.
5. Apply insulating cement to fittings, valves and strainers and trowel smooth to the thickness of adjacent covering. Cover with jacket to match piping. Extend covering on valves up to the bonnet. Leave strainer cleanout plugs accessible.
6. Provide pre-formed PVC valve and fitting covers.
7. Provide Calcium Silicate rigid insulation and sheet metal sleeve, 18 inch minimum length at each pipe hanger. Seal ends of insulation to make vapor tight with jacket.
8. Urethane insulation will not be allowed above ground or on hot water piping.

9. Test insulation, jackets and lap-seal adhesives as a composite product and confirm flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with UL723 or ASTM E84.
10. Clean thoroughly, test and have approved, all piping and equipment before installing insulation and/or covering.
11. Repair all damage to existing pipe and equipment insulation whether or not caused during the work of this contract, to match existing adjacent insulation for thickness and finish, but conforming to flame spread and smoke ratings specified above.

B. Insulation of Piping:

1. Insulate domestic hot and tempered water with 1 inch thick 3-1/2# minimum density fiberglass with ASJ-SSL jacket for sizes up to and including 3/4 inches. For larger sizes, provide 1-1/2 inch thick 3-1/2# minimum density fiberglass insulation and ASJ-SSL jacket.
2. Insulate domestic hot water piping under slab on grade and cold water piping exposed to the weather with 3/4" thick Therma-Cel, Armaflex, or equal; seal water tight per manufacturer's directions.
3. Insulate domestic cold water piping outside of insulation envelope in outside walls, vented attic spaces, and unheated spaces, including equipment rooms and below raised floor with 1 inch thick molded fiberglass, minimum density 3-1/2# per cubic foot, with ASJ-SSL jacket.
4. Exposed insulated piping within the building shall have a Zeston 2000 25/50, Proto Lo-Smoke, or equal, PVC jacket and fitting cover installed over the insulation, applied per manufacturer's instructions. Verify suitability with manufacturer of insulation. Insulation with pre-applied polymer jacket may be substituted at Contractor’s option.
5. Insulate condensate drain piping in freezer with 3/4 inch thick Therma-Cel, Armaflex, or equal. Seal water tight per manufacturer's directions. Install heat tape prior to insulation of piping, in accordance with manufacturer's directions.
6. Where insulated piping is exposed to the weather apply aluminum jacket secured with 1/2 inch aluminum bands on 12 inch centers. Cover fittings with glass cloth and two coats of Foster's Sealfas 30-36, Zeston 2000, or equal, PVC fitting covers. Insulation shall be vapor tight before applying metal jacket or PVC covers.

    a. Pipes 10 inches diameter and smaller: Minimum .016 inch thick jacket.
    b. Pipes 12 inches diameter and larger: Minimum .020 inch thick jacket.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION

A. Refer to Division 01 Sections “Cutting and Patching” and “Selective Demolition” for general demolition requirements and procedures.

B. Disconnect, dismantle and remove mechanical systems, equipment, and components indicated to be removed. Coordinate with all other trades.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping to remain with same or compatible piping material. Refrigerant system must be evacuated per EPA requirements.
3. Equipment to Be Removed: Drain down and cap remaining services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 ELECTRICAL REQUIREMENTS

A. Provide adequate working space around electrical equipment in compliance with the California Electrical Code. Coordinate the Mechanical Work with the Electrical Work to comply.

B. Furnish necessary control diagrams and instructions for the controls. Before permitting operation of any equipment which is furnished, installed, or modified under this Section, review all associated electrical work, including overload protection devices, and assume complete responsibility for the correctness of the electrical connections and protective devices. Motors and control equipment shall conform to the Standards of the National Electrical Manufacturers' Association. All equipment and connections exposed to the weather shall be NEMA IIIR with factory-wired strip heaters in each starter enclosure and temperature control panel where required to inhibit condensation.

C. All line voltage and low voltage wiring and conduit associated with the Temperature Control System are included in this Section. Wiring and conduit shall comply with Division 26.

3.3 PIPING SYSTEM REQUIREMENTS

A. Drawing plans, schematic and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

3.4 PRIMING AND PAINTING

A. Perform all priming and painting on the equipment and materials as specified herein.

B. Priming:

1. Exposed ferrous metals, including piping, which are not galvanized or factory-finished shall be primed. Black steel pipe exposed to the weather shall be painted one coat of Rust-Oleum #1069 primer for black steel piping or Rust-Oleum #5260, Kelly Moore, or equal, primer for galvanized piping.
2. Metal surfaces of items to be jacketed or insulated except piping shall be given two coats of primer unless furnished with equivalent factory finish. Items to be primed shall be properly cleaned by effective means free of rust, dirt, scale, grease and other deleterious matter and then primed with the best available grade of zinc rich primer. After erection or installation, all primed surfaces shall be properly cleaned of any foreign or deleterious matter that might impair proper bonding of subsequent paint coatings. Any abrasion or other damage to the shop or field prime coat shall be properly repaired and touched up with the same material used for the original priming.
3. Where equipment is provided with nameplate data, the nameplate should be masked off prior to painting. When painting is completed, remove masking material.

C. See Painting Section for detailed requirements.

3.5 EXCAVATING

A. Perform all excavating required for work of this Section. Provide the services of a pipe/cable locating service prior to excavating activities to determine location of existing utilities.

B. Unless shown otherwise, provide a minimum of 2'-6" cover above top of pipe to finished grade for all service piping, unless otherwise noted. Trim trench bottom by hand or provide a 4 inch deep minimum bed of sand to provide a uniform grade and firm support throughout entire length of pipe. For all PVC pipe and for PE gas pipe, bed the pipe in 4 inch sand bed. Pipe bedding materials should be clean crushed rock, gravel or sand of which 100 percent will pass a 1 inch sieve. For pipes that are larger than 10 inches in diameter, at least 95 percent should pass a 3/4 inch sieve, and for pipes 10 inches in diameter or smaller, 100 percent should pass a 1/2 inch sieve. All other materials should have a minimum sand equivalent of 50. Only a small proportion of the native soils will meet these requirements without extensive processing; therefore, importation of pipe bedding materials should be anticipated. Pipe bedding materials shall be compacted in lifts not exceeding 6 inches in compacted thickness. Each lift shall be compacted to not less than 90 percent relative compaction at or above the optimum moisture content, in accordance with ASTM Specification D2940, except that bedding materials graded such that less than 100 percent will pass a No. 200 sieve shall be compacted in 6 inch lifts using a single pass of a flat-plate, vibratory compactor or vibratory drum. Pipe bedding materials should extend at least to the spring line.

C. Maintain all warning signs, barricades, flares, and red lanterns as required.

D. For all trenches 5 feet or more in depth, submit copy of permit detailed drawings showing shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trenches. Obtain a permit from the Division of Industrial Safety prior to beginning excavations. A copy of the permit shall be available at the site at all times.

3.6 BACKFILLING

A. Backfill shall comply with applicable provisions of Division 31 of these Specifications.

B. Except under existing or proposed paved areas, walks, roads, or similar surfaces, backfill for other types of pipe shall be made using suitable excavated material or other approved material. Place backfill in 8 inch layers, measured before compaction, and compact with impact hammer to at least 90 percent relative compaction per ASTM D2940.

1. Backfill plastic pipe and insulated pipe with sand for a minimum distance of 12 inches above the top of the pipe. Compact using mechanical tamping equipment.

C. Entire backfill for excavations under existing or proposed pavements, walks, roads, or similar surfaces, under new slabs on grade, shall be made with clean sand compacted with mechanical tamping equipment vibrator to at least 90 percent relative compaction per ASTM D2940. Remove excess earth. Increase the minimum compaction within the uppermost two feet of backfill to 95 percent.

D. Replace or repair to its original condition all sod, concrete, asphalt paving, or other materials disturbed by the trenching operation. Repair within the guarantee period as required.

3.7 INSTALLATION OF VALVES

A. Install valves as indicated on Drawings and in the following locations:

1. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
2. Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere indicated or required to completely drain potable water system.
3. Provide gate or globe valves on inlet and outlet of each water heater or pump.

B. General:

1. Valves shall be full line size unless indicated otherwise on Drawings.
2. Install horizontal valves with valve stem above horizontal, except butterfly valves.
3. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
4. Locate valves for easy access and provide separate support where necessary.
5. Install valves in position to allow full stem movement.
6. Install exposed polished or enameled connections with special care showing no tool marks or exposed threads.
7. Butterfly valves conforming to the paragraph “Butterfly Valves” may be used in lieu of gate or globe valves for locations above grade.
8. Ball valves conforming to the paragraph “Ball Valves” may be used in lieu of gate valves for locations above grade for services 2-1/2 inches and smaller.
9. Valves 2-1/2 inches and smaller (except ball valves) in nonferrous water piping systems may be solder joint type with bronze body and trim.
10. Rigidly fasten hose bibbs, hydrants, fixture stops, compressed air outlets, and similar items to the building construction.

C. Gate Valves:
1. Furnish valves in copper lines with adapters to suit valve / line requirements.
2. Underground gate valves:

    a. Underground valves 3 inches and smaller may be furnished with operating nuts or hand-wheels, and with Ring-Tite joint ends.
    b. Furnish and deliver to Owner one wrench of each size required for operating underground valves.

D. Swing Check Valves: Install in horizontal position with hinge pin level.

E. Butterfly Valves: Install with stems horizontal.

F. Silent Check Valves: Install in horizontal or vertical position between flanges.

G. Calibrated Balancing Valves: Install calibrated balancing valves per manufacturers’ recommendations, including requirements for straight pipe lengths at valve inlet and outlet.

H. Gas Shut-Off Valves:
1. Provide line size ball valve in gas line to each appliance.
2. Provide line size electric solenoid gas valve in gas line to kitchen equipment (if not supplied with appliance) under Type 1 hood. Interlock with hood fire alarm system.

I. Valve Adjustment: Adjust or replace valve packing if valve leaks after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.8 INSTALLATION OF PIPING SYSTEMS

A. At time of final connection, and prior to opening valve to allow pressurization of water and gas piping from existing systems, on site or off site, perform a pressure test to indicate static pressure of existing systems. If pressure on water piping is greater than 80 psi, or gas pressure is not as indicated on Contract Documents, inform Architect immediately.

B. General:
1. All piping shall be concealed unless shown or otherwise directed. Allow sufficient space for ceiling panel removal.
2. Installation of piping shall be made with appropriate fittings. Bending of piping will not be accepted.
3. Install piping to permit application of insulation and to allow valve servicing.
4. Where piping or conduit is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.
5. Horizontal runs of pipes and/or electrical conduit suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect, or approved location.
6. Close ends of pipe immediately after installation. Leave closure in place until removal is necessary for completion of installation.
7. Each piping system shall be thoroughly flushed and proved clean before connection to equipment.
8. Pipe the discharge of each relief valve, air vent, backflow preventer, and similar device to floor sink or drain.
9. Install exposed polished or enameled connections with special care showing no tool marks or threads at fittings.
10. Install horizontal valves with valve stem above horizontal.
11. Use reducing fittings; bushings shall not be allowed. Use eccentric reducing fittings wherever necessary to provide free drainage of lines and passage of air.
12. Verify final equipment locations for roughing-in.
13. Furnish and install anchors or thrust blocks on PVC water lines in the ground, at all changes in direction of piping, and at all connections or branches from mains 1-1/2 inch and larger. Form anchors or thrust blocks by pouring concrete between pipe and trench wall. Thrust blocks shall be of adequate size and so placed as to take thrusts created by maximum internal water pressure. Sizing and placement shall be per manufacturer's recommendations, CPC, and IAPMO installation standards. Anchor piping to building construction.
14. Sanitary Sewer and Storm Drain: Grade piping inside building uniformly 1/4 inch per foot if possible but not less than 1/8 inch per foot. Run piping as straight as possible. Make piping connections between building piping and outside service pipe with cast iron reducers or increasers.

C. Expansion Loops:
1. Install expansion loops where piping crosses building expansion or seismic joints, between buildings, between buildings and canopies, and as indicated on Drawings.
2. Install expansion loops of sizes matching sizes of connected piping.
3. Install grooved-joint expansion joints to grooved-end steel piping.
4. Materials of construction and end fitting type shall be consistent with pipe material and type of gas or liquid conveyed by the piping system in which expansion loop is installed.

D. Sleeves:

1. At exterior wall penetrations and floor penetrations Install Adjus-to-Crete, Pipeline Seal and Insulator, or equal, pipe sleeves of sufficient size to allow for free motion of pipe, 24 gauge galvanized steel. The space between pipe and sleeves through floor slabs on ground, through

outside walls above or below grade, shall be caulked with oakum and mastic and made watertight. The space between pipe and sleeve and between sleeve and slab or wall shall be sealed watertight.

2. At Contractor's option, Link-Seal, Metraflex Metraseal, or equal, casing seals may be used in lieu of caulking. Wrap pipes through slabs on grade with 1 inch thick fiberglass insulation to completely isolate the pipe from the concrete.

E. Floor, Wall, and Ceiling Plates:

1. Fit all expose pipes with or without insulation passing through walls, floors, or ceilings, and all hanger rods penetrating finished ceilings with chrome-plated or stainless escutcheon plates.

F. Firestopping:

1. Pack the annular space between the pipe sleeves and the pipe through all fired floors and walls with UL listed fire stop, and sealed at the ends. All pipe penetrations shall be UL listed, Hilti, 3M Pro-Set, or equal.

    a. Install fire caulking behind plumbing services installed within fire rated walls, to maintain continuous rating of wall construction.

2. Provide SpecSeal Systems UL fire rated sleeve/coupling penetrators for each pipe penetration or fixture opening passing through fire rated floors, walls, partitions or floor/ceiling assemblies. All Penetrators shall comply with UL Fire Resistance Directory (Latest Edition), and in accordance with Chapter 7, CBC requirements.
3. Sleeve penetrators shall have a built in anchor ring for waterproofing and anchoring into concrete pours or use the special fit cored hole penetrator for cored holes.
4. .
5. All above Systems to be installed in strict accordance with manufacturer's instructions.
6. Alternate firestopping systems are acceptable if approved equal. However, any deviation from the above specification requires the Contractor to be responsible for determining the suitability of the proposed products and their intended use, and the Contractor shall assume all risks and liabilities whatsoever in connection therewith.

G. Flashing:

1. Flashing for penetrations of metal or membrane roof for plumbing items such as flues and pipes shall be coordinated with the roofing manufacturer and roofing installer for the specific roofing type. The work of this section shall include furnishing, layout, sizing, and coordination of penetrations required for the mechanical work.

    a. Furnish and install flashing and counterflashing in strict conformance with the requirements of the roofing manufacturer. Submit shop drawing details for review prior to installation.

2. For all other types of roofing system, furnish and install around each pipe, where it passes through roof, a flashing and counterflashing. All flashing shall be made of four pound seamless sheet lead with 6 inch minimum skirt and steel reinforced boot.

H. Hangers and Supports:

1. General: Support all equipment and piping so that it is firmly held in place by approved iron hangers and supports and special hangers as required. All components shall support weight of equipment and pipe, fluid, and pipe insulation based on spacing between supports with minimum factor of safety of five based on ultimate strength of material used. Do not exceed manufacturer's load rating. Pipe attachments or hangers, of same size as pipe or tubing on which used, or nearest available. Rigidly fasten hose faucets, fixture stops, compressed air

outlets, and similar items to the building construction. The Architect shall approve all hanger material before installation. Do not support piping with plumbers' tape, wire rope, wood, or other makeshift devices. Where building structural members do not match piping support spacing, provide all “bridging” support members as required firmly attached to building structural members in a fashion approved by the Structural Engineer.

a. Materials, design, and type numbers per Manufacturers' Standardization Society (MSS), Standard Practice (SP)-58.

2. Hanger components shall be provided by one manufacturer B-Line, Grinnell, Uni-Strut, Badger, or equal.
3. Pipe Hanger and Support Spacing:

a. Vertical piping support spacing: B-line #B3373 clamps attached to the pipe above each floor to rest on the floor. Provide with lead or Teflon liners on copper tubing. Provide additional support at base of cast iron risers and support at unsupported riser joints and horizontal offsets per 2007 Mason Industries Seismic Restraint Guidelines. Provide intermediate support for vertical piping, spaced at or within the following maximum limits.

Pipe Diameter	Steel Fluid	Steel Vapor	Copper Fluid	Copper Vapor	CPVC & PVC (Note 2)
1/2 - 1”	12 ft.	6 ft.	10 ft.	6 ft.	Base and Each Floor (Note 1)
1-1/4 - 2”	12 ft.	Each Floor	10 ft.	6 ft.	Base and Each Floor (Note 1)
2-1/2 - 3”	12 ft.	Each Floor	10 ft.	10 ft.	Base and Each Floor (Note 1)
Over 4”	12 ft.	Each Floor	10 ft.	10 ft.	Base and Each Floor (Note 1)

1) Note 1: Provide mid-story guides.
2) Note 2: For PVC piping, provide for expansion every 30 feet per IAPMO installation standard.

b. Vertical cast iron piping support spacing: Base and each floor not to exceed 15 feet.
c. Horizontal piping, hanger and support spacing: Locate hangers and supports at each change of direction, within one foot of elbow, and spaced at or within following maximum limits.

Pipe Diameter	Steel Fluid	Steel Vapor	Copper Fluid	Copper Vapor	CPVC & PVC
1/2 - 1"	6 ft.	6 ft.	5 ft.	6 ft.	3 ft.
1-1/4 - 2"	7 ft.	10 ft.	6 ft.	6 ft.	4 ft.

2-1/2 - 3"	10 ft.	10 ft.	10 ft.	10 ft.	4 ft.
Over 4"	10 ft.	10 ft.	10 ft.	10 ft.	4 ft.

d. Horizontal cast iron piping support spacing:

1) Support piping at every other joint for piping length of less than 4 feet.
2) For piping longer than 4 feet, provide support on each side of the coupling, within 18 inches of each joint.
3) Hanger shall not be installed on the coupling.
4) Provide support at each horizontal branch connection.
5) Provide sway brace at 40 foot maximum spacing for all suspended pipe with no-hub joints, except where a lesser spacing is indicated in the 2011 Mason Industries Seismic Restraint Guidelines. Provide a brace on each side of a change in direction of 90 degrees or more. Brace riser joints at each floor and at 15 foot maximum intervals.

4. Individually Suspended Piping:

a. Individually suspended piping: B-Line B3690 J-Hanger or B3100 Clevis, complete with threaded rod, or equal.

Pipe Size	Rod Size Diameter
2" and Smaller	3/8"
2-1/2" to 3-1/2"	1/2"
4" to 5"	5/8"
6"	3/4"

b. Provide 3/8 inch rod for support of PVC and CPVC and provide continuous support.
c. Trapeze Suspension: B-Line 1-5/8 inch width channel in accordance with manufacturer's published load ratings. No deflection to exceed 1/180 of a span.
d. Trapeze Supporting Rods:
e. Pipe Clamps and Straps: B-Line B2000, B2400; isolate copper pipe with two thicknesses of 2 inches wide 10-mil polyvinyl tape. Where used for seismic support systems, provide B-Line B2400 series pipe straps.
f. Concrete Inserts: B-line B22-I continuous insert or B2500 spot insert. Do not use actuated fasteners for support of overhead piping unless approved by Architect.
g. Steel Connectors: Beam clamps with retainers.

5. Support to Structure:

a. Wood Structure: Provide and install wood blocking as required to suit structure. Provide lag screws or through bolts with length to suit requirements, and with size (diameter) to match the size of hanger rods required.

1) Do not install Lag screws in tension without written review and acceptance by Structural Engineer.

Side Beam Angle Clip	B-Line B3062 MSS Type 34
Side Beam Angle Clip	B-Line B3060
Ceiling Flange	B-Line B3199

2) Blocking for support of piping shall be not less than 1.5 inch thick for piping up to 2 inch size (water filled) or 3 inch size (vapor filled). Provide 3 inch blocking for piping up through 5 inch size, and 4 inch blocking for larger piping. Provide support for blocking in accordance with Structural Engineers requirements.
3) Where lag screws are used, length of screw shall be 1/2 inch less than the wood blocking. Pre-drill starter holes for each lag screw.

b. Steel Structure: Provide and install additional steel bracing as required to suit structure. Provide through bolts with length to suit requirements of the structural components. Burning or welding on any structural member may only be done if approved by the Structural Engineer.

6. Rubber Neoprene Pipe Isolators:

a. Pipe isolators shall comprise an internal rubber or neoprene material that isolates pipe from hanger and structure. Install at all piping located in acoustical walls. Refer to Architectural Drawings for location of acoustical walls.
b. Isolation material shall be either a rubber or neoprene material that prevents contact between the pipe and the structure. The rubber shall have between a 45 to 55 durometer rating and a minimum thickness of 1/2 inch.
c. Acceptable Suppliers:

1) Vertical runs: Acousto-Plumb or equal.
2) Horizontal runs: B-Line, Vibraclamp; Acousto-Plumb or equal.

7. Provide continuous V channel support for all horizontal plastic piping.
8. Provide support for piping through roof, arranged to anchor piping solidly in place at the roof penetration.
9. Provide rigid insulation and a 12 inch long, 18 gauge galvanized sheet iron shield between the covering and the hanger whenever hangers are installed on the outside of the pipe covering.
10. Insulate copper tubing from ferrous materials and hangers with two thicknesses of 2 inch wide, 10 mil polyvinyl tape wrapped around pipe.
11. Provide a support or hanger close to each change of direction of pipe either horizontal or vertical and as near as possible to concentrated loads.
12. Suspend rods from concrete inserts with removable nuts where suspended from concrete decks. Power actuated inserts will not be allowed, unless approved by Structural Engineer.

3.9 PIPE JOINTS AND CONNECTIONS

A. General:
1. Cutting: Cut pipe and tubing square, remove rough edges or burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt and debris from inside and outside of pipe before assembly.
3. Boss or saddle type fittings or mechanically extracted tube joints will not be allowed, unless pre-approved by Mechanical Engineer.

B. Threaded Pipe: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply thread compound to external pipe threads: Rectorseal No. 5, Permatex No. 1, or equal.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

C. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

D. Joint Construction for Solvent-Cemented Plastic Piping: Clean and dry joining surfaces. Join pipe and fittings according to the following:
1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Piping: Join according to ASTM D 2855.

E. Copper Pipe and Tubing (Except pneumatic control piping): All joints shall be brazed according to ASME Section IX, Welding and Brazing Qualifications, except domestic water piping 2 inches and smaller when not buried in the ground or concrete and type DWV plumbing piping may be soldered.

1. Soldered joints: Apply water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828.

F. Cast Iron Soil Pipe:

1. No-Hub fittings shall be made with a torque wrench.
2. Hub joints shall be with Ty-Seal couplings.
3. Wrought iron, steel, or copper pipe shall have a ring or part of a coupling screwed on to form a spigot end if caulked into a joint.
4. Connect cast iron sewer piping to outside service pipe with cast iron or vitrified clay reducers or increasers as required. Caulking of smaller pipe into the larger without a reducer or increaser will not be permitted.

G. Welded Pipe:
1. Make up with oxyacetylene or electric arc process.
2. All welding shall conform to the American Standard Code for Power Piping ASME B-31.1. When requested by the Architect, furnish certification from an approved testing agency or National Certified Pipe Welding Bureau that the welders performing the work are qualified.
3. All line welds shall be of the single "V" butt type. Welds for flanges shall be of the fillet type.
4. Where the branch is two pipe sizes smaller than the main or smaller, Bonney Weldolets, Threadolets, Nibco, or equal, may be used in lieu of welding tees.

H. Flexible Connections:
1. Furnish and install Thermo Tech., Inc. F/J/R, Metraflex, or equal, flexible couplings with limiter bolts on piping connections to all equipment mounted on anti-vibration bases, on each connection to each base mounted pump and where shown. Couplings shall be suitable for pressure and type of service.
2. Anchor piping securely on the system side of each flexible connection.

3.10 UNIONS AND FLANGES

A. Install Watts, Epco, Nibco, or equal, dielectric unions or flanges at points of connection between copper or brass piping or material and steel or cast iron pipe or material except in drain, waste, vent, or rainwater piping. Bushings or couplings shall not be used. Dielectric unions installed in potable water systems shall conform to the lead-free requirements of the California Health and Safety Code Section 11 68 75.

B. Install unions in piping NPS 2” and smaller, and flanges in piping NPS 2-1/2” and larger whether shown or not at each connection to all equipment and tanks, and at all connections to all automatic valves, such as temperature control valves. Unions installed in potable water systems shall conform to the lead-free requirements of the California Health and Safety Code Section 11 68 75.

C. Locate the unions for easy removal of the equipment, tank, or valve.

3.11 ACCESS DOOR

A. Furnish and install access doors wherever required whether shown or not for easy maintenance of mechanical systems; for example, at concealed valves, strainers, traps, cleanouts, dampers, motors, controls, operating equipment, etc. Access doors shall provide for complete removal and replacement of equipment.

3.12 PIPE PROTECTION

A. Wrap bare galvanized and black steel pipe buried in the ground and to 6" above grade, including piping in conduit, with one of the following, or equal:
1. Polyethylene Coating: Pressure sensitive polyethylene coating, "X-Tru-Coat" as manufactured by Pipe Line Service Corporation or "Green Line" wrap as manufactured by Roystron Products, or equal.

    a. Field Joints and Fittings: Protecto Wrap #1170 tape as manufactured by Pipe Line Service Corporation, or Primer #200 tape by Roystron Products, or equal. Installation shall be as per manufacturer's recommendation and instructions.

2. Tape Wrap: Pressure-sensitive polyvinyl chloride tape, "Transtex #V-l0 or V-20", "Scotchwrap 50", Slipknot l00, Pabco, or equal, with continuous identification. Tape shall be a minimum of 20 mils thick for fittings and irregular surfaces, two wraps, 50 percent overlap, 40 mils total thickness. Tape shall be laminated with a suitable adhesive; widths as recommended by the manufacturer for the pipe size. Wrap straight lengths of piping with an approved wrapping machine.

B. Field Joints: Valves and Fittings: double wrap polyvinyl chloride tape as above. Provide at least two thicknesses of tape over the joint and extend a minimum of 4 inches over adjacent pipe covering. Build up with primer to match adjacent covering thickness. Width of tape of fittings shall not exceed 3 inches. Tape shall adhere tightly to all surfaces of the fittings without air pockets.

C. Cleaning: Clean all piping thoroughly before wrapping.
1. Inspection: Damaged or defective wraps shall be repaired as directed.

D. Sleeve copper piping/tubing installed below slab with “Polywrap-C” polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 6 mils thick, colored blue for domestic water piping and orange for other piping. Install sleeve per manufacturer’s recommendations and instructions.

E. Sleeve copper piping/tubing installed outside building below grade with “Polywrap-C” polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 6 mils thick, colored blue for domestic water piping. Install sleeve per manufacturer’s recommendations and instructions.

F. Sleeve cast iron and ductile iron pipe below grade and below slab with “Polywrap” polyethylene sleeve, as manufactured by Northtown Pipe Protection Products, or equal. Sleeve shall be a minimum of 8 mils thick, colored natural. Install sleeve per manufacturer’s recommendations and instructions.

G. Covering: No rocks or sharp edges shall be backfilled against the wrap. When backfilling with other than sand, protect wrap with an outer wrapping of Kraft paper; leave in place during backfill.

3.13 PIPE IDENTIFICATION

A. Provide temporary identification of each pipe installed, at the time of installation. Temporary identification shall be removed and replaced with permanent identification as part of the work.

B. Apply the legend and flow arrow at all valve locations; at all points where the piping enters or leaves a wall, partition, cluster of piping or similar obstruction, at each change of direction and at approximately 20'-0" intervals on pipe runs. Variations or changes in locations and spacing may be made with the approval of the Architect. There shall be at least one marking in each room. Markings shall be located for maximum visibility from expected personnel approach.
1. Apply legend and flow arrow at approximately 10’-0” intervals in science classrooms and science prep rooms.

C. Wherever two or more pipes run parallel, the markings shall be supplied in the same relative location on each.

D. Each valve on non-potable water piping shall be labeled with a metal tag stamped "DANGER -- NON-POTABLE WATER" in 1/4 inch high letters.

E. Apply markings after painting and cleaning of piping and insulation is completed.

3.14 EXPANSION ANCHORS IN HARDENED CONCRETE

A. Refer to Structural Drawings.

B. Qualification Tests: The specific anchor shall have a current ICC-ES report and evaluated in cracked concrete in accordance with Acceptance Criteria AC193. If the specific anchor satisfies cyclic testing requirements per Acceptance Criteria AC01, Section 5.6, the full allowable shear and tension loads listed in the current ICC-ES report and manufacturer’s recommendations for the specific anchor may be used. Otherwise, the design shear and tension loads shall not be more than 80% of the listed allowable shear and tension loads for the specific anchor.

C. Installation: The anchors must be installed in accordance with the requirements given in ICC Research Committee Recommendations for the specific anchor.

3.15 TESTS AND ADJUSTMENTS

A. Test the installations in accordance with the following requirements and all applicable codes:
1. Inspector of Record should witness all tests of piping systems.

2. All piping shall be tested at completion of roughing-in, or at other times as directed by the Architect.
3. Furnish all necessary materials, test pumps, gases, instruments and labor required for testing.
4. Isolate from the system all equipment that may be damaged by test pressure.

B. Test Schedule: No loss in pressure or visible leaks shall show after four hours at the pressures indicated.

Testing of Sanitary Sewer, Drain, Vent, Storm Drain may be done in segments in order to limit pressure to within manufacturer's recommendations. Test to 10 feet above the highest point in the system.

System Tested	Test Pressure PSI	Test With
Sanitary Sewer, Drain, Vent	10 Ft. Hd.	Water
Storm Drain, Condensate Drains	10 Ft. Hd.	Water
Domestic Water	125	Water
Natural Gas (PE)	60	Air & Non-corrosive Leak Test Fluid
Natural Gas (Steel)	100	Air

1. Flush distilled deionized water lines with distilled deionized water after test and approval.
2. Non-corrosive leak test fluid shall be suitable for use with the piping material specified, and with the type of gas conveyed by the piping system.

C. Perform operational tests under simulated or actual service conditions, including one test of complete plumbing installation with all fixtures and other appliances connected, and one test of complete installation of 48 hours each for heating and cooling with all equipment connected and operating.

D. Should any material or work fail in any of these tests, it shall be immediately removed and replaced for new material, and portion of the work replaced shall again be tested by Contractor at his own expense.

E. Lubricate each item of equipment, including motors, before operation.

3.16 TRACER WIRES

A. Provide tracer wire for non-metallic gas and water pipe in ground outside of buildings. Use AWG #12 tracer wire with low density high molecular weight polyethylene insulation, and lay continuously on pipe so that it is not broken or stressed by backfilling operations. Secure wire to the piping with tape at 18 inch intervals. Solder all joints. Tracer wire insulation shall be colored yellow for gas piping, blue for water piping.

B. Alternate: Use electronically detectable plastic tape with metallic core, Terra Tape D, manufactured by Reef Industries, Inc., Seton, Inc., Marking Services, Inc., or equal; tape 2 inches wide, continuously imprinted "CAUTION WATER (GAS, etc.) LINE BELOW". Install, with printed side up, directly over pipe, 18 inches below finish grade. Backfill material shall be as specified for the particular condition where pipe is installed, but avoid use of crushed rock or of earth with particles larger than l/2 inch within the top 12 inches of backfill. Take precautions to insure that tape is not damaged or misplaced during backfill operations. Terminal boxes not required.

3.17 OPERATION OF SYSTEMS

A. Do not operate any plumbing equipment for any purpose, temporary or permanent, until all of the following has been completed:
   1. Complete all requirements listed under “Check, Test and Start Requirements.”
   2. Piping has been properly cleaned. Piping systems shall be flushed and treated prior to operation.
   3. Filters, strainers etc. are in place.
   4. Bearings have been lubricated, and alignment of rotating equipment has been checked.
   5. Equipment has been run under observation, and is operating in a satisfactory manner.

B. Provide test and balance agency with one set of Contract Drawings, Specifications, Addenda, Change orders issued, applicable shop drawings and submittals and temperature control drawings.

3.18 CHECK, TEST AND START REQUIREMENTS

A. An authorized representative of the equipment manufacturer shall perform check, test and start of each piece of plumbing equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the check test and start of the equipment.
   1. As part of the submittal process, provide a copy of each manufacturer’s printed startup form to be used.
   2. Some items of specified equipment may require that check, test and start of equipment must be performed by the manufacturer, using manufacturer’s employees. See specific equipment Articles in these Specifications for this requirement.
   3. Provide all personnel, test instruments, and equipment to properly perform the check, test and start work.
   4. When work has been completed, provide copies of reports for review, prior to final observation of work.

B. Provide copies of the completed check, test and start report of each item of equipment, bound with the Operation and Maintenance Manual.

C. Upon completion of the work, provide a schedule of planned maintenance for each piece of equipment. Indicate frequency of service, recommended spare parts (including filters and lubricants), and methods for adjustment and alignment of all equipment components. Provide a copy of the schedule with each operating and maintenance manual. Provide a copy of certification from the Owner’s representative indicating that they have been properly instructed in maintenance requirements for the equipment installed.

3.19 PRELIMINARY OPERATIONAL REQUIREMENTS AND TESTS

A. Prior to observation to determine final acceptance, put all mechanical systems into service and check that work required for that purpose has been done, including but not limited to the following condensed check list. Provide indexed report to tabulating the results of all work.
   1. All equipment has been started, checked, lubricated and adjusted in accordance with the manufacturer's recommendations.
   2. Correct rotation of motors and ratings of overload heaters are verified.
   3. All manufacturers’ certificates of start-up specified have been delivered to the Owner.
   4. All equipment has been cleaned, and damaged painted finishes touched up.
   5. Missing or damaged parts have been replaced.

6. Flushing and chemical treatment of piping systems has been completed and water treatment equipment, where specified, is in operation.
7. Equipment labels, pipe marker labels, ceiling markers and valve tags are installed.
8. Valve tag schedules, corrected control diagrams, sequence of operation lists and start-stop instructions have been posted.
9. Preliminary test and balance work is complete, and reports have been forwarded for review.
10. Automatic control set points are as designated and performance of controls checks out to agree with the sequence of operation.
11. Operation and Maintenance Manuals have been delivered and instructions to the operating personnel have been made.

B. Prior to the observation to determine final acceptance, operate all mechanical systems as required to demonstrate that the installation and performance of these systems conform to the requirements of these specifications.
1. Commence tests after preliminary balancing and adjustments to equipment have been checked. Immediately before starting tests, install air filters and lubricate all running equipment.
2. During the test period, make final adjustments and balancing of equipment, systems controls, and circuits so that all are placed in first class operating condition.
3. Where Utility District rebates are applicable, demonstrate that the systems meet the rebate program requirements.

C. Review of Contractor's Tests:
1. All tests made by the Contractor or manufacturers' representatives are subject to observation and review by the Owner. Provide timely notice prior to start of each test, in order to allow for observation of testing. Upon the completion of all tests, provide a letter to confirm that all testing has been successful.

D. Test Logs:
1. Maintain test logs listing the tests on all mechanical systems showing dates, items tested, inspectors' names, remarks on success or failure of the tests.

E. Preliminary Operation:
1. The Owner reserves the right to operate portions of the plumbing system on a preliminary basis without voiding the guarantee.

3.20 CERTIFICATES OF INSTALLATION

A. Contractor shall complete applicable “Certificates of Installation” forms contained in the California Building Energy Efficiency Standards and submit to the authorities having jurisdiction for approval and issuance of final occupancy permit, as described in the California Energy Code.

3.21 DEMONSTRATION AND TRAINING

A. An authorized representative of the equipment manufacturer shall train Owner-designated personnel in maintenance and adjustment of equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the Owner training for the equipment installed.
1. As part of the submittal process, provide a training agenda outlining major topics and time allowed for each topic.
2. Some items of specified equipment require that training must be performed by the manufacturer, using manufacturer’s employees. See specific equipment Articles in these Specifications for this requirement.

3. Contractor shall provide three copies of certification by Contractor that training has been completed, signed by Owner's representative, for inclusion in Operation and Maintenance Manual. Certificates shall include:

    a. Listing of Owner-designated personnel completing training, by name and title.
    b. Name and title of training instructor.
    c. Date(s) of training.
    d. List of topics covered in training sessions.

4. Refer to specific equipment Articles for minimum training period duration for each piece of equipment.

END OF SECTION 22 00 50

SECTION 22 10 00

PLUMBING PIPING SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe and fittings.

B. Water hammer arrestors.

C. Water filters.

D. Hose bibbs.

E. Wall hydrants.

F. Reduced pressure backflow preventer for potable water system.

G. Gas pressure regulating valve.

H. Relief valves.

I. Trap primer.

J. Thermostatic water temperature control valve.

K. Cleanouts.

L. Floor drains.

M. Floor sinks.

N. Roof drains and overflow drains.

O. Hopper drains.

P. Heat tracing.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.3 ADDITIONAL REQUIREMENTS

A. Furnish and install any incidental work not shown or specified which is necessary to provide a complete and workable system.

B. Coordinate all of work in this Section with all of the trades covered in other Sections of the Specifications to provide a complete, operable and sanitary installation of the highest quality workmanship.

C. All plumbing work required in the course of this contract shall be performed in strict accordance with all codes and regulations. Plumbing work done under this contract shall not adversely affect the operation of the existing plumbing systems. All materials shall be new and shall match existing.

1.4 DESCRIPTION OF WORK

A. Furnish and install all plumbing work indicated on the drawings and described herein.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of plumbing piping systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with piping systems work similar to that required for project.

C. Requirements of Regulatory Agencies: The publications listed below form a part of this specification; comply with provisions of these publications except as otherwise shown or specified.
1. Plumbing Code Compliance: Comply with applicable portions of California Plumbing Code pertaining to selection and installation of plumbing materials and products.

    a. NSF Compliance:

        1) Pipe, tube, and fittings used in potable water systems intended to supply drinking water shall meet the requirements of NSF-61 2010a, “Drinking Water System Components – Health Effects.”
        2) Plastic potable water-service piping shall meet the requirements of NSF 14 2010, “Plastic Piping Components and Related Materials.”

2. California Health and Safety Code Compliance: For products covered under the scope of HSC 116875 for potable water service. Products for potable water service shall be third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.
3. NFPA/ANSI Compliance: Fabricate and install natural gas systems in accordance with latest edition of NFPA 54/ANSI Z223.1 "National Fuel Gas Code."
4. Utility Compliance: Fabricate and install natural gas systems in accordance with local gas utility company requirements.
5. CPC Compliance: Fabricate and install natural gas systems in accordance with California Plumbing Code.
6. Provide certified gas welder as defined in California Plumbing Code to weld all joints in welded gas piping.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing piping systems materials and products.

B. Provide welding certificate for all gas pipe welders.

C. Record Drawings: At project closeout, submit Record Drawings of installed piping systems, in accordance with requirements of Division 01.

D. Maintenance Data: Submit maintenance data and parts lists for plumbing piping systems materials and products. Include this data, product data, shop drawings, and record drawings in Operation and Maintenance Manual; in accordance with requirements of Division 01.

E. Pipe, pipe or plumbing fittings, fixtures, solder and flux installed in a system providing water for human consumption shall comply with lead free requirements of the California Health and Safety Code Section 11 68 75. Provide submittal information for products third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

1.7 JOB CONDITIONS

A. Cooperation with other trades: Coordinate Work of this Section with that of other Sections to ensure that Work is carried out in an orderly fashion.

B. Coordinate with other trades all equipment locations, pipe, duct and conduit runs, electrical outlets and fixtures, air inlets and outlets, and structural and architectural features. Provide information on location of piping and seismic bracing to all other trades as required for a completely coordinated project.

PART 2 - PRODUCTS

2.1 MATERIALS AND PRODUCTS

A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide materials and products complying with California Plumbing Code. Where more than one type of material or product is indicated, selection from materials or products specified is Contractor's option.

2.2 PIPE AND FITTINGS INSIDE BUILDINGS AND BELOW COVERED WALKS AND CORRIDORS

A. Drain and Waste Pipe Above Grade: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard (CISPI) 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler Pipe, or equal. Pipe and fittings shall be the products of a single manufacturer. At Contractor’s option, vertical piping above floor from lavatories, sinks, and drinking fountains may be Schedule 40 galvanized steel pipe with black cast iron drainage fittings, or DWV copper pipe and fittings.
   1. Joints above grade: No-Hub pipe conforming to ASTM A888 and CISPI 301. Couplings conforming to ASTM 1277 and CISPI 310, with stainless steel bands. Provide products by ANACO-Husky, Tyler, Ideal or equal. Provide sway brace at 20'-0" maximum spacing for suspended pipe with No-Hub joints. Provide a brace on each side of a change in direction of 90 degrees or more. Brace riser joints at each floor and at 15 foot maximum intervals (also see Specification Section 22 00 50).

      a. Provide sway brace at each joint per 2013 CBC.

B. Drain and Waste Pipe Below Grade: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and CISPI 301 and so marked. Pipe and fittings shall be as manufactured by

AB&I, Charlotte, Tyler Pipe, or equal. Pipe and fittings shall be the products of a single manufacturer. At Contractor's option, hub and spigot cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A-74 and so marked, may be used.

1. Joints below grade: ANACO-Husky SD 4000, Clamp-All 125, or equal couplings and No-Hub fittings, meeting the requirements of FM 1680, SD Class I and ASTM C1540.
2. Joints below grade (hub and spigot option): neoprene gaskets conforming to ASTM C564, as manufactured by Ty-Seal, Dual-Tite, or equal.

C. Vent Pipe:
1. 3 inch and larger: Cast iron soil pipe and fittings conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked.
2. 2-1/2 inch and smaller: Schedule 40 galvanized steel pipe with black cast iron drainage fittings, or DWV copper pipe and fittings.
3. Vent pipe buried in ground and to 6 inches above ground: Cast iron soil pipe and fittings conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Joints in cast iron vent pipe shall be the same as specified for cast iron waste pipe below ground.

D. Type DWV copper tubing or No-Hub cast iron pipe and fittings may be used for concealed rainwater leaders. Where no-hub piping is used, the fittings and couplings shall match those used for waste piping.

E. Grease Waste (GW) and Vent (GV) Pipe Underground to 6 Inches Aboveground: George Fisher Sloane, Inc., "Fuseal PP," Orion Fittings, Inc., "Rionfuse CF," IPEX, Inc., "Enfield," or equal, Schedule 40 polypropylene pipe and fittings assembled with electrofusion joints. Piping shall comply with ASTM F1412.

F. Grease Waste (GW) and Vent (GV) Pipe Aboveground:
1. In inaccessible spaces or within walls, George Fisher Sloane, Inc., "Fuseal PP," Orion Fittings, Inc., "Rionfuse CF," IPEX, Inc., "Enfield," or equal, flame-retardant schedule 40 polypropylene pipe and fittings assembled with electrofusion joints. Piping shall comply with ASTM F1412.
2. In accessible areas: George Fisher Sloan, Inc. "Fuseal PP," Orion Fittings, Inc. "Blueline," IPEX, Inc. "Labline," or equal, flame retardant Schedule 40 polypropylene drainage pipe and fittings, with mechanical joints. Piping shall comply with ASTM F1412.
3. Vent pipe aboveground: 3 Inches and Larger: Service weight cast iron soil pipe and fittings; 2-1/2 inches and smaller: Schedule 40 galvanized steel pipe with black cast iron drainage fittings.

G. Water Pipe (Tempered Water, Tempered Water Return, Hot Water, Hot Water Return and Cold Water): ASTM B88, Type L copper tubing, hard-temper, with wrought copper fittings. Provide full solder cup for all fittings. Capped or plugged outlets shall be Schedule 40 screwed brass. Water piping below slab: ASTM B88, Type K copper tubing, hard temper, with wrought copper fittings. At Contractor's option, pipe runs below slab having no branches may be ASTM B88, Type K annealed copper tubing without joints. See Section 22 00 50 for pipe protection requirements for below slab copper piping.

H. Temperature and Pressure Relief Valve Piping: ASTM B88, Type L copper tubing, hard-temper, with wrought copper fittings. Provide full solder cup for all fittings. Capped or plugged outlets shall be Schedule 40 screwed brass.

I. Gas Pipe: Schedule 40 black steel conforming to ASTM A53, with malleable iron screwed fittings above grade for piping 2 inch and smaller; welded piping below grade and for above grade piping larger than 2 inches, with Class 150 welding fittings.

1. Appliance fuel connectors, as defined in 1203 of the CPC, are not acceptable for connection of equipment, except where specifically indicated on the Contract Documents.
2. Where Drawings indicate installation of mechanical equipment on spring isolation rails or spring mounted curbs, provide flexible connection, Metraflex, Metraloop, Unisource Mfg. Co. “V” connector, or equal, CSA listed for 4 inches of movement.

    a. Provide CSA certification for gas connections.

3. Flexible Gas Connection System for Movable Gas-Fired Cooking Equipment:

    a. System shall include flexible PVC coated braided stainless steel hose, quick disconnect fitting, full port CSA certified ball valve, 2 swivel elbows, coiled steel restraining cable and mounting hardware. Assembly shall be certified per ANSI Z21.69/CSA 6.16, “Connectors for Movable Gas Appliances.” Size as required for appliance connection, 48” minimum hose length. Install per manufacturer’s instructions. Connectors shall be Dormont Safety System, T&S Safe-T-Link, or equal.

4. Provide gas tight Schedule 40 conduit to vent gas piping installed below covered walks and where noted on drawings (per CPC 1211).

J. Condensate Drain Piping:
1. Inside buildings provide ASTM B88, Type L copper tubing and fittings. Provide Wye fittings with capped cleanout plug for tubing up to 1 inch size. Provide wrought or cast DWV fittings for sizes 1-1/4 inch and larger.
2. Outside buildings provide ASTM B88, Type L copper pipe and fittings, cast iron drain pipe and fittings or Schedule 40 galvanized steel pipe and cast iron drain or vent fittings.
3. Connect condensate drains to mechanical equipment per equipment manufacturer's recommendations; provide P-trap where required. Slope piping to drain, with 1 inch in 10 foot minimum pitch. Provide di-electric couplings or unions at connections to dissimilar materials.
4. Where Drawings indicate installation of mechanical equipment on spring isolation rails or spring mounted curbs, provide threaded metal connector at mechanical equipment, Metraflex Model SST or BST, Unisource Mfg. Co. “V” connector, or equal, CSA listed for 4 inches of movement. Arrange flexible connection to insure drainage of condensate under all installation conditions, and arrange for support of flexible connection at each end of the connector, to insure alignment at all times.
5. Where condensate drain P-traps are required, install trap using Wye fitting on inlet and outlet of trap. Provide cap on top of each Wye, made removable for cleaning and inspection. Drill 1/8 inch diameter hole in cap at outlet of the trap to allow venting of the system. Minimum depth of trap should be 4 inches, or as recommended by the manufacturer in printed literature.

K. Condensing-Type Equipment Condensate Drain Pipe: CPVC pipe and fittings conforming to ASTM 2618.
1. Provide CPVC condensate drain pipe for condensing water heaters, and where shown on Drawings.
2. Provide continuous support for horizontal piping.
3. Piping and fittings shall be as manufactured by Spears Manufacturing, Charlotte Pipe and foundry Co., or equal.

2.3 PIPING AND FITTINGS OUTSIDE BUILDINGS AND BEYOND COVERED WALKS

A. Buried Drain, Waste, and Vent Piping:
1. 4 inches and larger: PVC, ASTM D3034 - SDR 35; use matching Ring Tite fittings.

2. 3 inches and smaller: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and Cast Iron Soil Pipe Institute Standard 301 and so marked. Pipe and fittings shall be as manufactured by AB&I, Charlotte, Tyler pipe, or equal. Provide ANACO-Husky SD 4000, Clamp-All 125, or equal couplings and No-Hub fittings, meeting the requirements of FM 1680, SD Class I and ASTM C1540. Pipe and fittings shall be the product of a single manufacturer.

B. Grease Waste (GW) and Vent (GV) Pipe: George Fisher Sloane, Inc., “Fuseal PP,” Orion Fittings, Inc., “Rionfuse CF,” IPEX, Inc, “Enfield,” or equal, polypropylene pipe and fittings assembled with electrofusion joints. Piping shall comply with ASTM F1412.

C. Water Service Piping:
1. Sizes 2 inches and larger (not under building): Gasket style PVC conforming to ASTM D2241-SDR21, Class 200 with gasket type fittings or ductile iron mechanical joint couplings. Gasket fittings shall be one piece injection molded PVC fittings, equal to Flo-Seal water main fittings for PVC pressure pipe, 200 psi, ASTM D-3139.
2. Sizes less than 2 inches: Type K copper tubing, hard temper, with wrought copper fittings. See Section 22 00 50 for pipe protection requirements for below grade copper piping.
3. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. J.M. Eagle.
    b. P.W. Pipe.
    c. Ipex Series Pipe.

D. Water Service Piping Above Grade:
1. Sizes 2 inches and larger: Class 150 flanged ductile cast iron water pipe conforming to AWWA/ANSI C150/A21.50 and manufactured in accordance with AWWA/ANSI C151/A21.51. Fittings shall conform to AWWA/AWWA C110/A21.10, Class 250 pattern. Pipe and fittings shall have factory applied cement-mortar lining in accordance with AWWA/ANSI C104/A21.4. Flanges shall conform to ASME/ANSI B16.1.
2. Piping 1-1/2 inches and smaller: Type L copper tubing, hard temper, with brazed wrought copper fittings.

E. Gas Piping Underground: Performance Pipe, “DriscoPlex” 6500 PE 2708 (yellow), Polypipe, Inc., “Polypipe”, or equal, polyethylene gas distribution pipe, ASTM D2513, ASTM D3261, and ASTM D2683 fittings with fusion welded joints. Provide piping labeled for natural gas in accordance with CPC.
1. Electrically isolate underground ferrous gas piping from the rest of the gas system with listed or approved isolation fittings installed a minimum of six inches above grade.
2. Provide Central Plastics Corp., Perfection, or equal, anodeless, single seal riser for transition from below grade polyethylene to schedule 40 steel piping above grade. Minimum horizontal length shall be 30 inches. Minimum vertical length shall be 30 inches, or greater as required. Provide fusion connection to polyethylene pipe below grade, and screwed connection to steel pipe above grade.

F. Gas Piping Aboveground to 30 inches Belowground: Schedule 40 black steel with beveled ends for welding, with Class 150 welding fittings. Mitering to form elbows or tees will not be permitted; where branch tee connections of welded piping are required, Bonney "Weldolet" Allied Pipe Fittings, or equal fittings may be used if the branch is one-half of the diameter of the main or less.

2.4 FIRE PROTECTION PIPING

A. Refer to specification Section 21 10 00 “Fire Protection.”

2.5 WATER HAMMER ARRESTORS

A. Provide water hammer arrestors conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, with nesting type bellows contained within a casing having sufficient displacement volume to dissipate the calculated kinetic energy generated in the piping system. Water hammer arrestors shall be sized for type and number of fixtures served. .

B. Water hammer arrestors shall be certified under P.D.I. Standard WH201 and by ASSE Standard 1010.

C. Select units in accordance with the requirements of Plumbing and Drainage Institute Standard P.D.I. WH201. Install above ceilings or behind wall access door at each plumbing fixture, or where plumbing fixtures are installed in groups, at each group of fixtures.

D. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   1. Josam Company, series 75000.
   2. Smith (Jay R.) Mfg. Co., Hydrotrol 5005-5050.
   3. Mifab, series WHB.
   4. Sioux Chief Series

2.6 HOSE BIBBS

A. Hose Bibbs:
   1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

      a. Acorn Engineering Co.
      b. Woodford Manufacturing Co.

B. Hose Station: Leonard THS-25-VB-CW, Symmons, or equal.

2.7 WALL HYDRANTS

A. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

   1. Acorn Engineering Co.
   2. Woodford Manufacturing Co.
   3. Mifab, Inc.

2.8 REDUCED PRESSURE BACKFLOW PREVENTER FOR POTABLE WATER SYSTEMS

A. Provide reduced pressure principle backflow preventer conforming to lead free requirements of California Health and Safety Code Section 11 68 75.
   1. Reduced-pressure principle backflow preventer assembly, consisting of shutoff valves on inlet and outlet, and strainer on inlet., Backflow preventer shall include test cocks, and pressure differential relief valve located between two positive seating check valves. Construct in accordance with ASSE Standard 1013.
   2. Manufacturers: Subject to compliance with requirements and local water authorities having jurisdiction, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

a. 2 inches and smaller: Wilkins 975XL2, Febco LF825YRP, Watts LF919.
b. 2-1/2 thru 10 inches: Wilkins 475AXL, Febco LF860RP.
c. 2-1/2 and 3 inches: Watts LF009.

B. Provide capped connections at each test cock. Install in accordance with requirements of Authority Having Jurisdiction.

C. For units installed within buildings, provide drain, connected to unit, to collect spillage from atmospheric vent. Run drain to nearest floor sink or drain.

D.

2.9 GAS PRESSURE REGULATING VALVES

A. Provide single-stage, spring-loaded, corrosion-resistant gas pressure regulators, with die-cast aluminum or cast iron body, complying with ANSI Z21.80. Unit shall be with atmospheric vent, internal relief overpressure protection, threaded ends for 2 inches and smaller, flanged ends for 2-1/2 inches and larger. For inlet and outlet gas pressures, specific gravity, and volume flow refer to Drawings schedule.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. 1/2 inch: Elster (American, Singer) model 1213B.
Itron (Actaris, Slumberger, Sprague) model B42R.

2. 3/4 thru 1-1/4inches: Elster (American, Singer) model 1813C.
Sensus (Ivensys, Equimeter, Rockwell) model 143-80-12
Itron (Actaris, Slumberger, Sprague) models B42R, B57R, B58R.

3. 1-1/2 thru 2 inches: Elster (American, Singer) models 1813, 1813B.
Sensus (Ivensys, Equimeter, Rockwell) model 243.
Itron (Actaris, Slumberger, Sprague) models B43SR, B34R, B38R.

2.10 RELIEF VALVES

A. Provide relief valves as indicated, of size and capacity as selected by Contractor for proper relieving capacity, in accordance with ASME Boiler and Pressure Vessel Code.

B. Combined Pressure-Temperature Relief Valves: Bronze body, test lever, thermostat, complying with ANSI A21.22 listing requirements for temperature discharge capacity. Provide temperature relief at 210 degrees F, and pressure relief at 150 psi.

C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

Watts Regulator Company.
Cash (A.W.) Valve Manufacturing Corporation.
Zurn Industries, Inc.; Wilkins-Regulator Division.

2.11 TRAP PRIMER

A. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

1. MiFab, Inc.
2. Precision Plumbing Products.
3. Sioux Chief Manufacturing Company.

2.12 THERMOSTATIC WATER TEMPERATURE CONTROL VALVE

A. Provide thermostatic water temperature control valve conforming to lead free requirements of California Health and Safety Code Section 11 68 75, with size as noted on Drawings, complete with union angle strainer checkstops. Valves shall be thermostatic type, with a maximum temperature setting as follows:

B. Provide surface recessed semi-recessed mounted, white enameled or stainless steel cabinet with locking door for control valves. Including:
1. Control valve cabinet and valve shall be provided as a package, and include thermostatic water mixing valve, thermometer, safety checkstops, volume control valve and internal piping.

C. Where indicated on drawings, provide a temperature alarm system, utilizing a micro-processor based controller and solid state temperature controller. Provide audible and visual indication of high and low temperature set points. Provide required hardware and wiring for a complete operating system.
1. Provide isolation transformer for control of the alarm system.
2. Provide solenoid valve and shock absorber, installed and wired to the alarm module.

D. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Leonard Valve Company.
2. Lawler Manufacturing Co., Inc.
3. Powers.

2.13 CLEANOUTS

A. General: Install cleanouts of same diameter as pipe (4 inch maximum) in all horizontal soil and waste lines where indicated and at all points of change in direction. Cleanouts shall be located not less than 18 inches from building construction so as to provide sufficient space for rodding. No horizontal run over 100 feet inside buildings or 100 feet outside buildings shall be without cleanout, whether shown on Drawings or not. Provide two-way cleanouts where indicated on drawings, and where required for satisfactory use.
1. Provide cleanouts in waste drop from each sink and urinal.
2. Provide one wrench for each size and type of cleanout used. Turn over to Owner at completion of the project, and obtain receipt. Place receipt in Operation and Maintenance Manuals.

B. Cleanouts in floor and in concrete sidewalks: Ducco Cast Iron with nickel bronze top, clamping collar and ABS plastic plug: Zurn ZN-1400-KC, or equal, with square or round top to suit floor construction.

C. Cleanouts in composition floors: Zurn ZN-1400-X-DX, or equal (nickel bronze top).

D. Cleanouts in concealed, aboveground cast-iron soil or waste lines: Zurn Z-1440A, or equal, with ABS plastic plug.

E. Cleanouts in walls: Zurn Z-1441 or Z-1443, or equal, with stainless steel cover. Provide long sweep elbow or combination wye at connection to riser and install with surface of cleanout within 1/2 inch of front face of finished wall.
   1. Where space does not permit the above installation, provide Zurn Z-1446, or equal, with stainless steel access cover, and vandal resistant screw.
   2. Install face of cleanout plug within 1/2 inch of front face of finished wall.

F. Cleanouts exterior to building in landscaped areas: Zurn Z-1449-BP, or equal, cleanout ferrule with tapered bronze plug. Where located at grade, provide 18 by 18 by 6 inch concrete pad; Trowel concrete smooth and edge; set flush with finished grade.

G. Cleanouts in drive areas: Zurn -1400-HD-KC, or equal, with heavy-duty top and ABS plastic plug.

H. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
   1. Zurn.
   2. J.R. Smith.
   3. Josam.

2.14 FLOOR DRAINS

A. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
   1. Zurn
   2. J.R. Smith
   3. Josam

2.15 FLOOR SINKS

A. Floor Sinks: Provide anchoring flange (seepage pan) at all floor sinks, and provide flashing clamp in locations where floor membrane is used. Provide cast iron "P" trap and trap primer connection at P-Trap.

B. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
   1. Zurn
   2. J.R. Smith
   3. Josam

2.16 ROOF DRAINS AND OVERFLOW DRAINS

A. See Architectural Drawings for drain style to be used.

B. Provide offset downspout boots where required for connection of exposed sheet metal downspouts to underground cast iron or PVC piping.

C. Provide rainwater leader nozzles on overflow piping. Nozzle body shall be bronze with threaded inlet and bronze wall flange with mounting holes. Size nozzle to match connected rainwater leader.

D. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
1. J.R. Smith.
2. Mifab.
3. Zurn.

2.17 HOPPER DRAINS

A. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:
1. Zurn.
2. J.R. Smith.

2.18 HEAT TRACING

A. Domestic Hot Water: Provide U.L. listed, 115 degrees F nominal temperature operation heat cable, in locations indicated on drawings. Provide all components required for complete system, including cable, power connections, end seals, splices, tees and accessories. Manufacturer shall be Raychem HWAT-G2, Thermon, or equal, 208 volt single phase.

B. Label all heat traced piping every 10 feet with "ELECTRIC TRACED" label.

C. Freezer Boxes: Where condensate drain piping is provided in freezer boxes, provide insulation and Raychem XL-Trace, Thermon or equal, selected to suit manufacturers' recommendations for the ambient temperature expected. Install in accordance with manufacturers recommendations.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which plumbing piping systems are to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to Contractor.

B. Determine sanitary sewer and storm drain location and elevation at all points of connection before installing any piping. Notify Architect immediately if indicated grades cannot be maintained.

C. At time of final connection, and prior to opening valve to allow pressurization of water and gas piping from existing systems, on site or off site, perform a pressure test to indicate static pressure of existing systems. If pressure on water piping is greater than 80 psi, or gas pressure is not as indicated on Contract Documents, inform Architect immediately.

3.2 INSTALLATION OF WATER PIPING

A. Run all water piping generally level, free of traps or unnecessary bends, arranged to conform to the building requirements, and to suit clearance for other mechanical work such as ducts, flues, conduits, and other work. No piping shall be installed so as to cause unusual noise from the flow of water therein under normal conditions.

B. Provide manufactured water hammer arrestors, sized and installed in accordance with Plumbing and Drainage Institute Standard PDI WH201.
   1. Locate water hammer arrestors at every plumbing fixture, or, where fixtures are located in groups, at every group of fixtures, and as indicated on Drawings.
   2. Install water hammer arresters above accessible ceilings, or install access doors for service.

C. Install piping on room side of building insulation.

3.3 INSTALLATION OF SANITARY AND STORM DRAINAGE SYSTEMS

A. Sewer Piping: Run all horizontal sanitary drain piping inside of building on a uniform grade of not less than 1/4 inch per foot unless otherwise noted or later approved. Unless otherwise noted on the plans, piping shall have invert elevations as shown and slope uniformly between given elevations.

B. Storm Drain Piping: Run all horizontal storm drain piping inside of building on a uniform grade of not less than 1/4 inch per foot. Unless otherwise noted on the plans, piping shall have invert elevations as shown and slope uniformly between given elevations.

C. Install rainwater leader nozzles at exposed bottom of leaders where they spill onto grade.

D. Run all drainage piping as straight as possible and provide easy bends with long turns; make all offsets at an angle of 45 degrees or less.

E. Grade all vent piping so as to free itself quickly of any water condensation.

F. Where possible, join groups of vent risers together with one enlarged outlet through roof. Maintain minimum of 10 foot horizontal or 3 foot vertical clearance from air intakes.

G. Install drip pan under storm drain piping, sanitary drain piping, and vent piping that must be run over kitchen areas.

H. Hubless Cast Iron Joints: Comply with coupling manufacturer's installation instructions.

3.4 INSTALLATION OF GREASE WASTE PIPING SYSTEMS

A. Install to comply with all manufacturers’ recommendations.

B. All buried pipe shall be bedded in and backfilled with 4 inches of sand, and installed as recommended by manufacturer.

C. Install piping at concrete slabs or footings with 1 inch minimum polystyrene surrounding piping.

D. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert.

E. Electrofusion joints: Make polypropylene drainage piping joints according to ASTM F 1290.

3.5 INSTALLATION OF CLEANOUTS

A. Cleanouts: Install in piping as indicated, as required by California Plumbing Code, at each change in direction of piping greater than 135 degrees. Install at maximum intervals of 100 feet for piping 4 inches and smaller and 100 feet for larger piping inside buildings, and at base of each conductor.

B. Flashing Flanges: Install flashing flange and clamping device with each cleanout passing through water resistant membrane.

3.6 INSTALLATION OF FLOOR DRAINS AND FLOOR SINKS

A. Install drains in accordance with manufacturer's written instructions and in locations indicated. Install floor drains with lip of drain slightly below finished floor to ensure drainage. Install floor sinks flush with finished floor. Coordinate with other Contractors to ensure that floor slopes to drain. Provide flashing flange and clamping device with each drain passing through water resistant membrane.

B. Install vented P-trap below each drain. Where trap primers are indicated, install trap primer connection in the P-trap.

3.7 INSTALLATION OF ROOF DRAINS AND OVERFLOW DRAINS

A. Install roof drains and overflow roof drains in accordance with manufacturer's written instructions and in locations indicated.

B. Coordinate with roofing as necessary to interface roof drains with roofing work.

3.8 INSTALLATION OF HOPPER DRAINS

A. Install hopper drain in wall, in sheet metal box, with access door.
   1. Size access door and box to suit the size required for hopper drain and trap primer, and solder all seams of box. Seal all penetrations to box with non-hardening waterproof sealant. Provide locking door in occupied spaces.

B. Grind top and sides of funnel, if required, to suit wall thickness.

3.9 INSTALLATION OF NATURAL GAS PIPING

A. Install natural gas piping in accordance with Division 22 Basic Plumbing Materials and Methods sections.

B. Use sealants on metal gas piping threads that are chemically resistant to natural gas. Use sealants sparingly, and apply to only male threads of metal joints.

C. Remove cutting and threading burrs before assembling piping.

D. Do not install defective piping or fittings. Do not use pipe with threads that are chipped, stripped, or damaged.

E. Plug each gas outlet, including valves, with threaded plug or cap immediately after installation and retain until continuing piping or equipment connections are completed.

F. Ground gas piping electrically and continuously within project, and bond tightly to grounding connection.

G. Install drip-legs in gas piping where indicated and where required by code or regulation.

1. Install "Tee" fitting with bottom outlet plugged or capped at bottom of pipe risers.

H. Install piping parallel to other piping.

I. Paint all gas piping installed in exposed exterior locations.

J. Provide shutoff valve downstream of meter.

K. Provide exterior shutoff valve where natural gas enters the building from the exterior. Provide sign affixed to wall at valve location reading: “Gas Shut-Off.” Size and location of the sign shall be as required by the Authority Having Jurisdiction. Where gas piping enters a building in more than one location, exterior shutoff valves shall have a permanently attached metal tag identifying the area served by that valve, in addition to sign on wall.

L. Provide watertight Schedule 40 PVC conduit to protect gas piping installed below covered walk, covered driveways, and where noted on Drawings. Extend sleeve at least 12 inches beyond any area where it is required to be installed, and terminate with valve box extended to grade, and marked “GAS”.

3.10 GAS PRESSURE REGULATING VALVES

A. Install as indicated; comply with utility requirements. In locations where regulators are installed in confined spaces, pipe atmospheric vent to outdoors, full size of outlet. Install gas shutoff valve upstream and downstream of each pressure-regulating valve.

3.11 GAS PIPING EQUIPMENT CONNECTIONS

A. Connect gas piping to each gas-fired equipment item, with union, drip leg and shutoff gas cock full size of supply line shown. Reduce only at connection to equipment. Comply with equipment manufacturer's instructions.
1. Appliance fuel connectors, as defined in 1203 of the CPC, are not acceptable for connection of equipment, except where specifically indicated on the Contract Documents.
2. Route gas vent and gas relief to outside.
3. Gas shutoff valve shall be placed as close as possible to equipment in a location where it can be serviced. Distance from equipment to valve shall not exceed 6 feet.

3.12 INSTALLATION OF TRAP PRIMERS

A. Install as indicated in manufacturers printed literature, with 1/2 inch, Type L, hard copper piping to trap primer connection on floor drains and floor sinks where indicated on Drawings. At Contractor’s option, Type K annealed copper tubing without joints may be used be used below slab only. See Section 22 00 50 for pipe protection requirements for below slab copper piping/tubing.

B. Install trap primer piping with 1/4 inch per foot slope, to insure that the line will drain fully to the floor drain or floor sink.

1. Provide ball valve to the inlet at each trap primer location.

C. Install trap primer and distribution unit exactly as called for in manufacturers printed installation instructions. Connect to domestic water piping from the top of the water line, in order to prevent foreign material from entering directly into primer assembly.

D. Mount trap primer in wall, in sheet metal box, with Karp or equal access door. Size access door and box to suit valve operation. Provide locking door where installed in occupied spaces.

E. Where one trap primer will be used for more than one trap, provide a distribution unit with feeder piping for a maximum of four traps sized for equal pressure drop to each trap.

3.13 EQUIPMENT CONNECTIONS

A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated.

B. Mechanical Equipment Connections: Connect hot and cold water piping system and gas piping system to mechanical equipment as indicated, and provide with shutoff valve and union for each connection.

3.14 HEAT TRACING INSTALLATION

A. Provide heat cable on walk in freezer condensate drains.

B. Manufacturer's installation recommendation shall be considered as part of this specification.

C. Field testing of insulation resistance and continuity of the units shall be carried out with a 500 volt meter and recorded by the contractor. Testing shall be done when received on the job site, after installation on the pipe, and after the heat insulation has been installed. Insulation resistance shall be consistently not less than 50 megohms with no decline in reading.

D. Where source of supply does not coincide with location of thermostat, cable shall be run along the pipe under the insulation to the thermostat.

E. All junction boxes shall be located above grade level. Covers shall be kept on boxes at all times when not working therein. Where allowable, a hole shall be provided in bottom of junction boxes to permit moisture to escape.

F. All terminations shall be protected from the water and from physical damage.

G. Any field alterations or deviations shall proceed only after authority via signed change order has been issued by Architect. All changes shall be accurately recorded by the Contractor and shall be turned over to the Engineer upon completion of that phase of the work.

H. All lines shall be insulated within 24 hours upon cable installation and acceptance.

I. Junction boxes, thermostats, transformers and the like shall not be attached to the insulation, but shall be mounted on brackets fabricated of galvanized angle, channel or other material of sufficient strength to support equipment mounted on them. Brackets shall not be mounted on pipe, but rather on separate supports.

J. Heating cables to be laid out along sections of piping to be traced to ensure reasonably uniform distribution of heat. It is recommended that the cable first be "roughed-in" using tape or rubber bands which are to be removed after permanent bending. The cable shall not be pulled taut, but allowed reasonable waving along axis of pipe.

K. Cable sheaths shall not cross or touch one another nor shall cables be installed directly on top of pipe.

L. Heating cable shall be strapped to two-inch and larger pipe using one-half inch wide stainless steel banding at intervals not exceeding one foot per CEC. Stainless steel tie wire #18 AWG, or larger, shall be used to hold the cable to irregular surfaces such as valves. Tie wire and strapping shall be snug but not so tight as to indent cable sheath. On small diameter and low temperature pipe, nylon ties or glass tape may be used.

M. Extra cable to be provided at areas of increased heat loss such as valves and flanges to allow dismantling and removal of equipment.

N. Thermostat bulb to be located as far away from heating cable as possible. Thermostat capillary and control wire shall have mechanical protection between the equipment rack and the pipelines.

O. Apply "ELECTRICALLY HEATED" signs to the outside of the thermal insulation.

3.15 KITCHEN EQUIPMENT

A. Coordinate all work with Specification Section for Kitchen Equipment.

B. All equipment shall be fully connected.

C. Furnish and install all required "P" traps.

D. Provide stops on all hot and cold water lines at equipment, in an accessible position. Include lines to kettle and range swing faucets.

E. Water pressure for dishwasher and glass-washer to be 25 pound maximum. Provide pressure reducing valves on water line to washers.

F. All floor openings are to be sealed watertight.

G. Indirect waste lines required for standard or fabricated items of kitchen equipment, except sinks, shall be furnished and installed by the Kitchen Equipment Contractor.

H. Provide all sink drains. All indirect drains shall terminate above floor sinks at least 1-1/2 times ID of drain line and shall be so set that flare will not spill on floor area.

I. Provide approved vacuum breaker or anti siphon device on water lines to equipment wherever required.

J. Provide gas pressure regulators for modular front manifold cooking equipment assemblies. Pressure regulators shall be adjustable from 2 inch to 7 inch water column and shall be set for approximately 6 inches W.C. at manifold connection.

K. All gas pressure regulators shipped loose with gas fired equipment shall be installed by Plumbing Contractor.

L. The Kitchen Equipment Contractor will provide all equipment trim including faucets and sink wastes and swing faucets at kettles all to be installed by Plumbing Contractor.

M. All horizontal piping lines connected to equipment shall be run at the highest possible elevation not less than 6 inches above floor. Piping rough-in shall be stubbed in walls wherever possible.

N. Vent piping for waste lines shall be concealed wherever possible and vertical vents for island or free-standing equipment shall be avoided. Any required exposed vents shall be submitted to the Architect for approval.

O. Kitchen Equipment Contractor to furnish coffee maker. Plumbing Contractor shall provide a cold water connection terminating in a 3′-0″ length of 1/4 inch OD soft copper tubing with a 1/4 inch female flare fitting on the end.

P. Fire protection systems for ventilators and cooking equipment are furnished and installed by Kitchen Equipment Contractor unless shown otherwise on the drawings. Gas valves which are a part of the fire protection systems are furnished only. Plumbing Contractor shall install gas valves.

Q. Connect movable gas-fired cooking equipment utilizing flexible gas connection system.

3.16 SPARE PARTS

A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

3.17 DOMESTIC WATER SYSTEM STERILIZATION

A. Clean and disinfect new or altered hot and cold water piping connected to domestic water systems using methods prescribed by the Health Authority. If the Health Authority does not prescribe methods, clean and disinfect new or altered hot and cold water piping using methods given in the California Plumbing Code.

1. A water treatment company that has a current state EPA license to apply disinfectant chlorine in potable water shall perform the procedure.

3.18 CARE AND CLEANING

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Remove labels from stainless steel sinks, except 316 stainless steel sink labels should be retained to confirm that the correct material has been provided. Leave systems and equipment in satisfactory operating condition.

3.19 OPERATION TEST

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.20 TESTING AND BALANCING

A. See Section 23 05 93 of these specifications for testing and balancing requirements.

3.21 CLEANING UP

A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION 22 10 00

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Water supplies and stops.

B. Plumbing fixture hangers and supports.

C. Refrigerator ice maker.

D. Dishwasher air gap fitting.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.3 ADDITIONAL REQUIREMENTS

A. Furnish and install any incidental work not shown or specified which is necessary to provide a complete and workable system.

B. Coordinate all of work in this Section with all of the Trades covered in other Sections of the Specifications to provide a complete, operable and sanitary installation of the highest quality workmanship.

1.4 DESCRIPTION OF WORK

A. Furnish and install all plumbing work indicated on the Drawings and described herein.

1.5 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of plumbing fixtures of the type, style and configuration required. All companies providing products with warranties must have been engaged in manufacturing of such products for as long as the warranty states.

B. Plumbing Fixture Standards: Comply with applicable portions of the following codes and requirements for all work in this section:
   1. California Building Code – CBC
   2. California Plumbing Code – CPC
   3. California Health and Safety Code
   4. American National Standards Institute - ANSI
   5. Federal Standards - F.S.
   6. National Sanitary Foundation – NSF International

C. ANSI Standards: Comply with ANSI/NSF 61, “Drinking Water System Components – Health Effects.”

D. PDI Compliance: Comply with standards established by Plumbing and Drainage Institute pertaining to plumbing fixture supports.

E. Americans with Disabilities Act (ADA).

F. California Health and Safety Code Compliance: For products covered under the scope of HSC 116875 for potable water service. Products for potable water service shall be third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's specifications for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished.

B. Maintenance Data: Submit maintenance data and parts lists for each fixture type and trim item, including instructions for care of finishes. Include this data in Operation and Maintenance Manual.

C. Pipe, pipe or plumbing fittings, fixtures, solder and flux installed in a system providing water for human consumption shall comply with lead free requirements of the California Health and Safety Code Section 11 68 75. Provide submittal information for products third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

1.7 QUALITY ASSURANCE

A. California Green Building Standards Code Requirements:
1. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.
2. Single Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES

A. General: Provide factory fabricated fixtures of type, style and material indicated. For each type fixture, provide fixture manufacturer's standard trim, carrier, seats, and valves as indicated by their published product information; either as designed and constructed, or as recommended by the manufacturer, and as required for a complete, installation. Where more than one type is dedicated, selection is Contractor's option; but, all fixtures of same type must be furnished by single manufacturer.
1. Take special care with the roughing-in and finished plumbing where batteries of fixtures occur.
2. Take location and mounting heights for roughing-in from Architectural Drawings.
3. Follow schedule on Plumbing Drawings for roughing-in connections. Set roughing-in for all fixtures exactly as per measurements furnished by the manufacturers of the fixtures used.
4. Roughing-in for lavatories and sinks shall be brought in through the wall under the centerline of the drain from the fixture wherever possible and as close to the fixture as possible.

2.2 MATERIALS

A. Provide materials that have been selected for their surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, foundry sand holes, stains, discoloration, or other surface imperfections on finished units are not acceptable.

B. Where fittings, trim and accessories are exposed or semi-exposed, provide, chromium plated 17 gauge seamless brass and match faucets and fittings. Provide 17 gauge seamless copper or brass where not exposed.

C. Handles on all faucets and stops shall be all metal chromium plated.

2.3 PLUMBING FITTINGS, TRIM AND ACCESSORIES

A. Water Outlets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valves, or dispensing devices, of type and size indicated, and as required to operate as indicated.
   1. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shut-down of water supply piping systems.

B. P-Traps: Include IAPMO approved removable P-traps where drains are indicated for direct connection to drainage system. P-Traps shall be less trap screw cleanout, and incorporate a chrome plated cast brass body, brass connection nuts, 17 gauge seamless brass wall return and chrome plated wall escutcheon to match trap finish.

C. Carriers: Provide cast iron supports for fixtures of graphitic gray iron, ductile iron, or malleable iron as indicated. Where the carrier for wall mounted water closets are installed more than 6 inches behind the finished wall, provide water closet support for wide pipe chase.

D. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.

E. Escutcheons: Where fixture supplies and drains penetrate walls in exposed location, provide chrome-plated cast brass escutcheons with setscrews.

F. Aerators: Provide aerators of types approved by Health Departments having jurisdiction. Delete aerators where not allowed by CPC for health care occupancies.

G. Comply with additional fixture requirements contained in Fixture Schedule shown on the drawings.

2.4 MANUFACTURERS

A. In accordance with California Plumbing Code, provide indelibly marked or embossed manufacturers name or logo, arranged so as to be visible after installation.

B. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following:
   1. Vitrified China Plumbing Fixtures:

      a. American Standard, U.S. Plumbing Products.
      b. Crane Plumbing.
      c. Eljer Plumbingware Div., Wallace-Murray Corp.

d. Kohler Co.
e. VitrA.

2. Plumbing Trim:

a. McGuire Manufacturing Co., Inc.
b. Delta Commercial.
c. Chicago Faucet Co.
d. T&S Brass and Bronze Works, Inc.

3. Flush Valves:

a. Sloan Valve Co.
b. Zurn Industries, Hydromechanics Div.
c. Toto USA, Inc.

4. Faucets:

a. Chicago Faucet Co.
b. Symmons Scott.
c. T&S Brass and Bronze Works, Inc.
d. Delta Commercial.

5. Fixture Seats:

a. Church Seat Co.
b. Bemis Mfg. Co.
c. Beneke Corp.

6. Water Coolers and Drinking Fountains:

a. Haws Corporation.
b. Halsey Taylor Mfg. Co.
c. Elkay Mfg. Co.
d. Acorn Aqua.

7. Service Sinks:

a. American Standard.
b. Kohler Co.
c. Williams Serviceptor.
d. Florestone.
e. Acorn.

8. Stainless Steel Sinks:

a. Elkay Mfg. Co.
b. Just Mfg. Co.
c. Haws Corporation.

9. Fixture Carriers:

a. Josam Mfg. Co.
b. J. R. Smith.

c. Tyler Pipe; Wade Div.
d. Zurn Industries; Hydromechanics Div.
e. Mifab, Inc.

2.5 FLUSH VALVE REQUIREMENTS

A. Electronic flush valves where required and specified shall be non-hold open type with exposed parts chrome plated. Conform to all codes and manufacturers' recommendations. All diaphragms are to have multiple filtered by pass and be chloramine and resistant synthetic rubber with rubber and internal components suitable for 180 degree hot water to 150 pounds pressure, plastic or leather diaphragm not acceptable. All flush valve solenoids and sensors shall be UL listed.

2.6 FIXTURE CONNECTIONS

A. Make connection between fixtures and flanges on soil pipe absolutely gastight and watertight with neoprene type gaskets (wall hung fixtures) or bowl wax (floor outlet fixtures). Rubber gaskets or putty will not be permitted.

B. Provide fixtures not having integral traps with P-traps of chromium-plated 17 gauge cast brass, with 17 gauge seamless brass wall return, connected to concealed waste in wall and sanitary fittings. Provide IAPMO approval for trap, and provide less trap screw cleanout.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

a. Dearborn Brass, Commercial series with brass nuts.
b. Delta Commercial.
c. McGuire Manufacturing Co., Inc.

C. Connections from stacks or horizontal wastes to wall or floor finish for wastes from lavatories, urinals, shall be IPS 85 percent red brass pipe.

D. Unions on waste pipes on fixture side of traps may be slip or flange joints with soft rubber or lead gaskets. Traps shall rough in full size to waste and vent connection, using deep escutcheon plate to cover wall penetration. Compression adaptor extensions or sweat adaptors are not acceptable.

2.7 WATER SUPPLIES AND STOPS

A. Provide 85 percent IPS threaded red brass nipple, conforming to the lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have stop valves installed on water supply lines.

B. Provide water supplies to fixtures with compression shut-off stops with IPS inlets and lock shield-loose key handles. Provide combination fixtures with compression stop and IPS inlet on each water supply fitting. Provide lock shield-loose key handle for each stop.

C. Provide 1/2 inch riser tubes with reducing coupling for fixtures, unless otherwise noted.

D. Provide cast brass escutcheon.

E. Furnish shut-off valves on hose bibbs where directly connected to mains with no intervening valves.

F. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. BrassCraft Manufacturing model SR37XC stop with 3-12AC riser and 647 escutcheon.
2. McGuire Manufacturing Company, Inc. model LFH2167LK.
3. Watts model LF890 203LK.

2.8 PLUMBING FIXTURE HANGERS AND SUPPORTS

A. Residential type fixture supports are not acceptable.

B. Install wall mounted water closets with combination support and waste fittings, with feet of support securely anchored to floor.

C. Install floor mounted water closets with J.R. Smith, Zurn, or equal government pattern cast iron closet flanges with brass bolts, nuts, washers, and porcelain caps secured with Spackle.

D. Install the following fixtures on concealed support with feet of support securely anchored to floor. Anchor top of support to wall construction in an approved manner.
1. Wall hung lavatories.
2. Wall mounted urinals.

2.9 PLUMBING FIXTURES

A. Install all plumbing fixtures at height indicated on Architectural Drawings. Where mounting height is not indicated, install at height required by Code.

B. Special Requirements For Accessible Fixtures:
1. Operating handle or valve for accessible water closets, urinals, lavatories, and sinks shall operate with less than 5 pounds force. Metering faucets shall be adjusted to operate between 10 and 15 seconds.
2. Insulate exposed waste piping and domestic water supplies below accessible fixtures with CBC access code compliant molded “closed-cell” vinyl covers. Covers shall be installed using vandal resistant fasteners and must be removable. Covers shall meet flame spread rating not to exceed 25 and smoke density not to exceed 50 when tested in accordance with ASTM E-84, and shall comply with the requirements of California Code of Regulations, Title 24. Plumberex – Handy Shield, Johns Manville – Zeston 2000, or equal.

C. Refrigerator Ice Maker:
1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

Guy Gray.
Water-Tite.

D. Dishwasher Air Gap Fitting:
1. Manufacturers: Drawing schedules indicate Basis of Design products. Subject to compliance with requirements, provide product indicated on Drawings, or comparable product by one of the following, or equal:

a. Zurn Industries, LLC.
b. Dearborn Brass.

PART 3 - EXECUTION

3.1 PRODUCT HANDLING AND PROTECTION

A. Deliver packaged materials in their original, unopened wrapping with labels intact. Protect materials from water, the elements and other damage during delivery, storage and handling.

3.2 PREPARATORY PROVISIONS

A. The Contractor is responsible for the examination and acceptance of all conditions affecting the proper construction and/or installation of the Work of this Section. Do not proceed until all unsatisfactory conditions have been corrected. Commencing work will be construed as acceptance of all conditions by the Contractor as satisfactory for the construction and/or installation of the Work.

3.3 INSPECTION AND PREPARATION

A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Install plumbing fixtures of types indicated where shown and at indicated heights; in accordance with fixture manufacturer's written instructions, roughing-in drawings. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the National Standard Plumbing Code pertaining to installation of plumbing fixtures.

C. Fasten plumbing fixtures securely to supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies to blocking behind or within wall construction so as to be rigid, and not subject to pull or push movement.

D. Install CBC accessible fixtures in accordance with Chapter 4 California Plumbing Code, and Chapters 11A and 11B California Building Code.

E. Refer to Division 26 for wiring for electronic flush valves.

3.4 INSTALLATION OF FAUCETS

A. Provide 85 percent IPS red brass pipe, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75, securely anchored to building construction, for each connection to faucets, stops, hose bibbs, etc. Each fixture, except hose bibbs, shall have a stop valve installed on water supply lines to permit repairs without shutting off water mains.

B. Adjust metering faucets to run for 10 to 15 seconds.

3.5 CLEAN AND PROTECT

A. Clean plumbing fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during the remainder of the construction period.

C. Grout voids between all fixtures and adjacent surfaces with white Dow Silicone Sealant, arranged to shed water.

3.6 FIELD QUALITY CONTROL

A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

3.7 EXTRA STOCK

A. General: Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt. Furnish one device for every ten units.

END OF SECTION 22 40 00

SECTION 22 50 00

PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Neutralizing basin.

B. Commercial electric water heaters.

C. Instantaneous electric water heaters.

D. Booster Heaters.

E. Gas fired water heaters.

F. Expansion tanks.

G. In-line domestic hot water recirculation pumps.

H. Concrete grease interceptors.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 22 00 50 Basic Plumbing Materials and Methods.

1.3 ADDITIONAL REQUIREMENTS

A. Furnish and install any incidental work not shown or specified which is necessary to provide a complete and workable system.

B. Coordinate all of work in this Section with all of the Trades covered in other Sections of the Specifications to provide a complete, operable and sanitary installation of the highest quality workmanship.

1.4 DESCRIPTION OF WORK

A. Furnish and install all plumbing work indicated on the Drawings and described herein.

1.5 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of plumbing equipment of type and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Trade names or catalog numbers stated herein indicates grade or quality of materials desired.

C. Dimensions, sizes, and capacities shown are minimum and shall not be changed without permission of Architect.

D. UL and NEMA Compliance: Provide electric motors and electrical components required as part of plumbing equipment, which have been listed and labeled by Underwriters Laboratories and comply with NEMA standards.

E. CEC Compliance: Comply with California Electrical Code (Title 24, Part 3) as applicable to installation and electrical connections of ancillary electrical components of plumbing equipment.

F. ANSI Compliance: Comply with ANSI Z223.1 (NFPA 54) "National Fuel Gas Code", as applicable to installation of gas-fired water heaters.

G. CSA/UL Labels:
1. Provide gas-fired water heaters that have been listed and labeled by CSA International or Underwriters Laboratories, certifying design according to ANSI Z21.10.1-CSA 4.1 standards governing storage-type water heaters with input ratings of 75,000 BTU/hr. or less.
2. Provide gas-fired water heaters that have been listed and labeled by CSA International or Underwriters Laboratories, certifying design according to ANSI Z21.10.3-CSA 4.3 standards governing storage-type water heaters with input ratings of greater than 75,000 BTU/hr.

H. ASME Relief Valve Stamps: Provide water heaters with safety relief valves bearing ASME valve markings.

I. ASME Code Symbol Stamps: For the following equipment, comply with ASME Boiler and Pressure Vessel Code for construction, and stamp with ASME Code symbol:

1. Water Heaters 200 MBH and greater.

J. California Energy Commission Compliance: Provide written confirmation of listing of all water heaters in the "Appliance Efficiency Database."

K. California Health and Safety Code Compliance: For products covered under the scope of HSC 116875 for potable water service. Products for potable water service shall be third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's plumbing equipment specifications, installation and start-up instructions, capacity and ratings, with selection points clearly indicated.

B. Maintenance Data: Submit maintenance data and parts lists for each item of plumbing equipment. Include "trouble-shooting" maintenance guides. Include this data in Operation and Maintenance Manual.

C. Pipe, pipe or plumbing fittings, fixtures, solder and flux installed in a system providing water for human consumption shall comply with lead free requirements of the California Health and Safety Code Section 11 68 75. Provide submittal information for products third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

D. Special Seismic Certification: Submit certification that will withstand seismic forces indicated in Contract Documents. Include the following:
1. OSHPD Special Seismic Certification Pre-Approval (OSP) number and back-up data.

a. Back-up data shall include copy of OSHPD form OSH FDD 735, “Application for Pre-Approval,” signed by OSHPD representative.
b. If compliance is achieved by alternate method approved by OSHPD, provide document indicating compliance method. Include back-up data. IBC Certification is not an acceptable alternate compliance method.

2. Letter from equipment manufacturer indicating:

a. The equipment manufacturer has reviewed seismic forces indicated in Contract Documents and that seismic forces utilized in testing equipment and obtaining an OSP number meet or exceed Project requirements.
b. The manufacturer shall indicate that submitted equipment with OSP number meets criteria in Contract Documents, including features, options, dimensions, weights, anchorage devices, etc. Include Specification Section article reference number or Drawing sheet number with reference to physical location of equipment. If submitted equipment with OSP number does not meet these requirements, the letter shall contain detailed list noting variances from the product specified in Contract Documents.

3. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
4. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.2 COMMERCIAL ELECTRIC WATER HEATERS

A. General: Provide commercial electric water heaters of size, capacity, and electrical characteristics indicated on Drawings. Comply with ASHRAE 90.1 for energy efficiency. Provide UL listing. Relief valve dip tube shall extend to within 3 inches of tank.

B. Heater: Working pressure of 150 psi, magnesium anode rod; glass lining on internal surfaces exposed to water.

C. Heating Elements: Heavy-duty, medium watt density, with incoloy sheath or zinc plated copper, thermostat stepped through magnetic contactor.

D. Safety Controls: Double-pole, manual-reset, high-limit, probe type electric water low water cutoff; both factory wired.

E. Jacket: Equip with full size control compartments with front panel opening. Insulate tank with vermin resistant polyurethane or glass fiber insulation. Provide outer steel jacket with bonderized undercoat and baked enamel finish.

F. Warranty: Furnish three-year minimum warranty on tank leakage.

G. Provide the following accessories:
1. Brass drain valve.
2. 3/4 inch temperature and pressure relief valve.
3. Thermometer.

H. Provide equal flow manifold for piping entering and leaving the water heaters. Manifold shall be provided as a standard option for the heaters proposed.

I. Controls: Adjustable immersion thermostat or surface mounted therm-o-disc; power circuit fusing.

J. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Bradford White Corporation.
2. Lochinvar Corporation.
3. PVI Industries, LLC.
4. Rheem Manufacturing Company.
5. Smith, A.O. Water Products Co.; a division of A.O. Smith Corporation.

2.3 INSTANTANEOUS ELECTRIC WATER HEATERS

A. General: Cabinet mounted stainless steel electric heating style. Flow switch activated, UL listed, 150 PSI rated.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Chronomite Laboratories, Inc.
2. Eemax, Inc.

2.4 GAS FIRED WATER HEATERS

A. General: All units shall comply with the emissions requirements of the Air Quality Management District (AQMD) in which they are to be installed.

B. Atmospheric Gas Fired Water Heaters:
1. General: Provide commercial atmospheric gas-fired water heater of size, capacity, and electrical characteristics indicated on Drawings. Comply with ASHRAE 90.1 for energy efficiency. Provide UL or CSA International listing.
2. Heater: Working pressure of 150 psi, rigidly supported magnesium anode rod, glass lining on internal surfaces exposed to water. Provide gas pressure regulator, adjusted for operation on natural gas, with pressure rating to suit heater listing. Provide hand-hole cleanout through tank and jacket.
3. Jacket: Insulate tank with rigid polyurethane foam or fiberglass insulation. Provide heavy-gauge steel jacket and baked enamel finish.
4. Warranty: Furnish three year minimum limited warranty on tank.

5. Accessories: Provide brass drain valve and 3/4 inch temperature and pressure relief valve. Provide thermometer, installed in the top 1/3 of the tank or at hot water discharge at the tank.
6. Controls: Adjustable immersion thermostat with safety shutoff.
7. Vent: Furnish and install "Metalbestos", Selkirk, or equal, Type B vent, UL listed. Furnish complete with roof support, flashing, Briedert Type L, Metalbestos, or equal stainless stack cap, and all supports and accessories required for a complete installation.
8. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. Bradford White Corporation.
    b. Lochinvar Corporation.
    c. PVI Industries, LLC.
    d. Rheem Manufacturing Company.
    e. Smith, A.O. Water Products Co.; a division of A.O. Smith Corporation.

C. Power Gas Fired Water Heaters:

1. General: Provide commercial power gas-fired water heater of size, capacity, and electrical characteristics as noted on Drawings. Comply with ASHRAE 90.1 for energy efficiency. Provide UL or CSA International listing. Units with gas input above 200 MBH shall be ASME constructed and listed, stamped for 125 PSIG.
2. Heater: Working pressure of 150 psi, magnesium anode rod, glass lining on internal surfaces exposed to water.
3. Jacket: Insulate tank with vermin-proof glass fiber or polyurethane foam insulation. Provide heavy-gauge steel jacket and baked enamel finish.
4. Warranty: Furnish three-year minimum limited warranty on tank.
5. Accessories: Provide brass drain valve and 3/4 inch temperature and pressure relief valve. Provide thermometer, installed in the top 1/3 of the tank or at hot water discharge at the tank.
6. Provide equal flow manifold for piping entering and leaving the water heaters. Manifold shall be provided as a standard option for the heaters proposed.
7. Controls: Adjustable immersion thermostat with safety shutoff.
8. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. Bradford White Corporation.
    b. Lochinvar Corporation.
    c. PVI Industries, LLC.
    d. Rheem Manufacturing Company.
    e. Smith, A.O. Water Products Co.; a division of A.O. Smith Corporation.

9. Vent: Furnish and install "Metalbestos", Selkirk, or equal, Model PS, all-steel vent, UL listed. Furnish complete with roof support, flashing, Briedert, Metalbestos, or equal, Type L stainless stack cap, .035" stainless steel inner pipe, and all supports and accessories required for a complete installation. All joints shall be sealed with silicone sealant as recommended by the manufacturer for pressure-tight joints.

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

        1) American Metal Products
        2) Selkirk
        3) Metalbestos

D. Direct Vented Sealed Combustion Condensing Gas-Fired Water Heater:
1. General: Provide commercial direct vented sealed combustion condensing gas-fired water heater of size, capacity, and electrical characteristics as noted on Drawings. Provide UL or CSA International listing. Design unit to conform to the following:

    a. ASHRAE/IESNA 90.1.
    b. California NOx emission requirements.
    c. Units with gas input above 200 MBH shall be ASME constructed and listed, stamped for 150 PSIG.
    d. Minimum efficiency of 95 percent.

2. Storage Tank Construction: Seamless steel with 150 psig working-pressure rating, glass lining on internal surfaces exposed to water.
3. Factory-Installed Storage Tank Appurtenances:

    a. Anode Rods: Magnesium.
    b. Jacket: Heavy-gauge steel with enameled finish.
    c. Cleanout: Hand-hole cleanout though tank and jacket.
    d. Burner: Low NOx, pre-mix powered type, down-fired configuration.
    e. Insulation: Non-CFC foam.
    f. Drain Valve: Brass construction.
    g. Heat Exchanger Coil: Located within submerged combustion chamber.
    h. Combination Temperature and Pressure Relief Valve.
    i. Dielectric Fittings.

4. Warranty: Furnish three-year minimum limited warranty on tank.
5. Accessories: Provide thermometer, installed in the top 1/3 of the tank or at hot water discharge at the tank.
6. Controls: Adjustable electronic immersion thermostat with safety shutoff.
7. Condensate Drain Piping: CPVC piping as defined in Section 22 10 00.
8. Vent and Exhaust Piping: CPVC piping as defined in Section 22 10 00
9. See equipment Schedule and details on Drawings for additional accessories and requirements.
10. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. Bradford White Corporation.
    b. Lochinvar Corporation.
    c. PVI Industries, LLC.
    d. Rheem Manufacturing Company.
    e. Smith, A.O. Water Products Co.; a division of A.O. Smith Corporation.

2.5 EXPANSION TANKS

A. Provide thermal expansion tanks of size and number as indicated on Drawings, conforming to lead-free requirements of California Health and Safety Code Section 11 68 75. Construct tank of welded steel for working pressure of 125 psi. Provide specially compounded flexible diaphragm securely sealed into tank to permanently separate air charge from system water, to maintain design expansion capacity.
1. Tanks shall be IAPMO approved and listed for use with domestic water systems.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Amtrol, Inc.
2. A.O. Smith Water Products Company.
3. Watts Water Technologies, Inc.

2.6 IN-LINE DOMESTIC HOT WATER RECIRCULATION PUMPS

A. Provide lead-free in-line domestic water recirculation pumps where indicated on Drawings and of capacities as scheduled on Drawings. Pumps shall be third-party certified by an approved laboratory as complying with California Health and Safety Code Section 11 68 75.

B. Pumps shall be of the centrifugal type with non-overloading characteristics and shall not overload the motor above its nameplate horsepower rating under any operating condition. No allowance for service factor shall be used in pump selection. Motor horsepower shown is minimum; furnish larger motors if necessary to meet the non-overloading requirements.

C. Type: Horizontal, designed for 125 thru 150 psi maximum working pressure and 225 degrees F continuous water temperature.

D. Construction: Bronze casing, non-metallic impeller.

E. Shaft: Ceramic, supported by carbon bearings. Bearings shall be lubricated by the pumped water.

F. Motors shall have permanently lubricated ball bearings. Motors shall meet NEMA specifications. Motors shall have built-in thermal overload or impedance protection.

G. Provide control wiring between field-installed controls, indicating devices, and pump control panels as work of this section, complying with requirements of Division 26 sections:

1. Control wiring specified as work of Division 23 for Automatic Temperature Controls is work of that section.

H. Wire pumps to mechanical control circuits to shut down pump when building is not occupied. Where no control system is installed, furnish pump manufacturers standard timer to automatically turn off circulating pump when hot water is not required.

I. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Grundfos Pumps Corporation.
2. Bell & Gossett, ITT Corporation.
3. Taco Incorporated.
4. Armstrong Pumps, Inc.

2.7 CONCRETE GREASE INTERCEPTORS

A. Furnish and install a concrete grease interceptor with minimum capacity as indicated on the drawings, complete as cataloged. Provide manholes to grade for access to each section. Provide gastight cast-iron ring and cover at grade for each manhole.

B. Provide concrete with an approved coating inside and outside.

C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. M.C. Nottingham Company.
2. Jensen Precast.

2.8 CATCH BASIN

A. Shall be as detailed on the drawings. Santa Rosa Precast, Model BK, Brooks, or equal, with cast iron grate and locking device, depth as required, Provide 6 inch thick concrete base, 6" minimum width each side, grout drain line into box a minimum of 6 inches above bottom.

B. Fill bottom with cobbles for a minimum of 6 inches deep. Joints between sections shall be sealed with Ram-Nek, or equal, flexible plastic gaskets.

PART 3 - EXECUTION

3.1 PRODUCT HANDLING AND PROTECTION

A. Deliver packaged materials in their original, unopened wrapping with labels intact. Protect materials from water, the elements and other damage during delivery, storage and handling.

3.2 PREPARATORY PROVISIONS

A. The Contractor shall be responsible for the examination and acceptance of all conditions affecting the proper construction and/or installation of the Work of this Section and shall not proceed until all unsatisfactory conditions have been corrected. Commencing work shall be construed as acceptance of all conditions by the Contractor as satisfactory for the construction and/or installation of the Work.

3.3 INSTALLATION OF ELECTRIC WATER HEATERS

A. Install electric water heaters as indicated, in accordance with manufacturer's installation instructions and in compliance with applicable codes.

B. Furnish wiring diagram to Electrical Installer. Refer to Division 26 for wiring of units, not work of this section.

C. Connect to hot and cold water lines with shutoff valve, check valve, and dielectric union in the cold water line, and ASME standard pressure and temperature relief valve and dielectric union in the hot water line. Connect drain and relief piping as noted on Drawings.

D. Start-up, test, and adjust electric water heaters in accordance with manufacturer's start-up instructions. Check and calibrate controls.

E. After installation has been completed, seal bottom of heaters without feet to floor with silicone sealer.

3.4 INSTALLATION OF GAS-FIRED WATER HEATERS

A. Install gas-fired water heaters as indicated, in accordance with manufacturer's installation instructions and in compliance with applicable codes.

B. Furnish wiring diagram to Electrical Installer. Refer to Division 26 for wiring of units, not work of this section.

C. Connect to hot and cold water lines with shutoff valves and dielectric unions. Install ASME standard pressure and temperature relief valve. Connect drain and relief piping as noted on Drawings.

D. Start-up, test, and adjust water heaters in accordance with manufacturer's start-up instructions. Check and calibrate controls.

E. Install thermometer, in the top 1/3 of the tank or at hot water discharge at the tank.

F. Confirm that water heater proposed is suitably equipped to be brought into the building through building openings provided, and that heater may be installed and removed through building openings provided.

G. Additional requirements for direct vented sealed combustion condensing water heaters:
1. Install vent and exhaust piping for direct vented sealed combustion condensing gas-fired water heaters strictly in accordance with unit manufacturers' recommendations.
2. Trap condensate drain line per manufacturers' recommendations and run to nearest code-compliant point of disposal.

H. Additional requirements for gas fired instantaneous water heaters:
1. Install pressure relief valve at the hot water discharge of the unit.
2. Install vent and exhaust piping for instantaneous gas-fired water heaters strictly in accordance with unit manufacturers' recommendations.

3.5 INSTALLATION OF PUMPS

A. Install pumps where indicated, in accordance with manufacturer's published instructions, complying with recognized industry practices to ensure that pumps comply with requirements and serve intended purposes.

B. Provide floor-mounted pumps with a 6 inch high concrete base and anchor bolts as recommended by the pump manufacturer. Pumps shall be carefully shimmed level.

C. Provide access space around pumps for service as indicated, but in no case less than that recommended by manufacturer.

D. Install in-line pumps with support from overhead structure on each side of pump, or as indicated on Drawings.

E. Support piping from the building structure so as to prevent any strain on the pump casings. Provide a final check for perfect alignment of the piping connections after pump has been secured to its base. Provide valves, accessories, gauges, flexible connections, and supports as indicated.

F. Install electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

G. Verify that electrical wiring installation is in accordance with manufacturer's submittal and installation requirements of Division 26 sections. Do not proceed with equipment start-up until wiring installation is complete and correct.

H. Check alignment, and where necessary, realign shafts of motors and pumps within recommended tolerances by manufacturer.

I. Lubricate pumps before start-up. Start-up in accordance with manufacturer's instructions.

J. Increase piping immediately at pump suction and discharge; flexible couplings and all valves shall be full line size.

K. Pumps shall not be connected to piping before piping is thoroughly flushed and cleaned of all dirt and grit. After piping connections have been made, systems shall be filled before starting pumps. Pumps shall not be run dry under any circumstances.

3.6 INSTALLATION OF INTERCEPTORS

A. Install interceptors as indicated, in accordance with manufacturer's installation instructions and in compliance with applicable codes.

B. Support: Anchor interceptors securely to substrate. Locate interceptors so that adequate clearance is provided to remove covers and sediment baskets. Set recessed units so top of cover is flush with finished grade.

C. Piping: Connect inlet and outlet piping to interceptors.

D. Refer to local standards for special installation requirements.

3.7 TRAINING

A. Provide a minimum of 8 hours of training and orientation of Owners staff in proper care and operation of Plumbing Equipment.

3.8 CARE AND CLEANING

A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Architect. At completion, carefully clean and adjust equipment, fixtures, and trim that are installed as part of this work. Leave systems and equipment in satisfactory operating condition.

3.9 OPERATION TEST

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.10 CLEANING UP

A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION 22 50 00

SECTION 23 00 50

BASIC HVAC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electric motors.

B. Motor starters.

C. Strainers.

D. Valve boxes.

E. Gauges.

F. Thermometers.

G. Access Doors.

H. Expansion loops.

I. Flexible joints.

J. Insulation.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This Section is a part of each Division 23 Section.

C. See Section 23 08 00.13, T-24 Commissioning of HVAC for Title 24 commissioning requirements.

1.3 ADDITIONAL REQUIREMENTS

A. Furnish and install incidental work not shown or specified necessary to provide a complete and workable system.

B. Make all temporary connections required to maintain services, including adequate heat and cooling, during the course of the Contract without additional cost to Owner. Notify Owner seven days in advance before disrupting services.

C. Provide for adjustments or modifications to fan and motor sheaves, belts, damper linkages, and other components as required to achieve specified air balance at no additional cost to Owner.

1.4 REFERENCED STANDARDS

A. Where material or equipment is specified to conform to referenced standards, it shall be assumed that the most recent edition of the standard in effect at the time of bid shall be used.

1. CSA – Canadian Standards Association International
2. ANSI - American National Standards Institute
3. ASTM - American Society for Testing and Materials
4. CCR - California Code of Regulations

    a. Title 8 - Division of Industrial Safety, Subchapter 7; General Industry Safety Orders, Articles 31 through 36

5. NCPWB - National Certified Pipe Welding Bureau
6. CEC - California Electrical Code
7. NEMA - National Electrical Manufacturers' Association
8. NFPA - National Fire Protection Association
9. OSHA - Occupational Safety and Health Act
10. UL - Underwriters' Laboratories, Inc.

1.5 DRAWINGS

A. Examine Drawings prior to bidding of work and report discrepancies in writing to Architect.

B. Visit Project site and examine existing conditions in order to become familiar with Project scope. Verify dimensions shown on Drawings at Project site. Bring discrepancies to the attention of Architect. Failure to examine Project site shall not constitute basis for claims for additional work because of lack of knowledge or location of hidden conditions that affect Project scope.

C. Drawings showing location of equipment and materials are diagrammatic and job conditions will not always permit installation in location shown. The HVAC Drawings show general arrangement of equipment and materials, etc., and shall be followed as closely as existing conditions, actual building construction, and work of other trades permit.
1. Architectural and Structural Drawings shall be considered part of the Work. These Drawings furnish Contractor with information relating to design and construction of the Project. Architectural Drawings take precedence over HVAC Drawings.
2. Because of the small scale of HVAC Drawings, not all offsets, fittings, and accessories required are shown. Investigate structural and finish conditions affecting the Work and arrange Work accordingly. Provide offsets, fittings, and accessories required to meet conditions. Inform Architect immediately when job conditions do not permit installation of equipment and materials in the locations shown. Obtain the Architects approval prior to relocation of equipment and materials.
3. Relocate equipment and materials installed without prior approval of the Architect. Remove and relocate equipment and materials at Contactors' expense upon Architects' direction.
4. Minor changes in locations of equipment, piping, ducts, etc., from locations shown shall be made when directed by the Architect at no additional cost to the Owner providing such change is ordered before such items of work, or work directly connected to same are installed and providing no additional material is required.

D. Execute work mentioned in the Specifications and not shown on the Drawings, or vice versa, the same as if specifically mentioned or shown in both.

1.6 REQUIREMENTS OF REGULATORY AGENCIES

A. The publications listed below form part of this Specification; comply with provisions of these publications except as otherwise shown or specified.
1. California Building Code, 2013.
2. California Electrical Code, 2013.
3. California Energy Code, 2013.

4. California Fire Code, 2013.
5. California Green Building Standards Code, 2013.
6. California Mechanical Code, 2013.
7. California Plumbing Code, 2013.
8. California Code of Regulations, Title 24.
9. California Health and Safety Code.
10. CAL-OSHA.
11. California State Fire Marshal, Title 19 CCR.
12. National Fire Protection Association.
13. Occupational Safety and Health Administration.
14. Other applicable state laws.

B. Nothing in Drawings or Specifications shall be construed to permit work not conforming to these codes, or to requirements of authorities having jurisdiction. It is not the intent of Drawings or Specifications to repeat requirements of codes except where necessary for clarity.

C. Comply with State of California 2013 Energy Code for systems, equipment, and construction.

D. When Contract Documents differ from governing codes, furnish and install larger size or higher standards called for without extra charge.

E. FEES AND PERMITS

F. Arrange for required inspections and secure approvals from authorities having jurisdiction. Comply with requirements of Division 01.

1.7 FRAMING, CUTTING AND PATCHING

A. Special framing, recesses, chases and backing for Work of this Section, unless otherwise specified, are covered under other Specification Sections.

B. Contractor is responsible for placement of pipe sleeves, hangers, inserts, supports, and location of openings for the Work.

C. Core openings through existing construction for passage of new piping and conduits. Cut holes of minimum diameter to suit size of pipe and associated insulation installed. Coordinate with building structure, and obtain Structural Engineer's approval prior to coring through existing construction.

1.8 SUBMITTALS

A. Submittal packages may be submitted via email as PDF electronic files, or as printed packages. PDFs shall be legible at actual size (100 percent). Provide seven copies of printed submittal packages.

B. Provide submittal of materials proposed for use as part of this Project. Product names in Specifications and on Drawings are used as standards of quality. Furnish standard items on specified equipment at no extra cost to the Contract regardless of disposition of submittal data. Other materials or methods shall not be used unless approved in writing by Architect. Architect's review will be required even though "or equal" or synonymous terms are used. Refer to Division 01 for complete instructions.
1. Partial or incomplete submittals will not be considered.
2. Quantities are Contractor's responsibility and will not be reviewed.
3. Provide materials of the same brand or manufacturer for each class of equipment or material.

4. Identify each item by manufacturer, brand, trade name, number, size, rating, or other data necessary to properly identify and review materials and equipment. Words "as specified" are not sufficient identification.
5. Identify each submittal item by reference to items' Specification Section number and paragraph, by Drawing and detail number, and by unit tag number.
6. Organize submittals in same sequence as in Specification Sections.
7. Show physical arrangement, construction details, finishes, materials used in fabrications, provisions for piping entrance, access requirements for installation and maintenance, physical size, mechanical characteristics, foundation and support details, and weight.

    a. Submit Shop Drawings, performance curves, and other pertinent data, showing size and capacity of proposed materials.
    b. Specifically indicate, by drawn detail or note, that equipment complies with each specifically stated requirement of Contract Documents.
    c. Drawings shall be drawn to scale and dimensioned (except schematic diagrams). Drawings may be prepared by vendor but must be submitted as instruments of Contractor, thoroughly checked and signed by Contractor before submission to Architect for review.
    d. Catalog cuts and published material may be included with supplemental scaled drawings.

C. Review of submittals will be only for general conformance with design concept and general compliance with information given in Contract Documents. Review will not include quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with work of other trades, or construction safety precautions, which are sole responsibility of Contractor. Review of a component of an assembly does not indicate acceptance of an assembly. Deviations from Contract Documents not clearly identified by Contractor are Contractor's responsibility and will not be reviewed by Architect.

D. Within reasonable time after award of contract and in ample time to avoid delay of construction, submit to Architect shop drawings or submittals on all items of equipment and materials provided. Provide submittal as a complete package.
1. Shop drawings and submittals shall include Specification Section, Paragraph number, and Drawing unit symbol or detail number for reference. Organize submittals into booklets for each Specification section and submit in loose-leaf binders with index. Deviations from the Contract Documents shall be prominently displayed in the front of the submittal package and referenced to the applicable Contract requirement.

E. Provide coordinated layouts for HVAC Ductwork systems, in accordance with Specification Section 23 80 00.

F. Furnish to the Project Inspector complete installation instructions on material and equipment before starting installation.

G. Have fire damper and fire smoke damper installation instructions available at Project site during construction for use by Project Inspector.

H. Product Data for California Green Building Standards Code Compliance: For adhesives and sealants, including primers, documentation of compliance including printed statement of VOC content and chemical components.

I. Provide product data for insulation products, including insulation, insulation facings, jackets, adhesives, sealants, and coatings, indicating compliance with requirement that these products

contain less than 0.1 percent (by mass) polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations.

J. Provide evidence of equipment certification to California Energy Code Section 110.1 or 110.2, if not providing Electrically Commutated motors for HVAC fans sized below 1 hp and above 1/12 hp. Refer to specific equipment articles requiring electrically commutated motors.

K. LEED Submittals:
1. Product Data for Credit EQ 4.1: For adhesives and sealants, documentation of compliance including printed statement of VOC content and chemical components.
2. Laboratory Test Reports for Credit EQ 4: For adhesives and sealants, documentation indicating that product complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

L. Delegated-Design Submittal: For seismic supports, anchorages, and restraints indicated to comply with performance requirements and design criteria.
1. Calculations performed for use in selection of seismic supports, anchorages, and restraints shall utilize criteria indicated in Structural Contract Documents.
2. Supports, anchorage and restraints for piping, ductwork, and equipment shall be an OSHPD pre-approved system such as Tolco, Afcon, ISAT, Badger, Mason, or equal. Pipes, ducts and equipment shall be seismically restrained in accordance with requirements of current edition of California Building Code. System shall have current OPM number and shall meet additional requirements of authority having jurisdiction. Provide supporting documentation required by the reviewing authority and the Architect and Engineer. Provide layout drawings showing piping, ductwork and restraint locations.

    a. Bracing of Piping, Ductwork, and Equipment: Specifically state how bracing attachment to structure is accomplished. Provide shop drawings indicating seismic restraints, including details of anchorage to building. In-line equipment must be braced independently of piping and ductwork, and in conformance with applicable building codes. Provide calculations to show that pre-approval numbers have been correctly applied in accordance with general information notes of pre-approval documentation.

3. In lieu of the above or for non-standard installations not covered in the above pre-approved systems, Contractor shall provide layout drawings showing piping, ductwork, and restraint locations, and detail supports, attachments and restraints, and furnish supporting calculations and legible details sealed by a California registered structural engineer, in accordance with 2013 California Building Code
4. Additional Requirements: In addition to the above, conform to all state and local requirements.

1.9 SUBSTITUTIONS

A. Refer to Division 01 for complete instructions. Requirements given below are in addition to or are intended to amplify Division 01 requirements. In case of conflict between requirements given herein and those of Division 01, Division 01 requirements shall apply.

B. It is the responsibility of Contractor to assume costs incurred because of additional work and or changes required to incorporate proposed substitute into the Project. Refer to Division 01 for complete instructions.

C. Substitutions will be interpreted to be manufacturers other than those specifically listed in the Contract Documents by brand name, model, or catalog number.

D. Only one request for substitution will be considered for each item of equipment or material.

E. Substitution requests shall include the following:
1. Reason for substitution request.
2. Complete submittal information as described herein; see “Submittals.”
3. Coordinated scale layout drawings depicting position of substituted equipment in relation to other work, with required clearances for operation, maintenance and replacement.
4. List optional features required for substituted equipment to meet functional requirements of the system as indicated in Contract Documents.
5. Explanation of impact on connected utilities.
6. Explanation of impact on structural supports.

F. Installation of reviewed substitution is Contractors’ responsibility. Any mechanical, electrical, structural, or other changes required for installation of substituted equipment or material must be made by Contractor without additional cost to Owner. Review by Architect of substituted equipment or material, will not waive these requirements.

G. Contractor may be required to compensate Architect for costs related to substituted equipment or material.

1.10 OPERATION AND MAINTENANCE MANUAL

A. Furnish three complete sets of Operation and Maintenance Manual bound in hardboard binder, and one compact disc containing complete Operation and Maintenance Manual in searchable PDF format. Provide Table of Contents. Provide index tabs for each piece of equipment in binder and disc. Start compiling data upon approval of submittals.
1. Sets shall incorporate the following:

a. Service telephone number, address and contact person for each category of equipment or system.
b. Complete operating instructions for each item of heating, ventilating and air conditioning equipment.
c. Copies of guarantees/warrantees for each item of equipment or systems.
d. Test data and system balancing reports.
e. Typewritten maintenance instructions for each item of equipment listing lubricants to be used, frequency of lubrication, inspections required, adjustment, etc.
f. Manufacturers' bulletins with parts numbers, instructions, etc., for each item of equipment.
g. Temperature control diagrams and literature.
h. Check test and start reports for each piece of mechanical equipment provided as part of the Work.
i. Commissioning and Preliminary Operation Tests required as part of the Work.

B. Post service telephone numbers and addresses in an appropriate place designated by Architect.

1.11 SITE CONDITIONS

A. Information on Drawings relative to existing conditions is approximate. Deviations from Drawings necessary during progress of construction to conform to actual conditions shall be approved by the Architect and shall be made without additional cost to the Owner. The Contractor shall be held responsible for damage caused to existing services. Promptly notify the Architect if services are found which are not shown on Drawings.

1.12 EXISTING MATERIALS

A. Remove existing equipment, piping, wiring, construction, etc., which interferes with Work of this Contract. Promptly return to service upon completion of work in the area. Replace items damaged by Contractor with new material to match existing.

B. Removed materials which will not be re-installed and which are not claimed by Owner shall become the property of Contractor and shall be removed from the Project site. Consult Owner before removing any material from the Project site. Carefully remove materials claimed by Owner to prevent damage and deliver to Owner-designated storage location.

C. Existing piping and wiring not reused and are concealed in building construction may be abandoned in place and all ends shall be capped or plugged. Remove unused piping and wiring exposed in Equipment Rooms or occupied spaces. Material shall be removed from the premises. Disconnect power, water, gas, pump or any other active energy source from piping or electrical service prior to abandoning in place.

1.13 WARRANTY

A. Refer to Division 01 for warranty requirements, including effective date of warranty. Refer to specific items of equipment specified herein for warranty duration if different from that specified in Division 01.

B. Repair or replace defective work, material, or part that appears within the warranty period, including damage caused by leaks.

C. On failure to comply with warranty requirements within a reasonable length of time after notification is given, Architect/Owner shall have repairs made at Contractor's expense.

1.14 RECORD DRAWINGS

A. Refer to Division 01, Record Documents, for requirements governing Work specified herein.

B. Upon completion of the Work, deliver to Architect the following:
1. Originals of drawings showing the Work exactly as installed.
2. One complete set of reproducible drawings showing the Work exactly as installed.
3. One compact disc with complete set of drawings in PDF format showing the Work exactly as installed.
4. Provide Contractor’s signature, verifying accuracy of record drawings.

C. Obtain the signature of the Inspector of Record for all Record Drawings.

1.15 DELIVERY AND STORAGE

A. Protect equipment and materials delivered to Project site from weather, humidity and temperature variations, dirt, dust and other contaminants.

1.16 COORDINATION

A. General:
1. Coordinate Work in this Section with trades covered in other Specifications Sections to provide a complete, operable and sanitary installation of the highest quality workmanship.

B. Mechanical Coordination:
1. Arrange for pipe spaces, chases, slots and openings in building structure during progress of construction, to accommodate mechanical system installation.
2. Coordinate installation of supporting devices. Set sleeves in poured-in-place concrete and other structural components during construction.

3. Coordinate requirements for access panels and doors for mechanical items requiring access where concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section “Access Doors and Frames.”

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials or equipment of the same type shall be of the same brand wherever possible. All materials shall be new and in first class condition.

B. All sizes, capacities, and efficiency ratings shown are minimum, except that gas capacity is maximum available.

C. Refer to Division 22 10 00 and 23 80 00 for specific system piping materials.

2.2 MATERIALS

A. No material installed as part of this Work shall contain asbestos.

B. California Green Building Code Compliance:
1. HVAC and refrigeration equipment shall not contain CFCs.
2. HVAC and refrigeration equipment shall not contain Halons.

2.3 ACCESS DOORS

A. Where floors, walls, or ceilings must be penetrated for access to mechanical equipment, provide access doors, 14 inch by 14 inch minimum size in usable opening. Where entrance of a serviceman may be required, provide 20 inch by 30 inch minimum usable opening. Locate access doors/panels for non-obstructed and easy reach.
1. All access doors less than 7'-0" above floors and exposed to public access shall have keyed locks.

B. Access doors shall match those supplied in Division 08 in all respects, except as noted herein.

C. Provide stainless steel access doors for use in toilet rooms, shower rooms, kitchens and other damp areas. Provide steel access doors with prime coat of baked-on paint for all other areas.

D. Where panels are located on ducts or plenums, provide neoprene gaskets to prevent air leakage, and use frames to set door out to flush with insulation.

E. Provide insulated doors where located in internally insulated ducts or casings.

F. Do not locate access doors in highly visible public areas such as lobbies, waiting areas, and primary entrance areas. Coordinate with the Architect when access is required in these areas.

G. Where specific information or details relating to access panels different from the above is shown or given on the Drawings or other Divisions of work, then that information shall supersede this specification.

H. Manufacturers: Subject to compliance with requirements, available manufacturers offering products which may be incorporated into the Work include Milcor, Karp, Nystrom, or Cesco, equal to the following:
1. Milcor

a. Style K (plaster).
b. Style DW (gypsum board).
c. Style M (Masonry).
d. Style "Fire Rated" where required.

2.4 EQUIPMENT IDENTIFICATION

A. Identify each piece of equipment with a permanently attached engraved bakelite plate, 1/2 inch high white letters on black background.

2.5 INSULATION WORK

A. General:
1. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).
2. Adhesives and sealants shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.
3. Adhesives and sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
4. Urethane insulation will not be allowed above ground or on hot water piping.
5. Test insulation, jackets, and lap-seal adhesives as a composite product and confirm flame spread of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with UL723, ASTM E84, or NFPA 255.
6. Clean thoroughly, test and have approved, and equipment before installing insulation and/or covering.
7. Repair all damage to existing duct insulation whether or not caused during the work of this contract, to match existing adjacent insulation for thickness and finish, but conforming to flame spread and smoke ratings specified above.

B. Duct Insulation:
1. All duct insulation shall meet minimum R-value of R-8 at 2 inch thickness 3/4 pound per cubic foot density for ductwork installed outside the building insulation envelope. For ductwork installed within the building insulation envelope, duct insulation shall have a minimum R-value of R-4.2 at 1.5 inch thickness, 3/4 pound per cubic foot density.
2. General: Insulation applied to the exterior surface of ducts located in buildings shall have a flame spread of not more than 25 and a smoke-developed rating of not more than 50 when tested as a composite installation including insulation, facing materials, tapes and adhesives as normally applied. Material exposed within ducts or plenum shall have a flame-spread rating of not more than 25 and a smoke-developed rating of not more than 50.
3. Wrap all unlined concealed supply and return ducts with fiberglass duct wrap, manufactured as a blanket of glass fibers factory laminated to a reinforced foil/kraft vapor retarding facing. Provide 2 inch stapling and taping flange. Wrap insulation entirely around duct and secure with outward clinching staples on 6 inch centers. Provide mechanical fasteners at maximum 18 inch centers for all bottoms of duct which are greater than 24 inches. Insulate ducts installed tight against other work before hanging in place. Seal all seams, both longitudinal and transverse, and all staple and mechanical fastener penetrations of facing with scrim backed foil tape or recommended sealant, to provide a vapor tight installation.
4. On all supply and return ductwork exposed to weather and not internally lined, field apply minimum 2” thick mineral-fiber board thermal insulation, glass fibers bonded with thermosetting resin. Comply with ASTM C612, type IB without facing and with all service jacket with factory applied FRK-25 foil reinforced kraft paper. Aluminum jacket, 0.024 inch thickness sheets

manufactured from aluminum alloy complying with ASTM B209, stucco embossed finish and having an integrally bonded moisture barrier over entire surface in contract with insulation.
5. Provide internal duct lining in accordance with specification section 23 80 00.

PART 3 - EXECUTION

3.1 MECHANICAL DEMOLITION

A. Refer to Division 01 Sections “Cutting and Patching” and “Selective Demolition” for general demolition requirements and procedures.

B. Disconnect, dismantle and remove mechanical systems, equipment, and components indicated to be removed. Coordinate with all other trades.
1. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
2. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

3.2 ELECTRICAL REQUIREMENTS

A. Provide adequate working space around electrical equipment in compliance with the California Electrical Code. Coordinate the Mechanical Work with the Electrical Work to comply.

B. Furnish necessary control diagrams and instructions for the controls. Before permitting operation of any equipment which is furnished, installed, or modified under this Section, review all associated electrical work, including overload protection devices, and assume complete responsibility for the correctness of the electrical connections and protective devices. Motors and control equipment shall conform to the Standards of the National Electrical Manufacturers' Association. All equipment and connections exposed to the weather shall be NEMA IIIR

C. All low voltage wiring and conduit associated with the Temperature Control System are included in this Section. Wiring and conduit shall comply with Division 26.

3.3 INSTALLATION OF PIPING AND DUCT SYSTEMS

A. General:
1. Where or ductwork is left exposed within a room, the same shall be run true to plumb, horizontal, or intended planes. Where possible, uniform margins are to be maintained between parallel lines and/or adjacent wall, floor, or ceiling surfaces.
2. Horizontal runs of ductwork suspended from ceilings shall provide for a maximum headroom clearance. The clearance shall not be less than 6'-6" without written approval from the Architect.
3. At the time of rough installation, or during storage on the construction site and until final startup of the heating and cooling equipment, all duct and other related air distribution component opening shall be covered with tape, plastic, sheet metal, or other methods acceptable to the enforcing agency.
4. Each piping system shall be thoroughly flushed and proved clean before connection to equipment.
5. Pipe the discharge of each relief valve, air vent, backflow preventer, and similar device to floor sink or drain.
6. Install exposed polished or enameled connections with special care showing no tool marks or threads at fittings.

B. Expansion Loops:

1. Install expansion loops where piping crosses building expansion or seismic joints, between buildings, between buildings and canopies, and as indicated on Drawings.
2. Install expansion loops of sizes matching sizes of connected piping.
3. Install grooved-joint expansion joints to grooved-end steel piping.
4. Materials of construction and end fitting type shall be consistent with pipe material and type of gas or liquid conveyed by the piping system in which expansion loop is installed.

C. Flashing:
1. Flashing for penetrations of metal or membrane roof for mechanical items such as flues, ducts, and pipes shall be coordinated with the roofing manufacturer and roofing installer for the specific roofing type. The work of this section shall include furnishing, layout, sizing, and coordination of penetrations required for the mechanical work.

    a. Furnish and install flashing and counterflashing in strict conformance with the requirements of the roofing manufacturer. Submit shop drawing details for review prior to installation.
    b. Furnish and install counterflashing above each flashing required. Provide
    c. Flues and ducts shall have 24 gauge galvanized sheet metal storm collar securely clamped to the flue above the flashing.

2. For all other types of roofing system, furnish and install around each pipe, where it passes through roof, a flashing and counterflashing. All flashing shall be made of four pound seamless sheet lead with 6 inch minimum skirt and steel reinforced boot. Counterflashing shall be cast iron. For vents, provide vandalproof top and flashing combination. Elmdor/Stoneman Model 1100-4.

D. Hangers and Supports:
1. General: Support all ductwork, equipment and piping so that it is firmly held in place by approved iron hangers and supports, and special hangers as required. All components shall support weight of ductwork, equipment and pipe, fluid, and pipe insulation based on spacing between supports with minimum factor of safety of five based on ultimate strength of material used. Do not exceed manufacturer's load rating. Pipe attachments or hangers, of same size as pipe or tubing on which used, or nearest available. The Architect shall approve all hanger material before installation. Do not support piping or ductwork with plumbers' tape, wire rope, wood, or other makeshift devices. Where building structural members do not match piping and ductwork support spacing, provide all “bridging” support members as required firmly attached to building structural members in a fashion approved by the Structural Engineer.

    a. Materials and design for ductwork support shall be per SMACNA “HVAC Duct Construction Standards, Metal and Flexible.”

2. All hanger components shall be provided by one manufacturer: B-Line, Grinnell, Uni-Strut, Badger, or equal.

3. Duct Hanger and Support Spacing: Conform to Requirements of CMC and SMACNA “HVAC Duct Construction Standards, Metal and Flexible.”

4. Support to Structure:

    a. Wood Structure: Provide and install wood blocking as required to suit structure. Provide lag screws or through bolts with length to suit requirements, and with size (diameter) to match the size of hanger rods required.

1) Do not install Lag screws in tension without written review and acceptance by Structural Engineer.

Side Beam Angle Clip	B-Line B3062 MSS Type 34
Side Beam Angle Clip	B-Line B3060
Ceiling Flange	B-Line B3199

2) Blocking for support of piping shall be not less than 2 inch thick for piping up to 2 inch size (water filled) or 3 inch size (vapor filled). Provide 3 inch blocking for piping up through 5 inch size, and 4 inch blocking for larger piping. Provide support for blocking in accordance with Structural Engineers requirements.
3) Where lag screws are used, length of screw shall be 1/2 inch less than the wood blocking. Pre-drill starter holes for each lag screw.

b. Steel Structure: Provide and install additional steel bracing as required to suit structure. Provide through bolts with length to suit requirements of the structural components. Burning or welding on any structural member may only be done if approved by the Architect.

3.4 ACCESS DOOR

A. Furnish and install access doors wherever required whether shown or not for easy maintenance of mechanical systems; for example, at concealed valves, strainers, traps, cleanouts, dampers, motors, controls, operating equipment, etc. Access doors shall provide for complete removal and replacement of equipment.

3.5 CONCRETE WORK

A. Concrete work required for work of this Section shall be included under another section of the Specification, unless otherwise noted, including poured-in-place concrete work for installing precast manholes, catch basins, etc., and shall include reinforced concrete bases for pumps, tanks, compressors, fan units, boilers, unless the work is specifically indicated on the Drawings to be furnished under this Section.

B.

3.6 EXPANSION ANCHORS IN HARDENED CONCRETE

A. Refer to Structural Drawings.

B. Qualification Tests: The specific anchor shall have a current ICC-ES report and evaluated in cracked concrete in accordance with Acceptance Criteria AC193. If the specific anchor satisfies cyclic testing requirements per Acceptance Criteria AC01, Section 5.6, the full allowable shear and tension loads listed in the current ICC-ES report and manufacturer's recommendations for the specific anchor may be used. Otherwise, the design shear and tension loads shall not be more than 80% of the listed allowable shear and tension loads for the specific anchor.

C. Installation: The anchors must be installed in accordance with the requirements given in ICC Research Committee Recommendations for the specific anchor.

D. Testing: Fifty percent of the anchors shall be load-tested on each job to twice the allowable capacity in tension, except that if the design load is less than 75 pounds; only one anchor in ten need be tested. If any anchor fails, all anchors must be tested. The load test shall be performed in the presence of a special inspector.

E. The load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, a torque wrench calibrated using the specific anchor or calibrated spring-loading devices. Anchors in which the torque is used to expand the anchor without applying tension to the bolt may not be verified with a torque wrench.

3.7 TESTS AND ADJUSTMENTS

A. Test the installations in accordance with the following requirements and all applicable codes:
   1. Notify the Architect at least seven days in advance of any test.

B. Testing, Evacuating, Charging and Lubrication of Refrigeration Systems:
   1. Pressurize with dry nitrogen and/or refrigerant to 300 psig and test all joints with an electronic detector or halide torch. Release the pressure and attach a high vacuum pump. Evacuate to 4 mm (4000 microns) and hold for 30 minutes. Break to 5 psig with dry nitrogen and allow to remain in the system for ten minutes. Evacuate to 2 mm (2000 microns) and hold for 30 minutes. Use a mercury manometer or electronic vacuum gauge. Do not start timing until recommended vacuum range is reached.
   2. At the end of the evacuation, if the system has been proved leak-free, charge with refrigerant and fill the crankcase to the oil level specified by the manufacturer. All refrigerant oil shall be delivered to the location in sealed containers.
   3. Replenish for a period of one year without cost to the Owner all refrigerant and oil required to maintain the proper levels.

3.8 OPERATION OF SYSTEMS

A. Do not operate any mechanical equipment for any purpose, temporary or permanent, until all of the following has been completed:
   1. Complete all requirements listed under “Check, Test and Start Requirements.”
   2. Ductwork and piping has been properly cleaned.
   3. Filters, strainers etc. are in place.
   4. Bearings have been lubricated, and alignment of rotating equipment has been checked.
   5. Equipment has been run under observation, and is operating in a satisfactory manner.

B. Provide test and balance agency with one set of Contract Drawings, Specifications, Addenda, Change orders issued, applicable shop drawings and submittals and temperature control drawings.

C. Operate every fire damper, smoke damper, combination smoke and fire damper under normal operating conditions. Activate smoke detectors as required to operate the damper, stage fan, etc. Provide written confirmation that all systems operate in a satisfactory manner.

3.9 TEMPORARY HEAT

A. The General Contractor will provide for all temporary heat at such times as may be required or directed by the Architect and pay all fuel and energy costs incurred.

B. Temporary heating facilities proposed for use by the Contractor will be subject to review of the Architect. Prior to use of any equipment for temporary heat, install temporary filters on all return air inlets, to preclude dust and construction debris from entering the duct system. In addition, install filters in air handling units, and replace at the completion of temporary operation.

C. Filters used for temporary operation of systems shall be as specified for permanent filters specified herein.

D. Comply with Check, Test and Start Requirements for start-up of equipment prior to operation for temporary heat.

E. Contractor shall complete the permanent heating system as soon as possible, thereby making it available for temporary heat. When available, the system may be used as required at the direction of the Architect after systems are properly prepared for use as specified elsewhere. Contractor shall then be responsible for operating the system during periods required and the General Contractor shall pay the fuel and energy costs incurred. Operation of the heating system prior to the filing of "notice of completion" shall not change the Guarantee provisions in any way.

3.10 CHECK, TEST AND START REQUIREMENTS

A. An authorized representative of the equipment manufacturer shall perform check, test and start of each piece of mechanical equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the check test and start of the equipment.
1. As part of the submittal process, provide a copy of each manufacturer’s printed startup form to be used.
2. Some items of specified equipment may require that check, test and start of equipment must be performed by the manufacturer, using manufacturer’s employees. See specific equipment Articles in these Specifications for this requirement.
3. Provide all personnel, test instruments, and equipment to properly perform the check, test and start work.
4. When work has been completed, provide copies of reports for review, prior to final observation of work.

B. Provide copies of the completed check, test and start report of each item of equipment, bound with the Operation and Maintenance Manual.

C. Upon completion of the work, provide a schedule of planned maintenance for each piece of equipment. Indicate frequency of service, recommended spare parts (including filters and lubricants), and methods for adjustment and alignment of all equipment components. Provide a copy of the schedule with each Operation and Maintenance Manual. Provide a copy of certification from the Owner’s representative indicating that they have been properly instructed in maintenance requirements for the equipment installed.

3.11 PRELIMINARY OPERATIONAL REQUIREMENTS AND TESTS

A. Prior to observation to determine final acceptance, put HVAC, plumbing, and fire protection systems into service and check that work required for that purpose has been done, including but not limited to the following condensed check list. Provide indexed report to tabulating the results of all work.
1. All equipment has been started, checked, lubricated and adjusted in accordance with the manufacturer's recommendations, including modulating power exhausts if present.
2. Correct rotation of motors and ratings of overload heaters are verified.
3. Specified filters are installed and spare filters have been turned over to Owner.
4. All manufacturers’ certificates of start-up specified have been delivered to the Owner.
5. All equipment has been cleaned, and damaged painted finishes touched up.
6. Damaged fins on heat exchangers have been combed out.
7. Missing or damaged parts have been replaced.

8. Flushing and chemical treatment of piping systems has been completed and water treatment equipment, where specified, is in operation.
9. Equipment labels, pipe marker labels, ceiling markers and valve tags are installed.
10. Valve tag schedules, corrected control diagrams, sequence of operation lists and start-stop instructions have been posted.
11. Preliminary test and balance work is complete, and reports have been forwarded for review.
12. Automatic control set points are as designated and performance of controls checks out to agree with the sequence of operation.
13. Operation and Maintenance Manuals have been delivered and instructions to the operating personnel have been made.

B. Prior to the observation to determine final acceptance, operate all mechanical systems as required to demonstrate that the installation and performance of these systems conform to the requirements of these specifications.
1. Operate and test all mechanical equipment and systems for a period of at least five consecutive 8 hour days to demonstrate the satisfactory overall operation of the project as a complete unit.
2. Include operation of heating and air conditioning equipment and systems for a period of not less than two 8 hour days at not less than 90 percent of full specified heating and cooling capacities in tests.
3. Commence tests after preliminary balancing and adjustments to equipment have been checked. Immediately before starting tests, install air filters and lubricate all running equipment. Notify the Architect at least seven calendar days in advance of starting the above tests.
4. During the test period, make final adjustments and balancing of equipment, systems controls, and circuits so that all are placed in first class operating condition.
5. Where Utility District rebates are applicable, demonstrate that the systems meet the rebate program requirements.

C. Before handing over the system to Owner replace all filters with complete new set of filters.

D. Review of Contractor's Tests:
1. All tests made by the Contractor or manufacturers' representatives are subject to observation and review by the Owner. Provide timely notice prior to start of each test, in order to allow for observation of testing. Upon the completion of all tests, provide a letter to confirm that all testing has been successful.

E. Test Logs:
1. Maintain test logs listing the tests on all mechanical systems showing dates, items tested, inspectors' names, remarks on success or failure of the tests.

F. Preliminary Operation:
1. The Owner reserves the right to operate portions of the mechanical system on a preliminary basis without voiding the guarantee.

G. Operational Tests:
1. Before operational tests are performed, demonstrate that all systems and components are complete and fully charged with operating fluid and lubricants.
2. Systems shall be operable and capable of maintaining continuous uninterrupted operation during the operating and demonstration period. After all systems have been completely installed, connections made, and tests completed, operate the systems continuously for a period of five working days during the hours of a normal working day.
3. This period of continuous systems operation may be coordinated with the removal of Volatile Organic Compounds (VOCs) from the building prior to occupancy should the Owner decide to implement such a program.
4. Control systems shall be completely operable with settings properly calibrated and adjusted.

5. Rotating equipment shall be in dynamic balance and alignment.
6. If the system fails to operate continuously during the test period, the deficiencies shall be corrected and the entire test repeated.

H. Pre-Occupancy Building Purge:
1. Prior to occupancy, ventilate the building on 100 percent outside air, 100 percent exhaust for a continuous period determined by a qualified industrial hygienist (engaged by the Contractor) to reduce V.O.C's prior to occupancy.
2. Submit report by the industrial hygienist verifying satisfactory completion of the pre-occupancy purge.

3.12 DEMONSTRATION AND TRAINING

A. An authorized representative of the equipment manufacturer shall train Owner-designated personnel in maintenance and adjustment of equipment. The representative may be an employee of the equipment manufacturer, or a manufacturer-certified contractor. Submit written certification from the manufacturer stating that the representative is qualified to perform the Owner training for the equipment installed.
1. As part of the submittal process, provide a training agenda outlining major topics and time allowed for each topic.
2. Some items of specified equipment require that training must be performed by the manufacturer, using manufacturer's employees. See specific equipment Articles in these Specifications for this requirement.
3. Contractor shall provide three copies of certification by Contractor that training has been completed, signed by Owner's representative, for inclusion in Operation and Maintenance Manual. Certificates shall include:

    a. Listing of Owner-designated personnel completing training, by name and title.
    b. Name and title of training instructor.
    c. Date(s) of training.
    d. List of topics covered in training sessions.

4. Refer to specific equipment Articles for minimum training period duration for each piece of equipment.

END OF SECTION 23 00 50

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

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. Balancing Air Systems:

a. Constant-volume air systems.

2. Balancing Domestic Water Piping Systems.

1.3 REFERENCES

A. Associated Air Balance Council (AABC)
1. National Standards for Total System Balance, latest edition.

B. National Environmental Balancing Bureau (NEBB)
1. Procedural Standards for Testing and Balancing of Environmental Systems, latest edition.

1.4 DEFINITIONS

A. The intent of this Section is to use the standards pertaining to the TAB specialist engaged to perform the Work of this Contract, with additional requirements specified in this Section. Contract requirements take precedence over corresponding AABC or NEBB standards requirements. Differences in terminology between the Specifications and the specified TAB organization standards do not relieve the TAB entity engaged to perform the Work of this Contract of responsibility from completing the Work as described in the Specifications.

B. Similar Terms: The following table is provided for clarification only:

Similar Terms		
Contract Term	AABC Term	NEBB Term
TAB Specialist	TAB Agency	NEBB Certified Firm
TAB Standard	National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems	Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems
TAB Field Supervisor	Test and Balance Engineer	Test and Balance Supervisor

C. AABC: Associated Air Balance Council.

D. NEBB: National Environmental Balancing Bureau.

E. TAB: Testing, adjusting, and balancing.

F. TAB Organization: Body governing practices of TAB Specialists.

G. TAB Specialist: An entity engaged to perform TAB Work.

1.5 ACTION SUBMITTALS

A. LEED Submittals:
1. Air-Balance Report for Prerequisite IEQ 1: Documentation of work performed for ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
2. TAB Report for Prerequisite EA 2: Documentation of work performed for ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
1. Provide list of similar projects completed by proposed TAB field supervisor.
2. Provide copy of completed TAB report, approved by mechanical engineer of record for a completed project with similar system types and of similar complexity.

B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
1. Submit examinations report with qualifications data.

C. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. Interim Reports. Submit interim reports as specified in Part 3. Include list of system conditions requiring correction and problems not identified in Contract Documents examination report.

E. Certified TAB reports.
1. Provide three printed copies of final TAB report. Provide one electronic file copy in PDF format.

F. Sample report forms.

G. Instrument calibration reports, to include the following:
1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

a. Instruments to be used for testing and balancing shall have been calibrated within a period of one year, or less if so recommended by instrument manufacturer. and be checked for accuracy prior to start of work.

1.7 QUALITY ASSURANCE

A. Independent TAB Specialist Qualifications: Engage a TAB entity certified by AABC or NEBB.

1. The certification shall be maintained for the entire duration of TAB work for this Project. If TAB specialist loses certification during this period, the Contractor shall immediately notify the Architect and submit another TAB specialist for approval. All work specified in this Section and in other related Sections performed by the TAB specialist shall be invalidated if the TAB specialist loses certification, and shall be performed by an approved successor.

B. To secure approval for the proposed TAB specialist, submit information certifying that the TAB specialist is either a first tier subcontractor engaged and paid by the Contractor, or is engaged and paid directly by the Owner. TAB specialist shall not be affiliated with any other entity participating in Work of this Contract, including design, furnishing equipment, or construction. In addition, submit evidence of the following:
1. TAB Field Supervisor: Full-time employee of the TAB specialist and certified by AABC or NEBB.

    a. TAB field supervisor shall have minimum 10 years supervisory experience in TAB work.

2. TAB Technician: Full-time employee of the TAB specialist and who is certified by AABC or NEBB as a TAB technician.

    a. TAB technician shall have minimum 4 years TAB field experience.

C. TAB Specialist engaged to perform TAB work in this Project shall be a business limited to and specializing in TAB work, or in TAB work and Commissioning.

D. TAB specialist engaged to perform TAB work shall not also perform commissioning activities on this Project.

E. Certified TAB field supervisor or certified TAB technician shall be present at the Project site at all times when TAB work is performed.
1. TAB specialist shall maintain at the Project site a minimum ratio of one certified field supervisor or technician for each non-certified employee at times when TAB work is being performed.

F. Contractor shall notify Architect in writing within three days of receiving direction resulting in reduction of test and balance scope or other deviations from Contract Documents. Deviations from the TAB plan shall be approved in writing by the mechanical engineer of record for the Project.

G. TAB Standard:
1. Perform TAB work in accordance with the requirements of the standard under which the TAB agencies' qualifications are approved unless Specifications contain different or more stringent requirements:

    a. AABC National Standards for Total System Balance, or

    b. NEBB Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.

2. All recommendations and suggested practices contained in the TAB standard are mandatory. Use provisions of the TAB standard, including checklists and report forms, to the extent to which they are applicable to this Project.
3. Testing, adjusting, balancing procedures, and reporting required for this Project, and not covered by the TAB standard applicable to the TAB specialist engaged to perform the Work of this Contract, shall be submitted for approval by the design engineer.

H. TAB Conference: Meet with Architect and mechanical engineer on approval of the TAB strategies and procedures plan to develop a mutual understanding of the project requirements. Require the participation of the TAB field supervisor. Provide seven days' advance notice of scheduled meeting time and location. TAB conference shall take place at location selected by Architect offices of Capital.
1. Agenda Items:

    a. The Contract Documents examination report.
    b. The TAB plan.
    c. Coordination and cooperation of trades and subcontractors.
    d. Coordination of documentation and communication flow, including protocol for resolution tracking and documentation.

2. The requirement for TAB conference may be waived at the discretion of the mechanical engineer of record for the Project.

I. Certify TAB field data reports and perform the following:
1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

J. TAB Report Forms: Use standard TAB specialist's forms approved by Architect.

K. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

L. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

M. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.8 PROJECT CONDITIONS

1.9 WARRANTY

A. Provide workmanship and performance warranty applicable to TAB specialist engaged to perform Work of this Contract:
1. AABC Performance Guarantee.
2. NEBB Quality Assurance Program.

B. Refer to Division 01 Specifications for additional requirements.

1.10 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

C. Coordinate TAB work with work of other trades.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contract Documents Examination Report:
1. TAB specialist shall review Contract Documents, including plans and specifications. Provide report listing conditions that would prevent the system(s) from operating in accordance with the sequence of operations specified, or would prevent accurate testing and balancing:

    a. Identify each condition requiring correction using equipment designation shown on Drawings. Provide room number, nearest building grid line intersection, or other information necessary to identify location of condition requiring correction.
    b. Proposed corrective action necessary for proper system operation.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan and pump curves.
1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

J. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

K. Examine system pumps to ensure absence of entrained air in the suction piping.

L. Examine operating safety interlocks and controls on HVAC equipment.

M. Report conditions requiring correction discovered before and during performance of TAB procedures.

N. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures. TAB plan shall be specific to Project and include the following:
   1. General description of each air system and sequence(s) of operation.
   2. Complete list of measurements to be performed.
   3. Complete list of measurement procedures. Specify types of instruments to be utilized and method of instrument application.
   4. Qualifications of personnel assigned to Project.
   5. Single-line CAD drawings reflecting all test locations (terminal units, grilles, diffusers, traverse locations, etc.
   6. Table indicating pressure relationships (positive, negative, or neutral) between building spaces.
   7. Air terminal correction factors for the following:

      a. Air terminal configuration.
      b. Flow direction (supply or return/exhaust).
      c. Effective area of each size and type of air terminal.
      d. Air density.

B. Complete system-readiness checks and prepare reports. Verify the following:
   1. Permanent electrical-power wiring is complete.
   2. Automatic temperature-control systems are operational.
   3. Equipment and duct access doors are securely closed.
   4. Balance, smoke, and fire dampers are open.
   5. Isolating and balancing valves are open and control valves are operational.
   6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
   7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.
   1. Comply with requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
   1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
   2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 23 07 13 "Duct Insulation," Section 23 07 16 "HVAC Equipment Insulation," Section 23 80 00 Heating, Ventilating, and Air Conditioning."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Test each system to verify building or space operating pressure, including all stages of economizer cycle. Maximum building pressure shall not exceed 0.03 inches of pressure.

C. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

D. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

E. Verify that motor starters are equipped with properly sized thermal protection.

F. Check dampers for proper position to achieve desired airflow path.

G. Check for airflow blockages.

H. Check condensate drains for proper connections and functioning.

I. Check for proper sealing of air-handling-unit components.

J. Provide for adjustments or modifications to fan and motor sheaves, belts, damper linkages, and other components as required to achieve specified air balance at no additional cost to Owner.

K. Automatically operated dampers shall be adjusted to operate as indicated in Contract Documents. Controls shall be checked for proper calibration.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
   1. Measure total airflow.

      a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow. Alternative methods shall be examined for determining total CFM, i.e., Pitot-tube traversing of branch ducts, coil or filter velocity profiles, prior to utilizing airflow values at terminal outlets and inlets.

   2. Measure fan static pressures as follows to determine actual static pressure:

      a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
      b. Measure static pressure directly at the fan outlet.
      c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
      d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
4. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
5. Obtain approval from Mechanical Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Check operation of relief air dampers. Measure total relief air quantity at each stage of normal, economizer, power exhaust, or power exhaust economizer operation, as applicable to installed equipment. Adjust relief air dampers to provide 100 percent relief in economizer mode. Ensure that relief dampers close completely upon unit shutdown.

C. Check operation of outside air dampers. Measure total outside air quantity at each stage of normal, economizer, power exhaust, or power exhaust economizer operation, as applicable to installed equipment. Adjust outside air dampers to provide 100 percent outside air in economizer mode. Ensure that outside air dampers close completely upon unit shutdown.

D. Measure air outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading digital backflow compensating hood. Use outlet manufacturer's written instructions and calculating factors only when direct-reading hood cannot be used due to physical obstruction or other limiting factors. Final report shall indicate where values listed have not been obtained by direct measurement.

E. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents, if included.
2. Adjust patterns of adjustable outlets for proper distribution without drafts. Terminal air velocity at five feet above finished floor shall not exceed 50 feet per minute in occupied air conditioned spaces.

F. Do not overpressurize ducts.

3.6 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter manufacturer’s name, model number, size, type, and thermal-protection-element rating.

a. Starter strip heater size, type, and rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.7 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record compressor data.

3.8 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each refrigerant coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.
4. Air pressure drop.

3.9 GENERAL PROCEDURES FOR PLUMBING SYSTEMS

A. Measure pressure drop across each backflow preventer assembly at design flows.

B. Measure water flow at pumps. Use the following procedures except for positive-displacement pumps:
1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights.

2. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
3. Report flow rates that are not within range given in article, Tolerances.

C. Set calibrated balancing valves, if installed, at calculated presettings.

D. Measure flow at all stations and adjust, where necessary, to obtain first balance.
1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.

E. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.

F. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
1. Determine the balancing station with the highest percentage over indicated flow.
2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
3. Record settings and mark balancing devices.

G. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.
H. Measure the differential-pressure-control-valve settings existing at the conclusion of balancing.
I. Check settings and operation of each safety valve. Record settings.

3.10 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 10 percent and minus 5 percent .
2. Air Outlets and Inlets: Plus 5 percent and minus 5 percent .
3. Multiple outlets within single room: Plus 5 percent and minus 5 percent for total airflow within room. Tolerance for individual outlets within a single room having multiple outlets shall be as for “Air Outlets and Inlets”.

a. Room shall be balanced to create pressure relationship (positive, negative, or neutral) with adjacent spaces as indicated on Drawings. Maintain airflow differentials between supply, return, and exhaust indicated on Drawings.

B. Set plumbing systems water flow rates within plus or minus 10 percent.

3.11 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing field supervisor. Report shall be co-signed by the Contractor, attesting that he has reviewed the report, and the report has been found to be complete and accurate.
2. The certification sheet shall be followed by sheet(s) listing items for which balancing objectives could not be achieved. Provide explanation for failure to achieve balancing objectives for each item listed.
3. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Project Performance Guaranty
6. Architect's name and address.
7. Engineer's name and address.
8. Contractor's name and address.
9. Report date.
10. Signature of TAB supervisor who certifies the report.
11. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
12. Summary of contents including the following:

a. Indicated versus final performance.
b. Notable characteristics of systems.

c. Description of system operation sequence if it varies from the Contract Documents.

13. Nomenclature sheets for each item of equipment.
14. Data for terminal units, including manufacturer's name, type, size, and fittings.
15. Test conditions for fans and pump performance forms including the following:

a. Settings for outdoor-, return-, and exhaust-air dampers.
b. Conditions of filters.
c. Cooling coil, wet- and dry-bulb conditions.
d. Settings for supply-air, static-pressure controller.
e. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Duct, outlet, and inlet sizes.
3. Position of balancing devices.

E. Air distribution outlets and inlets shall be shown on keyed plans with designation for each outlet and inlet matching designation used in Contract Documents and TAB test reports. Room numbers shall be included in keyed plans and test reports. Where multiple outlets and inlets are installed within a single room, a designation shall be assigned and listed for each outlet and inlet in addition to room number.

F. Test Reports – General:
1. All test reports containing air or liquid flow data shall record flow values prior to system adjustment in addition to required data listed for each test report.

G. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:

a. Unit identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Discharge arrangement.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.

3. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Filter static-pressure differential in inches wg.
f. Outdoor airflow in cfm.

g. Return airflow in cfm.
h. Relief airflow in cfm.
i. Outdoor-air damper position, normal and economizer, power exhaust, or power exhaust economizer modes, as applicable to installed equipment.
j. Return-air damper position.
k. Relief-air damper position, normal and economizer, power exhaust, or power exhaust economizer modes, as applicable to installed equipment.

4. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Outdoor-air, wet- and dry-bulb temperatures in deg F.
c. Entering-air, wet- and dry-bulb temperatures in deg F.
d. Leaving-air, wet- and dry-bulb temperatures in deg F.

H. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:
1. Unit Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and unit size.
e. Manufacturer's serial number.
f. Fuel type in input data.
g. Output capacity in Btu/h.

2. Test Data (Indicated and Actual Values):

a. Total air flow rate in cfm.
b. Entering-air temperature in deg F.
c. Leaving-air temperature in deg F.

I. Fan Test Reports: For supply, return, and exhaust fans, include the following:
1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

J. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated air flow rate in cfm.
h. Indicated velocity in fpm.
i. Actual air flow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

K. Air-Terminal-Device Reports:
1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Air velocity in fpm.
c. Preliminary air flow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final air flow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

L. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.12 INSPECTIONS

A. Initial Inspection:
1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

    a. Measure airflow of at least 10 percent of air outlets.
    b. Measure water flow of at least 5 percent of terminals.
    c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
    d. Verify that balancing devices are marked with final balance position.
    e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:
1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Mechanical Engineer.
2. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Mechanical Engineer.
3. Mechanical Engineer shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than 10 percent, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contact the TAB specialists' governing organization for remedial action by the governing organization under the workmanship and performance warranty. See article, Warranty.
3. If remedial action is not provided by the TAB specialists' governing organization in a timely manner, Owner may contract the services of another TAB specialist to complete the TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB specialists' final payment.

D. Prepare test and inspection reports.

END OF SECTION 23 05 93

SECTION 23 08 00.13

TITLE 24 COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. In the event of conflict between requirements of Division 01 Title 24 commissioning specifications and this Section, Division 01 requirements shall prevail.

1.2 SUMMARY

A. Section Includes: Requirements for commissioning of HVAC systems for Title 24 (T-24) compliance.

B. The requirements of this Section apply to all Sections of Division 23.

C. Scope: Commissioning Coordinator shall complete the building systems commissioning requirements of the California Energy Code, as applicable to Project. It is not the intention of Project specifications to require duplication in testing.
1. T-24 commissioning activities may be coordinated with Contractor tests and TAB work specified in technical Sections.

2. T-24 commissioning activities may be coordinated with LEED and CHPS program commissioning activities, as applicable to Project.

1.3 REFERENCES

A. 2013 California Energy Code.

B. 2013 California Energy Code and Building Energy Efficiency Standards Reference Appendices.

C. 2013 Building Energy Efficiency Standards Nonresidential Compliance Manual.

1.4 DEFINITIONS

A. Commissioning Coordinator: General Contractor, or an entity engaged by the General Contractor to perform T-24 commissioning.

B. Covered Processes: Process equipment for which there are listed requirements in the California Energy Code.

C. OPR: Owner’s Project Requirements.

D. TAB: Testing, Adjusting, and Balancing.

1.5 SUBMITTALS (FOR RECORD ONLY)

A. Submit the following:
1. Commissioning Plan.

2. Systems Manual.
3. Commissioning Report.
4. Certificates of Installation.
5. Certificates of Acceptance.

B. Above items for inclusion in closeout documents submitted to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 TEST INSTRUMENTS

A. Commissioning Coordinator shall supply test instruments. Instruments to be used for testing and balancing shall have been calibrated within a period of one year, or less if recommended by instrument manufacturer, and be checked for accuracy prior to start of work.

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS ROLES AND RESPONSIBILITIES

A. Architect/Engineer:
1. Performs construction observation. Provides construction observation reports.
2. Reviews and approves Commissioning Plan, Systems Manual, and Commissioning Report.
3. Assists in problem resolution.

B. Commissioning Coordinator:
1. Coordinates commissioning process.
2. Develops Commissioning Plan.
3. Schedules and conducts functional testing. Completes Certificates of Acceptance.
4. Assembles Systems Manual.
5. Schedules and conducts systems operations training. Verifies systems operations training completion.

C. HVAC Subcontractor: Assists in functional testing.

D. Electrical Subcontractor: Assists in functional testing.

E. Controls Subcontractor: Assists in functional testing.

F. TAB Subcontractor: Assists in functional testing.

G. Equipment Manufacturers/Vendors:
1. Performs Check, Test, and Start of equipment and systems, as required by Project technical Sections.
2. Provides systems and equipment documentation required to complete functional testing and assemble Systems Manual.

3.2 COMMISSIONING PLAN

A. Commissioning Coordinator shall author the code-required Commissioning Plan. The Commissioning Plan shall address HVAC systems for which commissioning is required. The Commissioning Plan shall be updated by Commissioning Coordinator throughout the construction process. The Commissioning Plan shall contain the following:

1. General Project Information: Commissioning Coordinator shall obtain general Project information from Project architectural Drawings.
2. Commissioning Goals:

    a. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.
    b. Verify and document proper integrated performance of equipment and systems utilizing functional testing for mechanical system acceptance, as required by the California Energy Code.
    c. Verify that Systems Manual documentation is complete.
    d. Verify that operating personnel are trained to enable them to operate, monitor, adjust, and maintain HVAC systems in an effective and energy-efficient manner.

3. Commissioning Coordinator shall compile the following information and include in Commissioning Plan:

    a. An explanation of original design intent: Commissioning Coordinator shall obtain copies of the OPR and BOD for the Project.
    b. Equipment and systems to be tested, including the extent of tests: Test 100 percent of a given type of installed equipment having associated Acceptance Requirements.

        1) Refer to forms MCH-01-E on Drawings for systems to be commissioned.
        2) Covered Processes: In addition to systems listed in MCH-01-E on Drawings, complete Acceptance Requirements for the following systems, if applicable to Project:

            a) Parking garage ventilation systems.
            b) Compressed air systems.
            c) Type 1 Kitchen exhaust systems.

    c. Functions to be tested: Refer to 2013 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Nonresidential Appendix NA7.
    d. Conditions under which the test shall be performed.
    e. Measureable criteria for acceptable performance: Refer to 2013 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Nonresidential Appendix NA7.
    f. Commissioning team information:

        1) Refer to Project information on architectural Drawings for design team participants. Commissioning Coordinator shall add subcontractor information to provided design team information and include in Commissioning Plan.

    g. Commissioning process activities, schedules, and responsibilities. Plans for the completion of functional performance testing, systems operations training, and commissioning report.

3.3 CERTIFICATES OF INSTALLATION

A. Commissioning Coordinator shall complete applicable Certificates of Installation forms.

3.4 FUNCTIONAL TESTING REQUIREMENTS

A. For systems to be commissioned, Commissioning Coordinator shall complete functional testing according to the applicable Acceptance Requirements for Code Compliance contained within the California Energy Code. Complete Certificates of Acceptance.

3.5 SYSTEMS MANUAL

A. Commissioning Coordinator shall assemble Systems Manual in accordance with the requirements of the California Energy Code, HVAC and Plumbing specifications, and Division 01 specifications, including Section 01 79 00, Demonstration and Training, and commissioning specifications.

3.6 SYSTEMS OPERATIONS TRAINING

A. Commissioning Coordinator shall provide systems operations training in accordance with the requirements of the California Energy Code, HVAC and Plumbing specifications, and Division 01 specifications, including Section 01 79 00, Demonstration and Training, and commissioning specifications.

3.7 COMMISSIONING REPORT

A. Commissioning Coordinator shall complete Commissioning Report in accordance with the requirements of the California Energy Code and Division 01 commissioning specifications.

END OF SECTION

SECTION 23 80 00

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Roof mounted air conditioning units.

B. Heating and ventilating units.

C. Split system air conditioning units.

D. Refrigeration piping and fittings.

E. Fans.

F. Kitchen exhaust hood – type 1.

G. Kitchen exhaust hood – type 2.

H. Louvers.

I. Air inlets and outlets.

J. Filters.

K. Dampers.

L. Ductwork.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 23 00 50, Basic HVAC Materials and Methods.

C. 23 05 93, Testing, Adjusting, and Balancing for HVAC.

D. Section 25 50 00, Automation Facility Controls.

E. Section 23 09 00, Instrumentation and Controls for HVAC.

1.3 ADDITIONAL REQUIREMENTS

A. Furnish and install any incidental work not shown or specified which is necessary to provide a complete and workable system.

B. Coordinate all of work in this Section with all of the Trades covered in other Sections of the Specifications to provide a complete, operable and sanitary installation of the highest quality workmanship.

1.4 DESCRIPTION OF WORK

A. Work of this section includes, but is not necessarily limited to Heating, Ventilating and Air Conditioning work indicated on the drawings and described herein.

1.5 QUALITY ASSURANCE

A. Design Criteria:
1. All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture. All gas-fired equipment shall be UL, ETL or CSA listed.
2. Supply all equipment and accessories in accordance with requirements of applicable national, state and local codes.
3. All items of a given type shall be products of the same manufacturer.
4. Scheduled equipment performance is minimum capacity required.
5. Scheduled electrical capacity shall be considered as maximum available.
6. Scheduled gas BTU input shall be considered as maximum available.

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, dimensions, weight, corner or mounting point weights, furnished specialties and accessories; and installation and start-up instructions. Product data shall include applicable product listings and standards. Refer to Section 23 00 50, Basic HVAC Material and Methods for additional requirements.
1. Upon approval of submittal, provide manufacturer’s installation and operating instructions to the Project inspector for the following:

a. Fire dampers, smoke dampers, and combination smoke-fire dampers.
b. Type 1 kitchen exhaust field applied grease duct enclosures.

B. Roof Curb Data: For roof mounted equipment where combined weight of equipment unit and roof curb or rail exceeds 400 pounds, submit calculations from manufacturer for roof curbs proving compliance with the seismic requirements of the California Building Code, and ASCE 7-10. Manufacturer shall certify that roof curbs are suitable for use indicated on Drawings and in Specifications for the seismic design category indicated in structural Contract Documents. Calculations shall be stamped and signed by a State of California registered structural engineer.

C. Economizer Fault Detection and Diagnostics (FDD) System Data: For all air-cooled unitary direct-expansion units equipped with an economizer, provide data for third-party supplied California Energy Commission certified FDD controller, documenting compliance with the requirements of California 2013 Building Energy Efficiency Standards. Provide evidence of certification.

D. Engineering Data: Submit fan curves and sound power level data for each fan unit. Data shall be at the scheduled capacity. Data shall include the name of the rating agency or independent laboratory.

E. Maintenance Data: Submit maintenance data and parts list for each piece of equipment, control, and accessory; including "trouble-shooting guide," in Operation and Maintenance Manual.

F. Record Drawings: At project close-out, submit Record Drawings of installed ductwork, duct accessories, and outlets and inlets in accordance with requirements of Division 01.

G. Product Data for California Green Building Standards Code Compliance: For adhesives and sealants, including primers, documentation of compliance including printed statement of VOC content and chemical components.

H. LEED Submittals:

1. Product Data for Credit EQ 4.1: For adhesives and sealants, documentation of compliance including printed statement of VOC content and chemical components.
2. Laboratory Test Reports for Credit EQ 4: For adhesives and sealants, documentation indicating that product complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

I. Coordinated Layouts: Submit coordinated layouts. For requirements refer to article, Coordinated Layouts, in this Section.

1.7 COORDINATED LAYOUT

A. Coordinated layouts are required to amplify, expand and coordinate the information contained in the Contract Documents.

B. Provide minimum 1/4 inch equals one foot scaled coordinated layout drawings showing plan and pertinent section or elevation views of piping, ductwork, equipment, accessories, and electrical systems. Drawings shall be reproducible and work of each trade represented shall be fully coordinated with structure, other disciplines, and finished surfaces. Drawings shall be presented on a single size sheet. Coordinated layout drawings shall have title block, key plan, north arrow and sufficient grid lines to provide cross-reference to design Drawings.
1. Provide a stamp or title block on each drawing with locations for signatures from all contractors involved, including but not limited to the General, HVAC, Plumbing, Fire Protection, and Electrical contractors. Include statement for signature that the contractor has reviewed the coordinated layout drawings in detail and has coordinated the work of his trade.
2. Show on drawings the intended elevation of all ductwork in accordance with the following example.

B.O.D. = 9'-0"
OFFSET UP 6"
B.O.D. = 9'-6"

3. Highlight, encircle or otherwise indicate deviations from the Contract Documents on the coordinated layouts. Architect will not be responsible for identifying deviations from the original Contract Documents.

C. Since scale of contract drawings is small and all offsets and fittings are not shown, contractor shall make allowances in bid for additional coordination time, detailing, fittings, offsets, hangers and the like to achieve a fully coordinated installation. If changes in duct size are required, equivalent area shall be maintained and the aspect ratio shall not be in excess of 2 to 1 unless approved by the Engineer. Drawings shall be submitted for review prior to fabrication and installation. Drawings may be submitted in packages representing at least one quarter of the building ductwork.

D. Check routing on all ductwork before fabricating. Report any discrepancies to Architect. No extra cost will be allowed for failure to conform to above.

1.8 REFERENCES

A. AABC - Associated Air Balance Council

B. AFBMA - Anti Friction Bearing Manufacturer's Association

C. CSA – Canadian Standards Association International

D. AMCA - Air Moving and Control Association Inc.

1. Standard 210 - Laboratory Methods of Testing Fans

E. ANSI - American National Standards Institute

F. ARI - Air-Conditioning and Refrigeration Institute

G. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers

H. ASME - American Society of Mechanical Engineers

I. ASTM - American Society of Testing and Materials

J. CCR - California Code of Regulations

K. CSFM - California State Fire Marshal

L. NIST - National Institute of Standards and Technology

M. NEMA - National Electrical Manufacturer's Association

N. NFPA - National Fire Protection Association

O. OSHA - Occupational Safety and Health Act

P. SMACNA - Duct Manuals

Q. CBC - California Building Code

R. UL - Underwriters' Laboratories, Inc.

S. CMC - California Mechanical Code

T. CPC - California Plumbing Code

U. CEC - California Electrical Code

PART 2 - PRODUCTS

2.1 MATERIALS

A. Insulation products, including insulation, insulation facings, jackets, adhesives, sealants and coatings shall not contain polybrominated diphenyl ethers (PBDEs) in penta, octa, or deca formulations in amounts greater than 0.1 percent (by mass).

2.2 GAS FIRED EQUIPMENT

A. All gas-fired equipment shall be listed for use as a gas appliance.

B. All units shall comply with the emissions requirements of the Air Quality Management District (AQMD) in which they are to be installed.

2.3 AIR CONDITIONING UNIT, ROOF-MOUNTED

A. Provide factory assembled single packaged outdoor rooftop mounted, electrically controlled gas heating and electric cooling unit, rated in accordance with ARI Standards 210/240 or 340/360, and ETL or UL listed and labeled, classified in accordance with UL 1995. Provide refrigerant charge R-410A, all internal wiring, piping, controls, and special features required prior to field startup. Design unit to conform to the following:
1. California NOx emission requirements.
2. ASHRAE 15.
3. ASHRAE 90.1.
4. Insulation, adhesive, and all materials exposed to air stream shall meet NFPA 90A requirements for flame spread and smoke generation.
5. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).

B. Unit shall be rated in accordance with ARI sound standards 270 or 370.

C. Unit shall be ETL or UL tested and certified in accordance with ANSI Z21.47 Standards as a total package.

D. Roof curb shall be designed to conform to NRCA Standards.

E. Unit shall be designed and manufactured in accordance with ISO 9001.

F. For unit sizes applicable to Energy Star program, units shall be Energy Star qualified.

G. Cabinet:
1. Provide galvanized steel unit cabinet, bonderized and coated with a baked enamel finish.
2. All airstream interior surfaces shall be insulated with a minimum 1/2 inch thick, 1.5 lb density cleanable insulation. Insulation shall be encapsulated with panel design or have sealed edges.
3. Cabinet panels shall be hinged with integrated non-corrosive hinges. Provide hinged access panels for the filter, compressors, evaporator fan, and control box/ heat section areas. Each panel shall have multiple latches and handles. Each external hinged access panel shall be double-wall construction and permanently attached to the rooftop unit.
4. Return air filters shall be accessible through a dedicated hinged access panel.
5. Fork lift slots and rigging holes shall be provided in unit base rails. Base rails shall be minimum 16 gauge.
6. Unit shall have an integral sloped condensate drain pan, providing minimum 3/4 in.-14 NPT connections for horizontal drain configuration. Provide unit with alternate vertical thru-the-bottom drain connection when furnished as standard for units sizes scheduled on Drawings. See Drawings for drain configuration. Pan shall be removable for cleaning and maintenance. All drain pans shall conform to ASHRAE 62.1 self-draining provisions.
7. Unit shall have standard side and alternate field or factory installed thru-the-bottom power and control wiring connection capability. Thru-the-bottom electrical connections shall use manufacturer's approved water-tight connection method.
8. Unit shall be field convertible to, or factory furnished with, horizontal air discharge, as applicable for unit sizes as scheduled on Drawings.

H. Fans:
1. Centrifugal supply air blower (evaporator fan) shall have sealed, permanently lubricated ball bearings, or rigid pillow block bearings, as supplied as standard equipment for unit sizes

scheduled on Drawings. Units supplied with pillow block bearings shall be furnished with accessible lubricant fittings. Provide belt-driven double inlet fan wheel, centrifugal type with forward curved blades and adjustable sheaves. Multiple speed direct drive motors may be utilized when supplied as standard equipment for efficiency and electrical requirements as scheduled on the Drawings. Fan wheel shall be steel, with corrosion resistant finish, dynamically balanced.

2. Condenser fans shall be of the direct-driven propeller type, with corrosion-resistant aluminum blades. Fans shall be dynamically balanced and discharge air upwards. Induced-draft blower shall be of the direct-driven, single inlet, forward-curved, centrifugal type, made from aluminized steel with a corrosion-resistant finish and shall be dynamically balanced.
3. Induced draft fan shall be of the direct driven, single inlet, forward-curved centrifugal type. Fan wheel shall be steel, with corrosion resistant finish, dynamically balanced.

I. Motors:
1. Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have line break thermal and current overload protection.
2. Evaporator fan motor shall have permanently lubricated, sealed bearings and inherent automatic-reset thermal overload protection or manual reset calibrated circuit breakers.
3. Totally enclosed condenser-fan motor shall have permanently lubricated, sealed bearings, and inherent automatic-reset thermal overload protection.
4. Induced-draft motor shall have permanently lubricated sealed bearings and inherent automatic-reset thermal overload protection.
5. For single-phase fan motors sized larger than 1/12 hp and smaller than 1 hp, refer to Article, Electric Motors, in Section 23 00 50, Basic HVAC Materials and Methods.

J. Compressor:
1. Fully hermetic, scroll type with internal high-pressure and temperature protection.
2. Factory installed rubber shock mounted and internally spring mounted for vibration isolation.
3. Compressor Anti-Recycle Timer: Compressor shall be prevented from restarting for a minimum of five minutes after shutdown, with manufacturers installed compressor cycle delay.
4. Compressor shall have a five year warranty.

K. Coils:
1. Standard evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless internally finned copper tubes with all joints brazed.
2. Units shall have face-split type evaporator coils.
3. For units with single compressor, condenser coils shall be single slab, single pass design. For dual compressor units, condenser coils shall be single slab, 2 pass design.
4. Evaporator coils shall be leak tested at minimum 150 psig, and pressure tested at minimum 450 psig.
5. Condenser coils shall be leak tested at minimum 150 psig, and pressure tested at minimum 650 psig.

L. Heating Section:
1. Induced-draft combustion type with direct-spark ignition system and redundant main gas valve with 2-stage capability on all 3-phase units.
2. Heat Exchanger:
    a. The standard aluminized heat exchanger shall be of the tubular-section type constructed of minimum 20-gage aluminized steel. Standard heat exchanger shall have a ten year warranty.

3. Burners shall be of the in-shot type constructed of aluminum-coated steel.
4. All gas piping shall enter the unit at a single location. Gas entry shall be through side or bottom of unit. See Drawings for gas entry location. When bottom gas entry is utilized, unit shall be

furnished with field installed conversion kit, arranged so that gas shut-off valve is accessible from the roof.
5. All factory-installed orifices are for operation up to 2,000 feet of altitude. For altitudes between 2,000 feet and 7,000 feet, a factory certified kit shall be furnished for field installation.
6. Units shall be suitable for use with natural gas or propane. Provide field-installed propane conversion kit as required, see schedule on Drawings.
7. The integrated gas controller board shall include gas heat operation fault notification using an LED (light-emitting diode).
8. Unit shall be equipped with anti-cycle protection with one short cycle on unit flame rollout switch or 4 continuous short cycles on the high-temperature limit switch. Fault indication shall be made using an LED.
9. The integrated gas controller board shall contain algorithms that modify evaporator-fan operation to prevent future cycling on high-temperature limit switch.
10. The LED shall be visible without removal of control box access panel.
11. Gas burner tray shall be removable for maintenance.
12. Heating section shall be insulated with foil-faced fiberglass insulation.

M. Refrigerant Components:
1. Each refrigerant circuit shall include:

    a. Balanced port thermostatic expansion valve (TXV) with removable power element.
    b. Solid core refrigerant filter driers with pressure ports.
    c. Refrigerant pressure gage ports and connections on suction, discharge, and liquid lines.

N. Filter Section:
1. Standard filter section shall accommodate 2 inch deep filters. Filters shall conform to the “Air Filters” Article in this Specification Section.
2. Filter section shall use standard size filters.

O. Controls:
1. Unit shall be complete with self-contained low voltage fuse protected control circuit. Refer to Section 25 50 00, if included, and equipment schedule, sequence of operation and control diagram on Drawings for additional requirements.
2. When third party direct digital controls with an Energy Management System will be utilized, provide electro-mechanical controls with 24V thermostat interface.
3. When stand-alone thermostat operation is utilized, provide electro-mechanical controls with 24V thermostat interface or provide microprocessor controls.
4. When stand-alone thermostat operation is utilized for single-zone VAV units, provide microprocessor controls.. Units shall have factory mounted supply fan variable frequency drives.
5. When third party direct digital controls with an Energy Management System will be utilized for single zone VAV units, provide microprocessor controls with BACnet or LON interface. Units shall have factory mounted supply fan variable frequency drives.
6. Electro-mechanical controls shall include the following, as a minimum:

    a. Service run test capability.
    b. Provide compressor minimum run time (3 minutes) and minimum off time (5 minutes).
    c. Economizer control.
    d. Unit shall have 35° F low ambient cooling operation.
    e. Time delay relay.

7. Microprocessor controls shall include the following, as a minimum:

a. User diagnostic interface.
b. Unit control with standard suction pressure transducers and condensing temperature thermistors.
c. Shall provide a 5° F temperature difference between cooling and heating set points to meet ASHRAE 90.1 energy standard.
d. Service run test capability.
e. Shall accept input from a CO2 sensor (indoor).
f. Configurable alarm light shall be provided which activates when certain types of alarms occur.
g. Provide compressor minimum run time (3 minutes) and minimum off time (5 minutes).
h. Service diagnostic mode.
i. Economizer control.
j. Unit shall have 0° F low ambient cooling operation.
k. Time delay relay.

P. Safeties:
1. Unit shall incorporate a solid-state compressor lockout that provides optional reset capability at the space thermostat, should any of the following safety devices trip and shut off compressor:

a. Compressor lockout protection provided for either internal or external overload.
b. Low-pressure protection.
c. Freeze protection (evaporator coil).
d. High-pressure protection (high pressure switch or internal).
e. Compressor reverse rotation protection.
f. Loss of charge protection.
g. Start assist on singe-phase units.

2. Supply-air sensor shall be located in the unit and detect both heating and cooling operation.
3. Induced draft heating section shall be provided with the following minimum protections:

a. High-temperature limit switch.
b. Induced-draft motor speed sensor.
c. Flame rollout switch.
d. Flame proving controls.
e. Redundant gas valve.

4. Phase Protection: Provide unit-mounted “SymCom,” or equal, Motor Saver three phase voltage monitor, model 201A or equal, adjustable voltage range for each unit, install per manufacturer's recommendations, mount in NEMA 3R enclosure if exposed to the weather.

a. Units shall provide the following features:

1) Low voltage fault trip and reset.
2) Voltage unbalance/phasing fault trip and reset.
3) High voltage fault trip and reset.
4) Transient Protection (Internal).
5) Automatic restart.

b. Provide each unit with 600V socket, “SymCom” model OT08, or equal.

Q. Operating Characteristics:
1. Unit shall be capable of starting and running at 125° F ambient outdoor temperature per maximum load criteria of ARI Standards 210 or 360.

2. Unit will operate in cooling down to an outdoor ambient temperature of 35° F.
3. Unit shall be provided with fan time delay to prevent cold air delivery in heating mode.

R. Electrical Requirements:
1. All unit power wiring shall enter unit cabinet at a single location. Both unit side and bottom power entry provisions shall be provided. Refer to Drawings schedule for thru-the-bottom power wiring requirement.

S. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Carrier Corporation.
2. Trane Inc.
3. Johnson Controls, Inc.

T. Provide the following additional features and equipment:
1. Roof Curb: Formed galvanized steel with wood nailer strip capable of supporting entire unit weight. Provide 3 inch wide bottom flange.
2. Provide heavy-duty 18 gauge expanded metal coil guard grille to protect all surfaces of the condensing coil. Coil guard by Micrometl, Canfab, or equal.
3. Modulating Power Exhaust Economizer: Micrometl, Canfab, or equal. Integrated type capable of simultaneous economizer and compressor operation.

a. Provide self-contained outdoor rooftop system, mounted directly to the return air compartment of the HVAC packaged equipment. Provide differential dry bulb economizer control system and a factory programmed, fully programmable variable frequency drive package controlled by a differential pressure transmitter, mounted directly to the return air compartment of the HVAC packaged equipment. Design the system to continuously maintain space pressure, and provide capability of introducing up to 100 percent outdoor air.

1) Economizer control system shall be certified as meeting the requirements for Fault Detection and Diagnostics (FDD) in the 2013 California Building Energy and Efficiency Standards.

b. Provide outside differential pressure tubing termination with hex style pneumatic filter-muffler, minimum filtration 40 microns, 53 SCFM maximum at 100 psi, as manufactured by McMaster-Carr, or equal.
c. Provide hinged cabinet access doors and include latches to provide a tool-less entry for servicing.
d. Provide door lock on the power exhaust cabinet to meet ETL safety requirements.
e. Outdoor air intake dampers shall be low leak not to exceed 3 percent at 1 inch wg pressure differential and include stainless steel side seal and neoprene edge seal. Arrange dampers to close upon loss of power.
f. Provide belt driven exhaust blowers, double inlet, forward-curved centrifugal type. Provide gravity backdraft damper at fan outlet.
g. Provide fully programmable factory programmed variable frequency drive (VFD) package for each fan, driven by 4 to 20 mA signal from a differential pressure transmitter. Pressure transmitters shall measure 0 - 0.1 in wg. Install room sensor tubing with sensor tube termination installed within the room.

1) Where direct digital controls are utilized, provide Belimo, or equal, damper actuator, complete with spring return and all controls required to make the system fully operational.

2) Where stand-alone controls are utilized, provide Belimo, or equal, damper actuator, complete with spring return and all controls, including logic module, required to make the system fully operational.

4. Flue Extensions:

a. Provide at all locations where gas flue outlet will be within 10 feet of an adjacent building or unit air intake and locations where adjacent vertical surfaces within 3 feet extend more than 2 feet above the top of the unit, provide manufacturer's listed flue extension.
b. Arrange flue extension to terminate 3 feet above top of adjacent air intake or adjacent vertical surface.

5. Other features, accessories, and equipment scheduled on Drawings.

U. Replenish for a period of one year without cost to the Owner all refrigerant and oil required to maintain the proper levels.

V. Owner Training: Manufacturer shall provide two initial on-site 4-hour training sessions for Owners' maintenance personnel. Manufacturer shall provide one 4-hour follow-up training session to be scheduled by Owner within one year of the date of the final initial training session. Training session agenda shall be as follows:
1. First session: Equipment.
2. Second session: Controls.
3. Follow-up session: Agenda by Owner.

2.4 MAKEUP AIR UNIT

A. Provide factory assembled packaged rooftop mounted, electrically controlled heating and make-up air unit, ETL or UL listed and labeled, consisting of cabinet, supply fan, filters, and indirect-fired gas furnace. Provide all internal wiring, piping, controls and special features required prior to field startup. Design unit to conform to the following:

1. ANSI Z83.8/CSA 2.6.
2. NFPA 54.
3. ASHRAE 90.1.
4. Insulation, adhesive, and all materials exposed to airstream shall meet NFPA 90A requirements for flame spread and smoke generation.
5. Unit casing shall be capable of withstanding 1000-hour salt spray exposure per ASTM B117 (scribed specimen).
6. Roof curb shall be designed to conform to NRCA Standards.

B. Cabinet: Double-wall G90 galvanized steel panels, minimum 18 gauge, rigidly formed and supported by minimum 16 gauge galvanized steel channel base with rigging holes. Cabinet shall be fully weatherized for outdoor installation, and provided with the following:
1. Finish: Air-dried enamel.
2. Cabinet insulation: Minimum 1" thick fiberglass duct liner, complying with ASTM C 1071, Type II, applied on all unit sections.
3. Access Panels: Hinged, double-wall with cam-lock fasteners. Insulate access panels exposed to airstream equal to unit cabinet insulation. Provide access panels at furnace, fan motor, filter and control areas.
4. Provide with integral curb cap and matching roof curb. Roof curb shall be formed galvanized steel with wood nailer strip, capable of supporting entire unit weight. Provide 3 inch wide bottom flange.

C. Blower: Double width, double inlet centrifugal type fan, statically and dynamically balanced. Blower motor shall be single speed, open drip proof, and energy efficient. Motor bearings shall be permanently lubricated ball bearing or pillow block type. Blower and motor shall be vibration isolated.

1. For single-phase fan motors sized larger than 1/12 hp and smaller than 1 hp, refer to Article, Electric Motors, in Section 23 00 50, Basic HVAC Materials and Methods.
2. Drive: V-belt drive with matching fan pulley and adjustable motor sheaves and belt assembly. Linked blower belts will not be accepted.

D. Heating Section: CSA certified for use with natural gas, 80 percent minimum thermal efficiency. Heating section may be integral to blower cabinet or be provided as separate section. Provide with the following features:
1. Modulating gas valve, capable of turndown to minimum 25 percent of gas input value scheduled on Drawings.
2. Stainless steel burner assembly.
3. Combustion air vent fan: Direct drive centrifugal type.
4. Electronic discharge temperature controller. Control interface shall be LCD screen with indicating lights. Default display shall be actual discharge temperature.
5. Direct spark ignition with non-standing pilot.
6. 409 Stainless steel tubular heat exchanger with minimum 10 year warranty.

a. Controls and Safeties: All burner controls factory wired to terminal blocks, complete with 24 V transformer. Provide the following:

1) High temperature limit control with automatic reset.
2) Ignition with 100 percent timed lockout.
3) Pressure switch to lock out gas valve on failure of combustion air blower.
4) Gas Train: Regulated, redundant, 24 V AC gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shut off, and manual shut off.
5) Purge-period timer shall automatically delay burner ignition and bypass low-limit control, and provide pre-purge and post-purge cycle.

E. Filter Section
1. Standard filter section shall accommodate 2 inch deep filters. Filters shall conform to the “Air Filters” Article in this Specification Section.
2. Filter section shall use standard size filters.
3. Velocity shall not exceed 550 FPM.

F. Mixing Box: Inlet air control shall allow for 100 percent OA and 100 percent return air with mixed air controller and warm-up (ASHRAE Cycle III). Standard configuration shall be bottom return with rear outside air intake. Provide galvanized outside air hood with bird screen and rain baffles. Omit outside air hood when evaporative cooling module is utilized. When economizer operation is indicated in the sequence of operations, provide dry bulb economizer controller.

G. Dampers:

1. Outdoor-Air and Return Air Damper: Galvanized steel, opposed-blade dampers with vinyl blade seals and stainless steel jamb seals.
2. Damper Operator: Direct coupled, multi-position electronic type with spring return or fully modulating electronic type as required by control sequence indicated on Drawings.

H. Downturn Plenum: Provide downturn plenum if required for vertical supply air discharge. See Drawings for unit air discharge configuration. Plenum shall be of materials, construction and finish equal to that described for unit cabinet.

I. Controls:
1. Factory-wired, fuse protected control transformer, connection for power supply and field-wired unit to remote control panel. Refer to Section 25 50 00, if included, and equipment schedule, sequence of operation and control diagram on Drawings for additional requirements.
2. When utilizing stand-alone thermostat controls: Manufacturer provided remote surface-mounted or recessed control panel shall contain potentiometer for setting minimum outside air quantity. Refer to Drawings for location and type of control panel. Remote control panel and potentiometer not required for direct digital control. Remote control panel shall have the following additional features:

    a. Switches:

        1) On-off-auto fan switch.
        2) Heat-vent-cool switch.

    b. Status lights:

        1) Supply fan operation indicating light.
        2) Blower on.
        3) Heat/main valve on.

    c. Thermostat with over-ride.

3. When utilizing direct digital control: Provide factory installed application-specific controller and damper actuators compatible with the direct digital control system. Unit manufacturer shall coordinate with controls contractor to ensure compatibility. Controller shall have the following functions:
    a. Provide start and stop interface relay, and relay to notify DDC system of alarm condition. Provide the following alarms, as a minimum:

        1) Supply fan status.
        2) Heat status.
        3) Freeze alarm.

    b. Provide hardware interface or additional sensors as follows:

        1) Room temperature.
        2) Discharge air temperature.
        3) Furnace operating.
        4) Return air temperature.
        5) Outdoor air temperature.
        6) Heater output (0-100 percent).
        7) Modulating damper output or VFD control (0-100 percent).

J. Evaporative Cooling Module: When scheduled on Drawings, provide evaporative cooling module with pump and water metering system. Evaporative cooling module shall be wired and mounted to the base unit at the factory. Provide the following:
1. Cabinet: 300 series stainless steel with finish equal to that described for unit cabinet. Cabinet may be galvanized steel when internal cooling module is of all stainless steel construction. Cabinet shall include louvered intake and 2 inch aluminum mesh filters.

2. Water reservoir: 300 series stainless steel. Overflow and drain connections in the drain pan bottom to be 1/2 inch diameter pipe or standard hose thread.
3. Pump: Submersible, centrifugal sump pump with inlet strainer, balancing valve located in pump discharge, thermally protected, fan cooled motor with moisture-proof windings.
4. Media: Media shall be 12 inch thick GlasDek by Munters Corporation, or equal, cross-fluted pad material of large fibers bonded together by inorganic, non-crystalline fillers and conforming to UL900, Class 2 rating. Pads will have less than .25 inches water column air pressure drop at 550 fpm face velocity when wet, and develop a saturation efficiency of not less than 90 percent.
5. Water hammer arrestor (furnished by piping contractor).
6. Antifreeze protection kit to lock-out evaporative cooling module and drain supply line at a manually selected outside air temperature.
7. Water Metering System:

    a. Microprocessor-based water metering system: Provide timer, solenoid valve, and water distribution piping to apply the water supply to the media in response to outside air dry bulb and wet bulb temperatures. Remote thermostat shall open water supply valve to maintain dry-bulb temperature in space. Timer shall activate thermostat circuit.

K. Electrical: All unit power wiring shall enter the unit at a single location, standard side or alternate bottom. Single-point connection shall include evaporative cooler module. See unit schedule on Drawings for thru-the-bottom wiring requirement.

L. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include the following, or equal:
1. Greenheck Fan Corporation.
2. Reznor-Thomas & Betts Corporation; Mechanical Products Division.

M. Owner Training: Manufacturer shall provide one initial on-site 4-hour training session for Owners' maintenance personnel. Manufacturer shall provide one 2-hour follow-up training session to be scheduled by Owner within one year of the date of the final initial training session.

2.5 SPLIT SYSTEM AC UNIT

A. General: Furnish and install split system air conditioner, with R410A refrigerant, and complete with automatic controls. Equipment shall be shipped factory assembled, wired, tested, and ready for field connections.

B. Quality Assurance:
1. Unit shall be ETL or UL listed and labeled.
2. Unit shall be manufactured in a facility registered to ISO 9001:2000.
3. Unit shall be rated in accordance with ARI standard 210.

C. Delivery, Storage and Handling: Follow manufacturer's recommendations.

D. Cooling System: The total certified cooling capacity shall not be less than scheduled. The compressor power input shall not exceed that of the unit specified.

E. Indoor Section: Wall mounted, ceiling surface mounted, or ceiling recessed mounted, as indicated on Drawings.

1. Cabinet:

    a. Wall mounted: Molded white high strength plastic.

1) Provide wall mounted unit with factory mounting plate.

b. Ceiling surface mounted: Molded white high strength plastic with provision for outside air duct connection.
c. Ceiling recessed mounted: galvanized steel with provision for outside air duct connection.

2. Fans: Double inlet, forward curved, statically and dynamically balanced.
3. Fan Motor: Direct drive, permanently lubricated, with two or 4 speed operation for unit size scheduled on Drawings.
   a. For single-phase fan motors sized larger than 1/12 hp and smaller than 1 hp, refer to Article, Electric Motors, in Section 23 00 50, Basic HVAC Materials and Methods.
4. Evaporator Coil: Aluminum fins mechanically bonded to copper tubes. Coils shall be pressure leak tested.
5. Insulation: Interior surfaces exposed to the airstream shall be fully insulated.

F. Outdoor Section:
1. Casing: Galvanized steel plate, powder coated with acrylic or polyester.
2. Condenser Fan Grille: ABS plastic.
3. Fan and fan motor: Direct drive, totally enclosed, propeller type, permanently lubricated, horizontal discharge.
4. Compressor: Variable speed rotary type, with crankcase heater and accumulator. Compressor shall be capable of operating at 0 degrees F. Compressor mounted on vibration isolator pads.
5. Coil: Aluminum fins mechanically bonded to copper tubes. Coils shall be pressure leak tested. Provide coil with integral metal guard.

G. Controls: Hard wired, microprocessor based, wall mounted controller with LCD display shall provide the following functions, as a minimum:
1. 7-day programmable timer.
2. Test and check functions.
3. Diagnostic functions.
4. Vane position control.
5. Fan speed adjustment.
6. Temperature adjustment.
7. Automatic restart.
8. Mode selection, including cool/dry/fan.
   a. Provide lockable enclosure for wall mounted controller.

H. Safeties: Shall include the following, as a minimum:
1. Five minute compressor anti-recycle timer.
2. High pressure protection.
3. Current and temperature sensing motor overload protection.

I. Filters: Provide 1 inch thick fiberglass throwaway filters with cardboard holding frames for indoor unit. Provide sufficient filters for four complete changes for each unit.

J. Service Access: All components, wiring, and inspection areas shall be completely accessible through removable panels.

K. Refrigerant Piping:

1. Provide factory pre-charged and sealed line set piping, length to suit the location of equipment. Tubing sizes shall be in accordance with manufacturers written instructions.

2. Provide refrigeration piping in accordance with Article, Refrigerant Piping, in this Section.

L. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Mitsubishi Electric Corporation.
2. Carrier Corporation.
3. Sanyo Electric Co., Ltd.

M. Owner Training: Manufacturer shall provide one on-site 2-hour training session for Owners' maintenance personnel.

2.6 REFRIGERATION PIPE AND FITTINGS

A. Refrigeration gas and liquid piping shall be type ACR hard drawn copper tubing, cleaned and capped in accordance with ASTM B280, with wrought copper fittings. All joints shall be brazed with Sil-fos under nitrogen purge. Relief valve discharge piping shall be full size of relief discharge port.

1. Manufactured, pre-charged and pre-insulated refrigerant line-set refrigerant piping may be utilized at Contractor's discretion.
    a. VRF Systems: Use of manufactured, pre-charged and pre-insulated refrigerant line-set refrigerant piping between outdoor condensing units and indoor heat recovery controllers, or distribution headers and tees is not allowed. When system manufacturer's installation instructions allow use of refrigerant line-set piping between indoor heat recovery controllers, or distribution headers and tees, and air terminal devices, follow instructions for allowable pipe size range and support to avoid forming traps in the piping.

B. Refrigeration Piping Specialties: Furnish and install Superior, Sporlan, Alco, Henry, or equal, stop valves, solenoid valves, adjustable thermal expansion valves, sight glass, flexible connection, charging valve, and drier with valve bypass in the liquid lines and Superior DFN shell and cartridge suction line filter sized 2-1/2 times tonnage.

1. Install only those refrigeration piping specialties recommended by manufacturer of specific installed equipment.

2.7 FANS

A. All fans shall be Air Moving and Control Association Inc. (AMCA) labeled.

B. Provide self-aligning, enclosed ball bearings, accessible for lubrication unless specified otherwise.

C. Provide variable speed switch for all direct drive fans.

D. Roof Mounted:
1. Direct or V-belt Drive: Provide one-piece heavy-duty ventilator housings, one piece heavy gauge spun aluminum construction, with weatherproof assembly and integral weather shield. Mount ventilators on curbs furnished by the fan manufacturer. Install with fan assembly level.
2. Fan wheels shall be centrifugal design, statically and dynamically balanced. Tip speed, rpm and motor horsepower shall not exceed listing in manufacturer's catalog for unit specified.
3. Fans shall have integral factory formed base and one piece spinning without welding. Housings shall be provided with wiring channel and are to be of the direct discharge design. Motor and fan assembly shall be on vibration isolating mounts. Fans shall have capacity, speeds and motor sizes as shown.
4. Provide the following accessories:

a. Gravity backdraft dampers.
b. Aluminum bird screen with a minimum of 85 percent free area.
c. Adjustable motor pulley.
d. Laboratory fume hood exhaust fans shall be Keysite coated.
e. Provide grease collection tray for kitchen exhaust fans.
f. Provide ventilated roof curb for kitchen exhaust fans where exhaust duct is mounted within rated shaft.
g. Provide hinge kit for kitchen hood exhaust fans.

E. In-Line Centrifugal Fans:
1. Centrifugal fan with airfoil blades, aluminum or steel housing, externally mounted belt-drive motor, external lube tubes, integral support brackets.
2. Provide sloped roof or flat roof type roof cap, or wall cap to suit the location indicated on the Drawings.

F. Ceiling Mounted Fans:
1. Acoustic lined cabinet, built-in back draft damper, vibration isolated fan and motor, variable speed switch.
2. Provide sloped roof or flat roof type roof cap, or wall cap to suit the location indicated on the Drawings.

G. Fan Drives:
1. Drive Design: The design horsepower rating of each drive shall be at least 1.5 times, single belt drives 2 times, the nameplate rating of the motor with proper allowances for sheave diameters, speed ratio, arcs of contact and belt length.
2. Provide variable speed drives, Dayco, Browning, Woods, or equal. Allow for replacement of fan and motor drives and belts as required to suit the balance requirements of the project.
3. Select variable speed drives to allow an increase or decrease of minimum of ten percent of design fan speed.

H. Motors:
1. Motors of 25 HP and less shall have adjustable pitch sheaves; sheaves on motors above 25 HP may be non-adjustable. Change, at no extra cost to Owner, the non-adjustable sheaves to obtain desired air quantities.
2. For single-phase fan motors sized larger than 1/12 hp and smaller than 1 hp, refer to Article, Electric Motors, in Section 23 00 50, Basic HVAC Materials and Methods.

I. Sheaves: Sheaves shall be cast or fabricated, bored to size or bushed with fully split tapered bushings to fit properly on the shafts. All sheaves shall be secured with keys and set screws.

J. Belts:
1. All belts shall be furnished in matched sets.
2. Provide a minimum of two belts for all drives with motors 5 horsepower motors and larger.
3. Belts shall be within 1 degree 30 minutes of true alignment in all cases.

K. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

1. Greenheck Fan Corporation.
2. Loren Cook Company.
3. PennBarry.
4. American Coolair Corporation.

L. Fly Fan (Air Curtain)

1. Manufacturer's standard, high velocity, non-recirculating type. Units for kitchens or food storage shall comply with NSF 37.
2. Casing: Sheet metal or polycarbonate plastic. Provide internal or external vibration isolation to effectively prevent transmission of vibration and noise from units to building structure. Units shall completely house all parts and have manufacturer's standard finish coating.
3. Fans: Ruggedly constructed, statically and dynamically balanced. Noise level shall not exceed 77 dBA measured at 5 feet distance.
4. Air Discharge Outlet Nozzle: Cover full width of door opening. Fan discharge ducts, plenum, flow control vanes and nozzles shall provide a uniform distribution of air over entire length of door. Provide adjustable volume and directional control.
5. Heating Coil: Provide electric heating coil. Maximum discharge air temperature shall be 120 degrees F.
6. Controls: Provide on-off door operated switch. The "on-off" switch circuit shall close to start fan motors when door starts to open and open when the door reaches closed position. A local disconnect switch for each fan motor shall be provided and shall be mounted to be accessible without use of ladder.
7. Motors: Provide heavy-duty totally enclosed fan motor, sealed ball bearings, resilient mounting, automatic thermal overload switch, UL listed. Provide weather protection for motor and electrical equipment.

8. Available Manufacturers: Subject to compliance with requirements, manufacturers offering air doors / fly fans which may be incorporated in the work include the following, or equal:

    a. Mars Air Products; Mars Air Door Division.
    b. Berner International.
    c. Fantech.

M. Owner Training: Manufacturer shall provide one on-site 1-hour training session for Owners' maintenance personnel.

2.8 LOUVERS

A. Louvers shall be minimum 16 gauge steel with Bonderite and Epon gray primer and 1/2 inch square mesh, 16 gauge galvanized steel screen on the inside. Louvers shall be Airolite #609, Arrow United Industries, or equal, with 4 inch louver depth.

2.9 AIR INLETS AND OUTLETS

A. Except as otherwise indicated, provide manufacturer's standard outlets and inlets where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Ceiling, wall or floor Compatibility: Provide outlets with border styles that are compatible with adjacent ceiling, wall or floor systems, and that are specifically manufactured to fit into ceiling, wall or floor module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems that will contain each type of air outlet and inlet.

C. Refer to Schedule on Mechanical Drawings for details of inlets and outlets to be used.

2.10 AIR FILTERS

A. Provide MERV 13 disposable pleated media type. Refer to specific equipment Articles for filter depth and for exceptions to this specification. Filters shall conform to the following:
1. Standards:

a. ASHRAE Standard 52.2-2007.
b. Underwriters Laboratories: U.L. 900, Class 2.

2. Construction:

a. Media: Synthetic or cotton-synthetic blend with radial pleats.
b. Media Frame: High wet-strength beverage board.
c. Media Support: Welded wire or expanded metal grid bonded to air leaving side of the media.

3. Performance: 2" deep filter shall have a maximum initial air resistance of 0.31 inches w.g.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:
1. Camfil Farr, Inc., model 30/30.
2. Flanders Corporation, model 40 LPD.

C. Temporary (Construction Period) Filters:
1. Install new temporary filters in all units that have filter systems installed. Temporary filters shall match the permanent filters that are specified for the units. Replace filters as needed, in accordance with manufacturer's directions, in order to provide protection for the unit prior to occupancy by the Owner.
2. If air handling units are operated during construction of the project, install temporary filters directly over each return air inlet. Filters shall match the permanent filters that are specified for the units. Select size of filter to completely cover the frame of the return air inlet, and tape filters firmly in place to eliminate any construction debris from entering the duct system or unit. Remove the temporary filters upon completion of the work, and repair all damaged paintwork.

D. Spare Filters:
1. Furnish two new, complete sets of filter cartridges for each filter bank on completion and acceptance of the work. Install one set of filters in units (prior to final air balance) and leave the remaining filters in location designated by the Owner. Provide units designed to accommodate washable, permanent filters with one washable, permanent filter.

2.11 DAMPERS

A. Backdraft Dampers: Ruskin CBD2, counterbalanced, Nailer Industries, or equal.

B. Manual Air and Balance Dampers: Provide dampers of single blade type or multi-blade type constructed in accordance with SMACNA, "HVAC Duct Construction Standards," except as noted herein.
1. Rectangular Ductwork:
a. Single damper blades may be used in ducts up to 10 inches in height. Dampers shall be 16 gauge minimum. Provide self-locking regulators, equal to Ventlok 641. Provide end bearings equal to Ventlok 607 at each damper. Provide continuous solid 3/8 inch square shafts.
b. Multiple blade dampers shall be equal to Ruskin CD35 Standard Control Damper. Maximum width for multiple damper blades for use in rectangular duct shall not exceed 6 inches.
c. Where duct velocity may be expected to exceed 1500 fpm, provide Ruskin CD-50, or equal, low leakage dampers with airfoil blades.

2. Round Ductwork:

a. Single damper blades may be used in ducts up to 12 inches in diameter. Provide multiple blade opposed blade dampers, with connected linkage, for ductwork larger than 12 inches in diameter.
b. Damper blades for round ductwork shall be 20 gauge steel for ducts up to 12 inches diameter and 16 gauge steel for dampers larger than 12 inches damper. Provide self-locking regulators, equal to Ventlok 641, Durodyne, or equal for operation of dampers. Provide end bearings equal to Ventlok 607 and provide continuous solid 3/8 inch square shafts.

3. Where ductwork is externally insulated, provide self-locking regulators equal to Ventlok 644, Durodyne, or equal for rectangular ductwork, and Ventlok 637, Durodyne, or equal for round ducts.

C. Fire Dampers and Combination Fire/Smoke Dampers:
1. Fire dampers and combination fire/smoke dampers shall be listed and approved by the California State Fire Marshal. Installation shall conform to the manufacturer's UL approved installation instructions.

a. Fire dampers shall be UL 555 classified and labeled as dynamic fire dampers approved for wall and floor installation. They shall ship from the manufacturer as an assembly with a minimum 20-gauge factory installed sleeve. Sleeve length shall suit the requirements of the wall construction. Each dynamic fire damper/sleeve assembly shall ship complete with factory "roll formed" one-piece angles with pre-punched holes for easy installation. Dynamic fire dampers for vertical installation must consist of a single section on sizes up to 33" x 36" and a single section on sizes up to 24" x 24" for horizontal installation. 1-1/2 hour dynamic fire dampers shall be Ruskin DIBD20, Pottorff, or equal. 3 hour dynamic fire dampers shall be Ruskin DIBD230, Pottorff, or equal.
b. Fire dampers for high pressure/velocity systems where velocities exceed 2000 fpm and/or 4" w.g. pressure fire damper shall be Ruskin FD60, Pottorff, or equal
c. Fire dampers for ceiling installation shall be UL 555C classified and labeled as ceiling dampers. They shall be provided with a thermal insulating blanket to fit the inlet or outlet condition if required by the application. Ceiling dampers shall be Ruskin CFD 2, 3, 4 or 5. Ceiling dampers for ceilings constructed of wood shall have UL tested in design L501 and shall be Ruskin CFD7, Pottorff, or equal.
d. Combination fire/smoke dampers. Dampers shall be UL classified and labeled as Leakage Class I Smoke Dampers in accordance with the latest version of UL 555S. Dampers shall be warranted to be free from defects in material and workmanship for a period of 5 years after date of shipment. Damper/actuator assembly shall be tested to full open and full close at minimum 2000 fpm 250° F heated air and 4" w.g. with airflow in both directions. (Specified select: 250° / 350°, 2000 fpm/3000 fpm). Each damper shall be equipped with "controlled closure" quick detect heat actuated release device to prevent duct and HVAC component damage resulting from instantaneous damper closure. Release device shall be EFL type and shall allow reset from outside the sleeve after moderate temperature exposure. (Replacement type fusible links not acceptable.)
e. Two position combination fire smoke dampers shall be equipped with one or more factory installed, direct coupled, 120 volt, single phase, electric actuator for energize open – fail close operation. Dampers with multiple actuators shall be factory wired with single point connection at the EFL heat release devise for connection to poser. Damper actuator shall include minimum one-year energized hold open (no cycles) and spring return (fail) close reliability. Damper/actuator shall include minimum 20,000 full open-full close cycle performances.
f. Modulating combination fire smoke dampers shall be equipped with one or more factory installed contact for modulating signal connection. Damper/actuator shall

include minimum 100,000 full open-full close cycle performances with spring return (fail) close on loss of power.

g. Round combination fire smoke dampers up to 24" diameter shall be true round type with minimum 2- gauge minimum galvanized designed for lowest pressure drop and noise performance. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame. Blade seals shall be silicone edge designed to withstand 450° F and galvanized steel mechanically locked in to the blade edge (adhesive type seals are not acceptable). Each damper shall be equipped with a factory-installed sleeve of 17" minimum length and factory "roll formed" one-piece angles with pre-punched holes for easy installation. Dampers shall be Ruskin FSDR25, Pottorff, or equal.

h. Round (larger than 24" diameter) or rectangular combination fire smoke dampers shall include roll-formed structural hat channel frame, reinforced at the corners, formed from a single piece of minimum 16 gauge equivalent thickness formed from single piece galvanized steel. Bearings shall be stainless steel turning in an extruded hole in the frame. Blade edge seals shall be silicone rubber designed to withstand 450° F and galvanized steel mechanically locked in to the blade edge (adhesive type seals are not acceptable). Each damper shall be equipped with a factory-installed sleeve of 17" minimum length and factory "roll formed" one-piece angles with pre-punched holes for easy installation. Dampers shall be Ruskin FSD60, Pottorff, or equal.

i. 3-hour rated combination fire smoke dampers shall be Ruskin model FSD60-3, Pottorff, or equal.

j. All FSD60 type dampers shall be AMCA licensed and shall bear the AMCA Seal for Air Performance. AMCA certified testing shall verify pressure drop does not exceed .03" w.g. at a face velocity of 1,000 fpm on a 24" x 24" damper.

k. Wall type fire/smoke damper:

    1) Combination fire/smoke dampers for use in the wall of exit corridors shall be classified and labeled as Leakage Class II Smoke Dampers in accordance with the latest version of UL 555S. Dampers shall meet the requirements for combination fire/smoke dampers in paragraph 3 above except AMCA certified testing shall verify pressure drop does not exceed .07" w.g. at a face velocity of 1,000 fpm on a 24" x 24" damper and blades shall be single skin galvanized steel 10 gauge minimum with 3 longitudinal grooves for reinforcement. Dampers shall be Ruskin FSD36, Pottorff, or equal.
    2) Front access combination fire/smoke dampers shall meet all the requirements for combination fire/smoke dampers in paragraph 3 above except pressure drop requirement. In addition the dampers shall be constructed so that actuators and all accessories are accessible from the grille side. Actuators and accessories shall be housed within an integral cabinet on the side of the damper frame and shall not be installed in the air stream in front of the damper. The damper sleeve shall be minimum 14" and flanged to accept a steel framed grille. The sleeve shall be covered with fire resistant material. Dampers shall be Ruskin FSD60FA, Pottorff, or equal.

l. Ceiling type fire/smoke damper for tunnel type corridor construction: Combination fire/smoke dampers for use in the corridor ceiling of tunnel type corridor construction shall be UL classified and labeled as Corridor Damper. Dampers shall meet the requirements of paragraph 4a above except pressure drop testing does not require AMCA certification. Dampers shall be Ruskin FSD36C, Pottorff, or equal.

m. Fusible links shall have temperature rating approximately 50° F above normal maximum operating temperature of the heat producing appliance.
    1) Each fire/smoke damper shall be equipped with "controlled closure" quick detect heat actuated release device to prevent duct and HVAC component damage. Release device shall allow easy reset after moderate temperature

rise outside the sleeve. Heat release device shall be the Ruskin EFL, NCA or equal.

2. All actuators used for smoke dampers or combination fire/smoke dampers shall have a cycle time requirement of not more than every twelve months and shall be rated for continuous "0n" duty and shall be provided with internal spring return. Actuators shall be equipped with pilot light, remote key test switch, end switch and circuitry to activate pilot light on remote key (test) switch located in corridor ceiling adjacent to damper. Electric motors shall be Invensys MA-250, MA-253, Honeywell H2000, or equal.

D. Where required to suit the size of damper required, provide manufacturers standard UL Classified mullions, arranged to support multiple dampers. Assembly shall be of minimum 16 gauge galvanized steel, complete with all accessory caps and framing members required for installation.

2.12 DUCTWORK

A. Construct and install all sheet metal ductwork in accordance with the California Mechanical Code for 2 inches static pressure for supply air, and 2 inches minimum for return and exhaust air unless otherwise noted on Drawings.

1. Where not in conflict with the California Mechanical Code, construct and install all sheet metal ductwork in accordance with SMACNA HVAC Duct Construction Standards (Metal and Flexible). Where applicable for HVAC work, construct and install sheet metal work in accordance with SMACNA Architectural Sheet Metal Manual.
2. Provide variations in duct size, and additional duct fittings as required to clear obstructions and maintain clearances as approved by the Architect at no extra cost to the Owner.
3. Gauges, joints and bracing shall be in accordance with the California Mechanical Code.
4. Provide beading or cross breaking for all ductwork inside building. Provide cross breaking for ductwork exposed to weather.
5. At the contractor's option, ductwork may be fabricated using the Ductmate, Nexus, Quickduct, Transverse Duct Connection (TDC), Pyramid-Loc duct connection systems, or equal. Fabricate in strict conformance with manufacturer's written installation instructions and in accordance with California Mechanical Code.

    a. Seal flanged ends with pressure sensitive high density, closed cell neoprene or polyethylene tape gasket, Thermo 440, or equal.
    b. Provide metal clips for duct connections, except at breakaway connections for fire dampers and fire smoke dampers. Provide corner clips at each corner of duct, through bolted, at all locations except at breakaway connections for fire dampers and fire smoke dampers. Where used on locations exposed to weather, provide continuous metal clip at top and sides of duct, with 1 inch overhang for top side.

B. Design and installation standards:

1. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) for all work in this section.
2. NFPA Compliance: Comply with ANSI/NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," and ANSI/NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems."
3. California Mechanical Code.

C. Fabricate all ductwork with sheet metal. Fiberglass ductwork will not be accepted for use on this project.

D. Duct sizes indicated are external sizes.

E. Galvanized Sheet Steel: Lock-forming quality, ASTM A924 and ASTM A653, Coating Designation G 90. Provide mill phosphatized finish for exposed surfaces of ducts exposed to view.
1. Provide mill certification for galvanized material at request of the Project Inspector.Duct Sealing:
2. Sealant shall have a VOC content of 250 g/L or less.
3. Sealant shall comply with testing and product requirements of South Coast Air Quality Management District, Rule 1168.
4. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
5. Seal airtight all joints and seams, including standing seams and manufactured joints and seams, of all supply, return and exhaust ducts except those exposed in conditioned space. Provide one part, non-sag, synthetic latex sealant, formulated with a minimum of 68 percent solids. Sealant shall comply with ASTM E84, Surface Burning Characteristics.

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

        1) Design Polymerics, model DP1010.
        2) Polymer Adhesive Sealant Systems Inc, model Airseal #11.
        3) McGill Airseal, LLC.

6. Seal airtight and watertight joints and seams of ductwork exposed to weather with 6 ounce canvas bonded to ductwork with Foster 30-36 adhesive; cover canvas with heavy coat of Foster 56-10 coating, no dilution. Provide basis of design product or equal by Mon-Eco Industries, Inc., or McGill Airseal, LLC.

    a. Pressure-sensitive tapes or single part sealant not acceptable.
    b. Where seams are exposed to weather, paint seams with aluminum paint. Provide cross broken ductwork, and ensure that the ductwork will shed water. Beading of duct work exposed to weather will not be considered acceptable.

F. Provide sheet metal angle frame at all duct penetrations to wall, floor, roof, or ceiling.

G. Duct Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, straps, trim, and angles for support of ductwork.

H. Rectangular Duct Fabrication:
1. Shop fabricate ductwork of gauges and reinforcement complying with the more stringent of the following standards, except as noted herein.

    a. SMACNA HVAC Duct Construction Standards
    b. California Mechanical Code

2. Fabricate ducts for 2 inch pressure class with minimum duct gauges and reinforcement as follows, except as otherwise noted:

Duct Dimension	Minimum Gauge	Joint Reinforcement Per CMC
Through 12"	26	Not Required

13" through 18"	24	Not Required
19" through 30"	24	C/4
31" through 42"	22	E/4
43" through 54"	22	F/2
55" through 60"	20	G/4
61" through 84"	20	I/2
85" through 96"	20	J/2
Over 96"	18	K/2

3. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1.5 times associated duct width. Fabricate to include single thickness turning vane in elbows where space does not permit the above radius or where square elbows are shown. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers. Turning vanes shall be E-Z Rail II, Durodyne, or equal.
4. Fabricate round supply connections at rectangular, plenum type fittings using spin-in type fittings, complete with extractor and volume control damper. Refer to Paragraph “DAMPERS” for damper requirements.
5. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
6. Provide 20 gauge minimum for ductwork exposed within occupied spaces.

I. Rectangular Internally Insulated Duct Fabrication:

1. Provide internal duct lining where indicated on the Drawings, with a minimum of 10'-0" length in each direction from the fan, fan casing, or unit casing. Line all transfer ducts.

    a. Where ductwork is exposed to weather or outside the building insulation envelope, provide 2 inch thick, 1-1/2 pound density internal lining with matte facing, with an R-Value of 8.0 minimum.
    b. Where ductwork is within the building insulation envelope, lining shall be 1” thick, 1-1/2 pound density, with R-value of 4.2 minimum.
    c. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
    d. Where installed exposed in the conditioned space, duct shall be minimum 20 gauge with 1 inch insulation layer (minimum R-value – R-4.2).
    e. Cement duct liner in place with nonflammable, non-hardening duct adhesive. Seal all raw edges of insulation inside ductwork with adhesive, including longitudinal liner edges.
    f. Provide metal nosing at all locations where liner is preceded by unlined metal.
    g. Provide sheet metal weld pins and washers or clinch pins and washers on all ductwork on 12 inch intervals with the first row within 3 inches of the leading edge

of each piece of insulation and within 4 inches of corners. No use of adhesive mounted pins will be considered.

1) Install clinched pin fasteners with properly adjusted automatic fastening equipment. Manual installation will not be considered.
2) Install weld pins with properly adjusted automatic fastening equipment. Installation shall not damage the galvanized coating on the outside of the duct.

h. All ductwork, adhesives, lining, sealant, flex duct and the like shall have a flame spread of 25 or less and developed smoke rating of 50 or less when tested in accordance with one of the following test methods: NFPA 255, ASTM E84, or UL 723.

i. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

Manufacturer:	Product:
Johns Manville	Duct Liner PM
CertainTeed Corporation	ToughGard
Fosters Adhesive	85-62
Swifts Adhesive	7336

J. Round and Oval Ductwork Fabrication:

1. Round and oval duct and fittings shall be spiral lockseam or longitudinal seam as indicated in table below. Provide couplings to join each length of duct.
   a. At contractors' option, round or oval ductwork may be utilized in place of rectangular ductwork shown on Drawings, provided available space allows installation of round or oval ductwork without compromising space required for installation of products and systems of other trades.
      1) Round or oval ductwork utilized in place of rectangular ductwork shown on Drawings shall be sized to have a static pressure loss equivalent to rectangular duct shown on Drawings.
      2) Unlined round or oval duct shall not be utilized in place of rectangular internally lined ductwork shown on Drawings.
2. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1.5 times associated duct width. Provide two-piece, die-stamped, 45-degree to 90-degree elbows for sizes up to 12 inches; five-piece, 90-degree elbows for sizes 12 inches and above; conical tees; and conical laterals. All reducers shall be placed after a tap has been made on the duct main. Reducers shall be long-taper style.

3. Round Ductwork: Construct of galvanized sheet steel complying with ANSI/ASTM A 653 by the following methods and in minimum gauges listed.

Diameter	Minimum Gauge	Method of Manufacture
Up to 14"	28	Spiral Lockseam
15" to 23"	28	Spiral Lockseam
24" to 36"	24	Spiral Lockseam
37" to 50"	22	Spiral Lockseam
51" to 60"	20	Spiral Lockseam
Over 60"	18	Longitudinal Seam

4. Provide locked seams for spiral duct; fusion welded butt seam for longitudinal seam duct.
5. Fittings and Couplings: Construct of minimum gauges listed. Provide continuous welds along seams at exposed ducts. Provide spot weld bonded seams at concealed ducts.

Diameter	Minimum Gauge
3" to 36"	20
38" to 50"	18
Over 50"	16

6. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
7. Provide 20 gauge minimum for ductwork exposed within occupied spaces.

K. Round Internally Insulated Duct and Fittings: Where ductwork is exposed to weather or outside the building insulation envelope, construct with outer pressure shell, 2 inch thick (Minimum R-value = R-8) insulation layer, and perforated inner liner. Where ductwork is within the building insulation envelope, construct with outer pressure shell, 1 inch thick (minimum R-value = R4.2) insulation layer, and perforated inner liner. Construct shell and liner of galvanized sheet steel complying with ANSI/ASTM A 653, of spiral lockseam construction (use longitudinal seam for over 59 inches), in minimum gauges listed in table below. Where installed exposed in the conditioned space: duct and fitting outer pressure shell shall be minimum 20 gauge with 1 inch insulation layer (minimum R-value = R-4.2), and perforated inner liner.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" TO 12"	26 gauge	24 gauge

13" TO 24"	24 gauge	24 gauge
25" to 34"	22 gauge	24 gauge
35" to 48"	20 gauge	24 gauge
49" to 58"	18 gauge	24 gauge
Over 59"	16 gauge	20 gauge

1. Fittings and Couplings: Construct of minimum gauges listed. Provide continuous weld along seams of outer shell at exposed ducts. Provide spot weld bonded seams at concealed ducts.

Nominal Duct Diameter	Outer Shell	Inner Liner
3" to 34"	20 gauge	24 gauge
36" to 48"	18 gauge	24 gauge
Over 48"	16 gauge	24 gauge

2. Inner Liner: Perforate with 3/32 inch holes for 22 percent open area. Provide metal spacers welded in position to maintain spacing and concentricity.
3. Ducts exposed in the conditioned space shall be free of dents and blemishes and be mounted tight against adjacent surface with flat hangers. Remove all fabrication labels from ductwork.
4. Where installed exposed in the conditioned space, duct shall be minimum 20 gauge with 1 inch insulation layer (minimum R-value – R-4.2).
5. All ductwork, adhesives, lining, sealant, flex duct and the like shall have a flame spread of 25 or less and developed smoke rating of 50 or less when tested in accordance with one of the following test methods: NFPA 255, ASTM E84, or UL 723.
6. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following, or equal:

    a. Sheet Metal Div., McGill AirFlow, LLC., Acousti-k27
    b. Semco Duct and Acoustical Products, Inc.
    c. Air Systems Manufacturing, Inc. - Las Vegas

L. Duct Access Doors:

1. Duct Access: Provide hinged access door in rectangular ducts for access to fire dampers, control equipment, etc. Access door size shall be duct diameter wide by duct diameter high for all ducts under 24 inches. Ducts over 24 inches in diameter shall have 24-inch by 18-inch access doors. Minimum size access doors shall be 6 inches by 6 inches.
2. Provide sandwich style access doors for round ductwork, Ductmate DR style, or equal. Access doors shall be 16 gauge galvanized steel with continuous piano hinge. Locks shall be plated steel strike and catch. Provide 1" x 3/8" Polyethylene "Perma Stik" gasket all around door.

M. Flexible Air Ducts:

1. Standard factory fabricated product, construct an inner wall of impervious vinyl or chlorinated polyethylene, permanently bonded to a vinyl or zinc coated spring steel helix. Cover the assembly with fiberglass blanket insulation covered by an outer wall of vinyl or fiberglass – reinforced metalized vapor barrier. UL 181 listed Class 1 flexible air duct material. Overall thermal transmission no more than 0.25 (BTU/in)/(hr/sq.ft./deg. F) at 75F differential per ASTM C335. Vapor transmission value no more than 0.10 perm, per ASTM E96. Rated for 4-inch w.g. positive pressure and 1-inch w.g. negative pressure. Air Fiction correction factor of 1.3 maximum at 1000 FPM. Working air velocity of at least 2000 FPM. Flame spread rating no more than 25. Smoke development rating no more than 50 as tested per ASTM E84. Must have cataloged data on insertion loss characteristics, minimum attenuation of 29 DB for 10-foot straight length at 8-inch diameter and 500 hz.
2. Flexible ductwork shall be maximum of 5 feet long, and shall be extended to the fullest possible length, in order to minimize pressure drop in the duct.
3. Flexible ducts shall be selected for minimum of 6 inch positive static pressure and minimum of 1 inch negative static pressure.

N. Kitchen Exhaust Ducts (Type 1):
1. Fabricate kitchen exhaust ducts and supports used for removal of smoke and grease-laden air from cooking equipment of 16 gauge minimum black steel where concealed and of 18 gauge minimum Type 304 stainless steel where exposed. At Contractor's option, 18 gauge minimum Type 304 stainless steel may be used where concealed. Finish exposed stainless steel with Number 4 finish. All ductwork shall be of welded construction in accordance with Section 510 of California Mechanical Code. For duct construction, comply with SMACNA "HVAC Duct Construction Standards" and ANSI/NFPA 96 "Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations."

2. Kitchen Exhaust Duct Access Panels:

    a. Provide listed duct access panel assembly of the same material and gauge used for the duct. Duct access panels shall conform to the following:

        1) Fasteners: Black steel or stainless steel to match material used for the duct. Panel fasteners shall not penetrate duct wall.
        2) Gasket: Comply with NFPA 96, grease-tight, high temperature ceramic fiber, rated for minimum 1500 °F.
        3) Minimum Pressure rating: 10 inches wg., positive or negative.

    b. Available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

        1) Ductmate Industries, Inc.
        2) 3M.
        3) Flame Gard, Inc.

3. Field-Applied Grease Duct Enclosure:

    a. Cover concealed portions of grease exhaust duct with two layers of 1-1/2 inch thick Thermal Ceramics Firemaster FastWrap XL, or equal, field-applied grease duct enclosure listed in accordance with ASTM E 2336.

O. Kitchen Exhaust Ducts (Type 2):
1. Cooking Equipment Exhaust Ducts:

a. Fabricate kitchen exhaust ducts and supports used for removal of vapor, heat and odors from cooking equipment of 16 gauge minimum black steel where concealed and of 18 gauge minimum Type 304 stainless steel where exposed. At Contractor's option, 18 gauge minimum Type 304 stainless steel may be used where concealed. Finish exposed stainless steel with Number 4 finish. All ductwork shall be of welded construction in accordance with Section 510 of California Mechanical Code. For duct construction, comply with SMACNA "HVAC Duct Construction Standards" and ANSI/NFPA 96 "Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations."

2. Dishwasher Exhaust Ducts:

a. Fabricate dishwasher exhaust ducts and supports used for steam removal from dishwasher of 18 gauge minimum 304 stainless steel. For duct construction, comply with California Mechanical Code, SMACNA "HVAC Duct Construction Standards," and ANSI/NFPA 96 "Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations."

3. Duct Access Panels:

a. Provide duct access panel assembly of the same material and gauge used for the duct. Duct access panels shall conform to the following:

1) Fasteners: Black steel or stainless steel to match material used for the duct. Panel fasteners shall not penetrate duct wall.
2) Gasket: Comply with NFPA 96, grease-tight, high temperature ceramic fiber, rated for minimum 1500 °F.

PART 3 - EXECUTION

3.1 ROOF MOUNTED EQUIPMENT

A. Mount and anchor equipment in strict compliance with drawings details. Alternate anchorage methods will not be considered for roof mounted equipment and without prior approval of the mechanical engineer.

B. Examine rough-in for roof mounted equipment to verify actual locations of piping and duct connections prior to final equipment installation.

C. Verify that piping to be installed adjacent to roof mounted equipment allows service and maintenance.

D. Verify that gas piping will be installed with sufficient clearance for burner removal and service.

E. Install ducts to termination at top of roof curb and install heavy duty rubber gaskets on supply and return openings and on full perimeter of curb, or as required for an airtight installation, prior to setting unit on curb.

F. Cover roof inside each roof mounted air conditioning unit, heat pump unit, and heating and ventilating unit roof curb with 2 inch thick, 3 pound density fiberglass insulation board.

G. Connect supply and return air ducts to horizontal discharge roof mounted equipment with flexible duct connectors specified elsewhere in these Specifications.

H. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.

3.2 INSTALLATION OF SPLIT SYSTEM AC, HEAT PUMP, AND VRF SYSTEMS

A. General:
1. Install units level and plumb.
2. Install evaporator-fan components as detailed on Drawings.
3. Install ground or roof- mounted condensing units as detailed on Drawings.
4. Install seismic restraints as required by applicable codes. Refer to Article, Submittals, in Section 23 00 50, Basic HVAC Materials and Methods, for delegated design requirements for seismic restraints.
5. Install and connect refrigerant piping as detailed in unit manufacturers' literature. Install piping to allow access to unit.
6. Install cooling coil condensate primary drain pan piping, and overflow, if provided, and run to nearest code-compliant receptacle, or as indicated on Drawings. Install secondary drain pan for units installed over permanent and suspended-tile ceilings. Install secondary drain pan piping and terminate 1/2 inch below ceiling, with escutcheon, in a readily visible location or as shown on Drawings.
7. Install air filters at each indoor unit. Install washable, permanent filters at indoor units designed to accept washable, permanent filters. Refer to Drawings schedule, and Article, Air Filters, in this Section, for filter requirements for ducted, above-ceiling units incorporating mixing boxes.
8. Duct Connections: Duct installation requirements are specified in Article, Ductwork, in this Section. Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Article, Ductwork, in this Section.

3.3 INSTALLATION OF FANS

A. Ceiling Mounted Fans: Mount variable speed switch within fan housing. Mark final balance point on variable speed switch.

B. Provide access doors for fans or motors mounted in ductwork.

C. Mount all fans as detailed on Drawings and in compliance with CBC standards.

D. Fan motors mounted in air-stream to be totally enclosed.

E. Completely line supply, return or exhaust fan cabinets with 1 inch thick, 3/4 pound density acoustic insulation securely cemented in place.

F. Roof fans shall be mounted level.

G. Provide heavy-duty rubber gasket between exhaust fan mounting flange and roof curb, or as required for an airtight installation.

3.4 AIR INLETS AND OUTLETS

A. Provide all air inlets and outlets with gaskets and install so that there will be no streaking of the walls or ceilings due to leakage. Duct connection to outlet on exposed duct shall be full size of outer perimeter of outlet flange.

B. Unless otherwise indicated on Drawings, provide rectangular plenum on top of each diffuser and ceiling return for connection to ductwork. Line plenum with internal insulation as indicated for lined ductwork. Size plenum to allow full opening into air terminal.

C. Ceiling-mounted air terminals or services installed in T-Bar type ceiling systems shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.
   1. Terminals or services weighing not more than 56 pounds shall have two No. 12 gauge hangers connected from the terminal or service to the structure above. These wires may be slack.
   2. Support terminals or services weighing more than 56 pounds directly from the structure above by approved hangers. Provide 4 taut 12 gauge wires each, attached to the fixture and to the structure above. The 4 taut 12 gauge wires, including their attachment to the structure above must be capable of supporting 4 times the weight of the unit.
   3. Secure air inlets and outlets to main runners of ceiling suspension system with two #8 sheet metal screws at opposing corners.

D. Furnish all air inlets and outlets with a baked prime coat unless otherwise noted. Provide off-white baked enamel finish on ceiling-mounted air inlets and outlets. Paint exposed mounting screws to match the material being secured.

E. Air inlets and outlets shall match all qualities of these specified including appearance, throw, noise level, adjustability, etc.

3.5 FILTERS

A. Mount filters in airtight frames furnished by the filter manufacturer, and install in accordance with manufacturer's recommendations.

B. Air filters shall be accessible for cleaning or replacement.

C. Provide temporary filters for all fans that are operated during construction; after all construction dirt has been removed from the building install new filters at no additional cost to the Owner. In addition to temporary filters at filter location, provide temporary filters on all duct openings which will operate under a negative pressure.
   1. Filters used for temporary operation shall be the same as permanent filters for the application. Filters used for duct openings may be 1 inch thick pleated media disposable type.

3.6 DAMPERS

A. All dampers automatically controlled by damper motors are specified under "Temperature Control System" except those specified with items of equipment.

B. Provide opposed blade manual air dampers at each branch duct connection and at locations indicated on the drawings and where necessary to control air flow for balancing system. Provide an opposed blade balancing damper in each zone supply duct. Provide an access panel or Ventlok flush type damper regulator on ceiling or wall for each concealed damper.

C. Install fusible link fire dampers full size of duct at points where shown or required.

D. Provide 18 inch x 12 inch minimum hinged access doors in ductwork and furring for easy access to each fire damper; insulated access doors in insulated ducts. Label access doors with 1/2 inch high red letters.
   1. Provide Ventlok Series 100, Durodyne, or equal access doors with hardware for convenient access to all automatic dampers and other components of the system, insulated type in insulated

ducts. Provide Ventlok #202 for light duty up to 2 inch thick doors, #260 heavy-duty up to 2 inch thick doors and #310 heavy-duty for greater than 2 inch thick doors. Provide #260 hinges on all hinged and personnel access doors; include gasketing.

3.7 INSTALLATION OF DUCTWORK

A. Assemble and install ductwork in accordance with recognized industry practices which will achieve air tight and noiseless (no objectionable noise) systems capable of performing each indicated service. Install each run with minimum of joints. Align ductwork accurately at connections within 1/8 inch misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type which will hold ducts true to shape and to prevent buckling. Where possible, install ductwork to clear construction by 1/4 inch minimum, except at air inlets and outlets. Where ductwork will not clear construction, secure duct firmly to eliminate noise in the system.

B. Duct Joints: Install duct sealers, pop rivets or sheet metal screws at each fitting and joint. Duct sealer shall be fire retardant. Sheet metal screw for joints shall be minimum #10 size galvanized.

C. Applicable Leakage Classes:

Pressure Class	Leakage Class	
	Round Duct	Rectangular Duct
2"W.G. or less	12	12
4"W.G. or greater	3	6

D. Upper connection of support to wood structure shall be with wood screws or lag screws in shear fastened in the upper one half of the wood structural member. Fasteners shall conform to the following schedule:

E. Upper connection in tension to wood shall not be used unless absolutely necessary. Where deemed necessary the contractor shall submit calculations to show the size fastener and penetration required to support loads in tension from wood in accordance with the following schedule:

F. Install concrete inserts for support of ductwork in coordination with formwork as required to avoid delays in work.

G. Upper connection to manufactured truss construction must comply with truss manufacturers published requirements and Structural Engineers requirements.

H. Support ductwork in manner complying with SMACNA "HVAC Duct Construction Standards," hangers and supports sections. Where special hanging of ductwork is detailed or shown on Drawings, Drawings shall be followed. Angles shall be attached to overhead construction in a manner so as to allow a minimum of 2 inches of movement in all directions with no bending or sagging of the angle.
   1. Except where modified in individual paragraphs of this Section, provide hanger support with minimum 18 gauge straps, 1 inch wide. Fold duct strap over at bottom of duct.
   2. Install duct supports to rectangular ducts with sheet metal screws. Provide one screw at top of duct and one screw into strap at bottom of duct.

I. Installation of Flexible Ductwork:

1. Provide flexible ducts with supports at 30 inch centers with 2 inch wide, 26 gauge steel hanger collar attached to the structure with an approved duct hanger. Installation shall minimize sharp radius turns or offsets.

    a. Supports shall be in accordance with SMACNA HVAC Duct Construction Standards (Metal and Flexible).
    b. Make bends to maintain R/W-1.5.

2. Make connections to rigid duct and units with Panduit style draw band at inner liner material, and a second draw band over the outer vapor barrier material.
3. Make connection to duct with spin-in fittings, with air scoop and balance damper.

J. Installation of Kitchen Exhaust Ducts (Type 1):

1. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease.
2. Slope duct a minimum of 2 percent to drain grease back to the hood.
3. Provide for thermal expansion of ductwork through 2000 ◦F temperature range.
4. Install listed grease duct access panel assemblies at each change of direction and at maximum intervals of 12 feet in horizontal ducts, and at every floor for vertical ducts, and as indicated on Drawings. Locate access panel on top or sides of duct. Locate panel so that edge of opening is not less than 1-1/2 inch from all outside edges of the duct or welded seams. For large horizontal ducts, install 20 inch by 20 inch access panel for personnel entry at maximum intervals of 20 feet.
5. Install listed grease duct access panel assemblies in accordance with the terms of their listings and the manufacturers' instructions. Access panels shall be labeled with the words: "Access Panel – Do Not Obstruct."
6. Fabricate ducts with continuous welds for grease-tight construction.
7. Grind welds to provide smooth surface free of burrs, sharp edges and weld splatter. When welding stainless steel with a No. 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to removed discoloration caused by welding.
8. Install field-applied grease duct enclosure in accordance with manufacturer's instructions and listing requirements.

K. Installation of Kitchen Exhaust Ducts (Type 2):

1. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease.
2. Slope duct a minimum of 1 percent to drain back to the hood or dishwasher connection.

3.8 DUCTWORK SEALING AND LEAK TESTING

A. New Construction: All duct systems (supply, return, outside air intake, and exhaust), except those exposed in the conditioned space. The leakage rate shall be confirmed through field verification and diagnostic testing in accordance with the procedures set forth in the 2013 California Building Energy Efficiency Standards Reference Appendices.

3.9 TEMPERATURE CONTROL SYSTEM

A. Provide thermostats where indicated on drawings. All wiring shall be in conduit. Provide all relays, transformers and the like to render the control system complete and fully operable. All control conduit to be rigid steel type.

3.10 EQUIPMENT START-UP

A. Initial start-up of the systems and pumps shall be under the direct supervision of the Contractor.

B. Equipment start-up shall not be performed until the piping systems have been flushed and treated and the initial water flow balance has been completed.

C. It shall be the responsibility of the Contractor to assemble and supervise a start-up team consisting of controls contractor, start-up technician, and test and balance contractor; all to work in concert to assure that the systems are started, balanced, and operate in accordance with the design.

D. After start-up is complete, instruct the Owner's personnel in the operation and maintenance of the systems. Obtain from the Owner's representative a signed memo certifying that instruction has been received.

E. For additional requirements, refer to article, Check, Test and Start Requirements, in Section 23 00 50, Basic HVAC Materials and Methods.

3.11 TESTING AND BALANCING

A. For testing and balancing requirements, refer to Section 23 05 93, Testing and Balancing for HVAC.

3.12 CLEANING AND PROTECTION

A. Deliver ductwork with ends sealed to keep internal surfaces clean.

B. Store ductwork with protective caps on open ends of ductwork.

C. At the end of each work period or when sections of work are completed, cover ends of ductwork to keep interior surfaces clean. Flexible duct may have outer coverings stretched and zip tied closed.

D. Strip protective paper from stainless steel ductwork surfaces, and repair finish wherever it has been damaged.

E. Temporary Closure: At ends of ducts that are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering that will prevent entrance of dust and debris until connections are to be completed.

F. As each internally lined duct section is installed, check internal lining for small cuts, tears, or abrasions. Repair all damage with fire retardant adhesive.

3.13 EQUIPMENT MOUNTING

A. Mount and anchor equipment in strict compliance with Drawings details. Alternate anchorage methods will not be considered for roof mounted equipment.

3.14 MODULATING POWER EXHAUST START UP

A. Pre Start Up:
1. Once the power exhaust economizer is installed, remove the access doors on the exhaust cabinet.

    a. Route the 1/8” pressure tubing (provided with the economizer) from the high pressure port on the transmitter to the occupied building space. Terminate the pressure tubing in the conditioned space at a port (field provided) shielded from drafts.
    b. Route line voltage cable from the VFD to the disconnect or unit power distribution point as required.

2. Note:

    a. Check local code requirements prior to installing the line voltage through ac package unit. A separate disconnect may be required. See power exhaust name plate for electrical ratings.

B. Start Up:

1. Use the MODULATION POWER EXHAUST START-UP REPORT (included at the end of this section) to record unit information and verification of start up checks.

    a. The power exhaust will be energized when the exhaust control contacts are closed. The contacts will not be closed until the outside air dampers start to open. Once the contacts are closed the run signal at the VFD will be enabled. Motor speed will be dependent upon the building pressure signal from the pressure transmitter.

2. Check the power exhaust installation is complete, power exhaust is level and all seams are tight.
3. Check the set screws on the blower wheel hub. Be sure they are tight and the wheel does not rub the housing.
4. Check the motor and blower pulleys. Be sure they are tight and aligned.
5. Check the belt tension. Assure there is not more than 1/2" of belt deflection.
6. Check all line and low voltage connections for loose or un-connected wires.

    a. WARNING: Hazard of Electrical Shock! Capacitors in the VFD retain their charge after the power is removed. Disconnect incoming power and wait until the voltage between terminals b+ & b- is 0 vdc before servicing the drive.

7. Verify correct voltage to the disconnect before turning on power to the power exhaust.

    a. To check out the blower, temporarily disconnect the jumper from terminals 13a to 2 on the VFD terminal strip.
    b. This will place the VFD in keypad/frequency operation.
    c. Use the arrow keys on the keypad to increase the speed to 60 Hz.
    d. If the blower is rotating the wrong direction, switch the t1 & t2 motor leads at the VFD to t2 & t1.
    e. Adjust the motor sheave for the desired blower CFM output at full speed.
    f. When the blower check-out is complete, run the speed back down to 20 Hz and re-connect the jumper between terminals 13a and 2.

8. Adjust the setpoint per job requirements. The VFD will display the pressure control set point in hundredths of an inch w.g. (Example: 3.0 = .03" w.g.)

    a. Note: The initial setting at first power up will be 3.0. To adjust the set point, press the up or down arrow, pic will flash in the display then the set point will display with a dot in the upper left corner of the window. Use the up or down arrow to adjust the set point now. After 5 seconds of inactivity the VFD will revert to display mode. Use the following chart for reference.

DISPLAY	INCHES WATER GAGE
10.0	0.10"

9.0	0.09”
8.0	0.08”
7.0	0.07”
6.0	0.06”
5.0	0.05”
4.0	0.04”
3.0	0.03”
2.0	0.02”
1.0	0.01”
0.0	0.00”

b. To see the frequency output: press mode twice, p50 will display, press the up arrow until p71 is displayed, press mode. The display now shows the frequency output. Press mode to return to the set point display.
c. To see the transmitter output: press mode twice, p50 will display, press the up arrow until p69 is displayed, press mode. The display now shows the transmitter output signal level. 0.0=0vdc, 10.0=10vdc. Press mode to return to the set point display.
d. For more advanced features and settings, refer to the VFD manual.
e. Note: to change the OEM settings, parameter p48 must be set to 01 (user settings). The VFD must be in a stopped state with “---“ in the display to change this parameter.

9. Notes:

a. Power supply, provide disconnect means and circuit protection as required. See power exhaust name plate for electrical ratings. If local codes allow connecting to the HVAC unit power make sure the disconnect and incoming wiring are sized to handle the load of both the HVAC unit and the power exhaust.
b. The exhaust contacts (ec) initiate the run/stop signal for the VFD. When the outside air dampers are fully closed the VFD is in stop mode. When the dampers start to open the VFD will go into run mode. The exhaust contacts will be either integral to the economizer controller or actuator or be a separate end switch mounted on the damper frame.
c. The VFD is factory pre-programmed to accept the 0-10 vdc signal from the differential pressure transmitter. For custom programming, first change parameter 48 to user settings. See instructions in the VFD hand book to set parameters.

d. MODULATION POWER EXHAUST START-UP REPORT

PROJECT _____
AC UNIT MODEL _____ UNIT TAG _____
POWER EXHAUST MODEL _____
POWER EXHAUST SERIAL NUMBER _____
DATE _____ TECHNICIAN _____

____ POWER EXHAUST CABINET IS INSTALLED IN AC UNIT (SEAMS ARE TIGHT, POWER EXHAUST IS LEVEL, NO GAPS)
____ ELECTRICAL CONNECTIONS ARE TIGHT
____ VERIFY BLOWER ROTATES FREELY AND WHEEL DOES NOT RUB
____ MOTOR SHEAVE, BLOWER SHEAVE AND BLOWER WHEEL SET SCREWS ARE TIGHT.
____ VERIFY PRESSURE TUBING IS RUN TO OCCUPIED SPACE
____ LOW VOLTAGE WIRING IS CONNECTED
____ LINE VOLTAGE WIRING IS CONNECTED
____ VERIFY VOLTAGE _____ L1-L2 _____ L2- L3 _____ L1-L3
_____ L1-N _____ L2-N _____ L3-N
____ VERIFY BLOWER ROTATION
____ BLOWER & VFD DATA AT 60HZ _____ CFM _____ RPM
VFD _____ L1 AMPS _____ L2 AMPS _____ L3 AMPS
MOTOR _____ T1 AMPS _____ T2 AMPS _____ T3 AMPS
MOTOR _____ BHP
____ VERIFY VFD IS OPERATING IN PI MODE
____ PRESSURE SET POINT FOR OCCUPIED SPACE

SAMPLE BLOWER SET UP LABEL TO BE PLACED ON DRIVE SIDE OF BLOWER

MOTOR SHEAVE: 1VL34X.625 BLOWER SHEAVE: AK41H BLOWER BUSHING: HX.75 BELT: A37 MOTOR SHEAVE ADJUSTMENT 2 TURNS OPEN BLOWER RPM=1167 4 TURNS OPEN BLOWER RPM=987

END OF SECTION 23 80 00

SECTION 260010

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Table of Contents, Division 26 - Electrical:

SECTION NO.	SECTION TITLE
260010	BASIC ELECTRICAL REQUIREMENTS
260060	POWER SYSTEM STUDY
260090	ELECTRICAL DEMOLITION
260519	BUILDING WIRE AND CABLE
260526	GROUNDING AND BONDING
260529	ELECTRICAL HANGERS AND SUPPORTS
260531	CONDUIT
260533	BOXES
260536	CABLE TRAYS
260543	UNDERGROUND DUCTS AND STRUCTURES
260546	SIGNAL SYSTEMS RACEWAY
260553	ELECTRICAL IDENTIFICATION
260800	ELECTRICAL COMMISSIONING
260943	NETWORK ADDRESSABLE LIGHTING CONTROL
262213	DRY TYPE TRANSFORMERS
262413	SWITCHBOARDS
262416	PANELBOARDS
262716	CABINETS AND ENCLOSURES
262726	WIRING DEVICES
262816	OVERCURRENT PROTECTIVE DEVICES
262819	DISCONNECT SWITCHES
262900	MOTOR CONTROLS
264313	SURGE PROTECTIVE DEVICES
265100	INTERIOR LIGHTING
266116	FIRE ALARM/LIFE SAFETY SYSTEM
267319	ASSISTIVE LISTENING SYSTEM
270500	BASIC COMMUNICATIONS MATERIALS AND METHODS
275116	PUBLIC ADDRESS & MASS NOTIFICATION SYSTEMS
281600	INTRUSION DETECTION

B. Work included: This Section includes general administrative and procedural requirements for Division 26. The following administrative and procedural requirements are included in this Section to supplement the requirements specified in Division 01.

1. Quality assurance.
2. Definition of terms.
3. Submittals.
4. Coordination.
5. Record documents.
6. Operation and maintenance manuals.
7. Rough-in.
8. Electrical installation.
9. Cutting, patching, painting and sealing.
10. Field quality control.
11. Cleaning.
12. Project closeout.

C. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete and operable installation.

1. General and supplementary conditions: Drawings and general provisions of Contract and Division 01 of the Specifications, apply to all Division 26 Sections.
2. Earthwork: Include trenching, backfilling, boring and soil compaction as required for the installation of underground conduit, in-grade pull boxes, vaults, lighting pole foundations, etc. Refer to Division 31, Earthwork.
3. Selective demolition: Nondestructive removal of materials and equipment for reuse or salvage as indicated. Also dismantling electrical materials and equipment made obsolete by these installations. Refer to Division 02, Selective Demolition.
4. Concrete Work: Include forming, steel bar reinforcing, cast-in- place concrete, finishing and grouting as required for underground conduit encasement, light pole foundations, pull box slabs, vaults, housekeeping pads, etc. Also includes setting of floor boxes in existing concrete slabs, saw-cutting of existing slabs and grouting of conduits in saw-cut. Refer to Division 03, Concrete.
5. Miscellaneous metal Work: Include fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of raceways, lighting fixtures, panelboards, distribution boards, switchboards, motor control centers, etc. Refer to Division 05, Miscellaneous Metals.
6. Miscellaneous lumber and framing Work: Include wood grounds, nailers, blocking, fasteners and anchorage for support of electrical materials and equipment. Refer to Division 06, Rough Carpentry.
7. Moisture protection and smoke barrier penetrations: Include membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors, ceiling slabs and foundation walls. All penetrations through vapor barriers at slabs on grade shall be taped and made vaportight. Refer to Division 07, Thermal and Moisture Protection.
8. Access panels and doors: Required in walls, ceilings and floors to provide access to electrical devices and equipment. Refer to Division 08, Access Doors also, Division 05, Metals.

9. Painting: Include surface preparation, priming and finish coating as required for electrical cabinets, exposed conduit, pull and junction boxes, etc. where indicated as field painted in this Division. Refer to Division 09, Painting.
10. Lighting fixture supports: Provide slack fixture support wire for lighting fixtures installed in acoustical tile or lay-in suspended ceilings. Refer to Division 09, Acoustical Treatment.

D. Work furnished and installed under another Division requiring connections under this Division includes but is not limited to:

1. Electric motors.
2. Package mechanical equipment: fans, fan coil units, pumps, boilers, compressors, etc.
3. Flow switches and valve monitors for sprinkler system.
4. Pre-wired electrified partition furniture.
5. Temperature control panel(s). (Line voltage only)
6. Irrigation controller(s). (Line voltage only)
7. FM-200 control panel. (Line voltage only)
8. Kitchen equipment and appliances.
9. Electric signage.
10. Electric door locks.
11. Door hold-open/release devices.
12. Variable frequency drive units.
13. Motorized roll down/sliding doors and grills.
14. Projection screens.

E. Items furnished under another Division, but installed and connected under this Division includes but is not limited to:

1. Wall mounted control stations for motorized roll down and sliding doors.
2. Electric fire sprinkler water flow bells.
3. Speed control switches for ceiling exhaust fans.

1.2 QUALITY ASSURANCE

A. Reference to Codes, Standards, Specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Such codes or standards shall be considered a part of this Specification as though fully repeated herein.

B. When codes, standards, regulations, etc. allow Work of lesser quality or extent than is specified under this Division, nothing in said codes shall be construed or inferred authority for reducing the quality, requirements or extent of the Contract Documents. The Contract Documents address the minimum requirements for construction.

C. Work shall be performed in accordance with all applicable requirements of the latest edition of all governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:

1. California Electric Code (CEC).
2. California Building Code (CBC).
3. California Fire Code (CFC).

4. California Mechanical Code (CMC).

D. Standards: Equipment and materials specified under this Division shall conform to the following standards where applicable:

ACI	American Concrete Institute
ANSI	American National Standards Institute
ASTM	American Society for Testing Materials
CBM	Certified Ballast Manufacturers
ETL	Electrical Testing Laboratories
FS	Federal Specification
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IPCEA	Insulated Power Cable Engineer Association
NEMA	National Electrical Manufacturer's Association
UL	Underwriters' Laboratories

E. Independent Testing Agency qualifications:

1. Testing Agency shall be an independent testing organization that will function as an unbiased authority, professionally independent of Manufacturer, Supplier and Contractor, furnishing and installing equipment or system evaluated by Testing Agency.
2. Testing Agency shall be regularly engaged in the testing of electrical equipment, devices, installations and systems.
3. Testing Agency shall meet Federal Occupational Safety and Health Administration (OSHA) requirements for accreditation of independent testing laboratories, Title 9, Part 1907.
4. On-site technical personnel shall be currently certified by the International Electrical Testing Association in electrical power distribution system testing.
5. Testing Agency shall use technicians who are regularly employed by the firm for testing services.
6. Contractor shall submit proof of above Testing Agency qualifications with bid documentation upon request.

F. All base material shall be ASTM and/or ANSI standards.

G. All electrical apparatus furnished under this Section shall conform to NEMA standards and the NEC and bear the UL label where such label is applicable.

H. Certify that each welder performing Work has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.

1.3 DEFINITION OF TERMS

A. The following list of terms as used in the Division 26 documents shall be defined as follows:

1. "Provide": Shall mean furnish, install and connect unless otherwise indicated.
2. "Furnish": Shall mean purchase and deliver to Project site.
3. "Install": Shall mean to physically install the items in-place.
4. "Connect": Shall mean make final electrical connections for a complete operating piece of equipment.
5. "As directed": Shall be as directed by the Owner or their authorized Representative.

6. "Utility Companies": Shall mean the company providing electrical, telephone or cable television services to the Project.

1.4 SUBMITTALS

A. Format: Furnish submittal data neatly bound in an 8-1/2" x 11" folder or binder for each Specification Section with a table of contents listing materials by Section and paragraph number.

B. Submittals shall consist of detailed Shop Drawings, Specifications, block wiring diagrams, "catalog cuts" and data sheets containing physical and dimensional information, performance data, electrical characteristics, materials used in fabrication and material finish. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories which are included and those which are excluded. Furnish quantities of each submittal as noted in Division 01.

C. Each submittal shall be labeled with the Specification Section Number and shall be accompanied by a cover letter or shall bear a stamp stating that the submittal has been thoroughly reviewed by the Contractor and is in full compliance with the requirements of the Contract Documents. Cover letters shall list in full the items and data submitted. Failure to comply with this requirement shall constitute grounds for rejection of data.

D. The Contractor shall submit detailed Drawings of all electrical equipment rooms and closets if the proposed installation layout differs from the construction documents. Physical size of electrical equipment indicated on the Drawings shall match those of the electrical equipment that is being submitted for review, i.e.: switchboards, panelboards, transformers, control panels, etc. Minimum scale: 1/4" = 1'- 0". Revised electrical equipment layouts must be approved prior to release of order for equipment and prior to installation.

E. As part of the equipment and fixture submittals, the Contractor shall provide anchorage calculations for floor and wall mounted electrical equipment and fixtures, distribution conduits and raceways, in conformance with the 2013 California Building Code (CBC) and ASCE 7-05. Use the Occupancy Category, Ground Accelerations, Site Class, Seismic Design Category, and Seismic Importance Factor as noted in the structural drawings. For components required for Life Safety or containing hazardous materials use Ip=1.5. Structural Calculations shall be prepared, stamped and signed by a California Registered Structural Engineer. Specify proof loads for drilled-in anchors, if used.

F. The Manufacturer shall recommend the method of anchoring the equipment to the mounting surface and shall provide the Contractor with the assembly dimensions, weights and approximate centers of gravity.

G. The Manufacturer shall recommend the method of anchoring the equipment to the mounting surface and shall provide the Contractor with the assembly dimensions, weights and approximate centers of gravity.

H. All resubmittals shall include a cover letter that lists the action taken and revisions made to each Drawing and equipment data sheet in response to Submittal Review Comments. Resubmittal packages will not be reviewed unless accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.

I. Shop Drawings for the following systems must be prepared via a computer aided drafting (CAD) system for submission by the Contractor. The Engineer can provide files of the electrical Contract Documents to the Contractor.

1. Fire alarm/life safety system, Section 266116.

2. Security alarm monitoring system, Section 266516.

J. Independent Testing Agency report:

1. Testing Agency shall provide 3 copies of the complete testing report.

2. Test report shall include the following:

a. Summary of Project.

b. Description of equipment.

c. Equipment used to conduct the test.

1) Type.

2) Manufacturer.

3) Model number.

4) Serial number.

5) Date of last calibration.

6) Documentation of calibration leading to NIST standards.

d. Description of test.

e. Test results, as compared to Manufacturers or industry accepted standards and tolerances.

f. Conclusion and recommendation.

g. Signature of responsible test organization authority.

3. Furnish completed test report to Engineer no later than 30 days after completion of testing, unless otherwise directed.

K. Substitutions:

1. All requests for substitutions shall conform to the general requirements and procedure outlined in Division 01.

2. Where items are noted as "or equal," a product of equal design, construction and performance will be considered. Contractor must submit to the Engineer all pertinent test data, catalog cuts and product information required substantiating that the product is in fact equal to that specified. Only one substitution will be considered for each product specified.

3. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility and appearance. Materials, processes or equipment, which in the opinion of the Engineer is equal in quality, utility and appearance, will be approved as substitutions to that specified.

4. Whenever any material, process or equipment is specified in accordance with a Federal specification, an ASTM standard, an ANSI specification, UL rating or other association standard, the Contractor shall present an affidavit from the Manufacturer certifying that the product complies with the particular standard specification. When requested by the Engineer, support test data to substantiate compliance shall be submitted by the Contractor at no additional cost.

5. Substitutions shall be equal, in the opinion of the Architect/Engineer, to the specified product. The burden of proof of such shall rest with the Contractor. When the Architect/Engineer in writing accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted article or material to be equal to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the Work or from any provisions of the Specifications.

6. The Contractor shall be responsible for all expenses in connection with the substitution materials, processes and equipment, including the effect of the substitution on the Contractor, Subcontractor's or other Contractor's Work. No substitution of material, processes or equipment shall be permitted without written authorization of the Architect/Engineer. Any

assumptions on the acceptability of a proposed substitution prior to acceptance by the Engineer are at the sole risk of the Contractor.

1.5 COORDINATION

A. Discrepancies:

1. In the event of discrepancies within the Contract Documents, the Engineer shall be so notified, within sufficient time, as delineated in Division 01, prior to the Bid Opening to allow the issuance of an Addendum.

2. If, in the event that time does not permit notification or clarification of discrepancies prior to the Bid Opening, the following shall apply: The Drawings govern in matters of quantity and the Specifications govern in matters of quality. In the event of conflict within the Drawings involving quantities or within the Specifications involving quantities or within the Specifications involving quality, the greater quantity and higher quality shall apply. Such discrepancies shall be noted and clarified in the Contractor's Bid. No additional allowances will be made because of errors, ambiguities or omissions that reasonably should have been discovered during the preparation of the Bid.

B. Project conditions:

1. Examination of Project site: The Contractor shall visit the Project site and thoroughly review the locale, working conditions, conflicting utilities and the conditions in which the Electrical Work will take place. Verify all existing conditions in the field. No allowances will be made subsequently for any costs that may be incurred because of any error or omission due to failure to examine the Project site and to notify the Engineer of any discrepancies between Contract Documents and actual Project site conditions.

2. Protection: Keep conduits, junction boxes, outlet boxes and other openings closed to prevent entry of foreign matter. Cover fixtures, equipment, devices and apparatus and protect them against dirt, paint, water, chemical or mechanical damage, before and during construction period. Prior to final acceptance, restore to original condition any fixture, apparatus or equipment damaged including restoration of damaged factory applied painted finishes. Protect bright finished surfaces and similar items until in service. No rust or damage will be permitted.

3. Supervision: Contractor shall personally or through an authorized and competent representative constantly supervise the Work from beginning to completion and, within reason, keep the same foreman and workmen on the Project throughout the Project duration.

C. Preparation:

1. Drawings:

a. Layout: General layout indicated on the Drawings shall be followed except where other Work may conflict with the Drawings.

b. Accuracy: Drawings for the Work under this Section are essentially diagrammatic within the constraints of the symbology applied.

2. Design-Build systems approach: The Drawings do not fully represent the entire installation for the systems indicated below. The Contractor is required to complete the design for these systems as specified herein and as indicated on the Drawings. CAD Shop Drawings shall be submitted for review prior to installation:

a. Security system: Drawings indicate the layout and location of control console(s) components, as well as location of all security devices, i.e. CCTV cameras, card readers, door locks and contacts, intercom stations, duress stations, personal security system receivers, etc. conduits, wire and cabling between all system components, equipment, devices, etc. are not indicated

1.6 RECORD DOCUMENTS

A. Provide Project Record Drawings as described herein:

1. Drawings shall fully represent installed conditions including actual locations of outlets, true panelboard connections following phase balancing routines, correct conduit and wire sizing as well as routing, revised fixture schedule listing Manufacturers and products actually installed and revised panel schedules. Contractor shall record all changes in the Work during the course of construction on blue or black line prints. These prints shall be made subject of monthly review by the Owner's Representative to ascertain that they are current. If not current monthly payments may be withheld.
2. Record Drawings shall be the transfer of information on these prints to the Revit Model.
3. Record drawing submissions shall be provided to the Engineer to review upon the completion of the following phases of Work:
    a. Final electrical installation.
4. Include in the record drawing submission the following shop drawing submission with all updated installation information:
    a. Fire alarm/life safety system.
    b. Security alarm monitoring system.
    c. Telecommunication cabling system
    d. School communication system.
5. A single set of half size prints of the Record Drawings shall be submitted for review. Upon receipt of the Engineer's review comments, corrections shall be made and the Contractor shall provide the following:
    a. Printed drawing sets and digital files as defined in Division 1.
    b. Updated electrical Revit model with all field changes, redlines, shop drawings, and updated installation information completed by the Contractor.

B. Panel schedules:

1. Typewritten panel schedules shall be provided for panelboards indicating the loads served and the correct branch circuit number. Schedules shall be prepared on forms matching those in the construction documents and inserted in the pocket of the inner door of each panelboard. See Section 262416: Panelboards for requirements.
2. The contractor shall update the Revit model panel schedules at project completion.

1.7 OPERATION AND MAINTENANCE MANUALS

A. Prior to Project closeout furnish to the Owner, six (6) hard back 3-ring binders containing all bulletins, operation and maintenance instructions, part lists, service telephone numbers and other pertinent information as noted in each Section all equipment furnished under Division 26. Binders shall be indexed into Division Sections and labeled for easy reference. Bulletins containing more information than the equipment concerned shall be properly stripped and assembled.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Contractor shall verify lines, levels and dimensions indicated on the Drawings and shall be responsible for the accuracy of the setting out of Work and for its strict conformance with existing conditions at the Project site.

B. Verify final locations for rough-ins with field measurements and with the requirements for the actual equipment to be connected.

C. Refer to equipment specification in Divisions 22 through 33 for rough-in requirements.

3.2 ELECTRICAL INSTALLATION

A. Preparation, sequencing, handling and installation shall be in accordance with Manufacturer's written instructions and technical data particular to the product specified and/or accepted equal except as otherwise specified. Comply with the following requirements:

1. Shop Drawings prepared by Manufacturer.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots and openings in other building components during progress of construction, to allow for electrical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting height is not detailed or dimensioned, contact the Architect for direction prior to proceeding with rough-in.
7. Install systems, materials and equipment to conform with approved submittal data, including coordination Drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are indicated only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.
8. Install systems, materials and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
9. Install electrical equipment to facilitate servicing, maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
10. Coordinate electrical systems, equipment and materials installations with other building components.
11. Provide access panel or doors where devices or equipment are concealed behind finished surfaces. Furnish and install access doors per the requirements of Division 08.
12. Install systems, materials and equipment giving right-of-way priority to other systems that are required to maintain a specified slope.
13. Conform to the National Electrical Contractor's Association "Standard of Installation" for general installation practice.

3.3 CUTTING, PATCHING, PAINTING AND SEALING

A. Structural members shall in no case be drilled, bored or notched in such a manner that will impair their structural value. Cutting of holes, if required, shall be done with core drill and only with the approval of the Architect and Structural Engineer.

B. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

C. Application of joint sealers:

1. General: Comply with joint sealer Manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

2. Installation of fire-stopping sealant: Install sealant, including forming, packing and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops and fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.4 FIELD QUALITY CONTROL

A. General testing requirements:

1. The purpose of testing is to ensure that all tested electrical equipment, both Contractor and Owner supplied, is operational and within industry and Manufacturer’s tolerances and is installed in accordance with design Specifications.

2. Tests and inspections shall determine suitability for energization.

3. Perform tests in presence of the Owner's Representative and furnish test equipment, facilities and technical personnel required to perform tests.

4. Tests shall be conducted during the construction period and at completion to determine conformity with applicable codes and with these Specifications.

B. Tests: In addition to specific system test described elsewhere, tests shall include:

1. Equipment operations: Test motors for correct operation and rotation.

2. Lighting control circuits: Test lighting circuits for correct operation through their control devices.

3. Alarm and interlock systems: Produce malfunction symptoms in operating systems to test alarm and interlock systems. In addition, all specific tests described in the fire alarm/life safety system shall be performed.

4. Circuit numbering verification: Select on a random basis various circuit breakers in the panelboards and cycle them on and off to verify compliance of the typed panel directories with actual field wiring.

5. Voltage check:

a. At completion of job, check voltage at several points of utilization on the system that has been installed under this Contract. During test, energize all installed loads.

b. Adjust taps on transformers to give proper voltage, which is 118 to 122 volts for 120 volt nominal systems and proportionately equivalent for higher voltage systems. If proper voltage cannot be obtained, inform the Owner and the serving Utility Company.

C. Contractor shall provide test power required when testing equipment before service energization and coordinate availability of test power with General Contractor after service energization. The Contractor shall provide any specialized test power as needed or specified herein.

D. Testing safety and precautions:

1. Safety practices shall include the following requirements:

a. Applicable State and Local safety operating procedures.

b. OSHA.

c. NSC.

d. NFPA 70E.

2. All tests shall be performed with apparatus de-energized and grounded except where otherwise specifically required ungrounded by test procedure.

E. Calibration of test equipment:

1. Testing Agency shall have calibration program that assures test instruments are maintained within rated accuracy.
2. Instruments shall be calibrated in accordance with the following frequency schedule:
    a. Field instruments: Analog, 6 month maximum; Digital, 12 months maximum.
    b. Laboratory instruments: 12 months.
    c. Leased specialty equipment: 12 months where accuracy is guaranteed by lessor.
3. Dated calibration labels shall be visible on test equipment.
4. Records, which show date and results of instruments calibrated or tested, must be kept up-to-date.
5. Up-to-date instrument calibration instructions and procedures shall be maintained for test instrument.
6. Calibration standards shall be of higher accuracy than instrument tested.
7. Equipment used for field testing shall be more accurate than instrument being tested.

F. Coordinate with General Contractor regarding testing schedule and availability of equipment ready for testing.

G. Notify Owner and Engineer one week in advance of any testing.

H. Any products which fail during the tests or are ruled unsatisfactory by the Owner's Representative shall be replaced, repaired or corrected as prescribed by the Owner's Representative at the expense of the Contractor. Tests shall be performed after repairs, replacements or corrections until satisfactory performance is demonstrated.

I. Testing Agency shall maintain written record of tests and shall assemble and certify final test report.

J. Include all test results in the maintenance manuals.

3.5 CLEANING

A. Prior to energizing of electrical equipment, the Contractor shall thoroughly clean the interior of enclosures from construction debris, scrap wire, etc. using Manufacturer's approved methods and materials.

B. Upon completion of Project, prior to final acceptance, the Contractor shall thoroughly clean both the interior and exterior of all electrical equipment per Manufacturers approved methods and materials. Remove paint splatters and other spots, dirt and debris.

C. Touch-up paint any marks, blemishes or other finish damage suffered during installation.

3.6 PROJECT CLOSEOUT

A. Training: At the time of completion, a period of not less than 24 hours shall be allotted by the Contractor for instruction of building operating and maintenance personnel in the use of all systems. This 24 hours training is in addition to any instruction time called out in the Specifications for specific systems, i.e., Fire Alarm, etc. All personnel shall be instructed at one time, the Contractor making all necessary arrangements with Manufacturer’s Representative. The equipment Manufacturer shall be requested to provide product literature and application guides for the users' reference. Costs, if any, for the above services shall be paid by the Contractor.

B. Special tools: Provide one of each tool required for proper operation and maintenance of the equipment provided under this Section. All tools shall be delivered to the Owner at the Project completion.

C. Keying: Provide two keys for each lock furnished under this Section and turn over to Owner.

END OF SECTION – 26 00 10

SECTION 260060

POWER SYSTEM STUDY

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Services necessary to complete the system analysis studies required for the item specified under this Division, including but not limited to:

1. Short circuit study.
2. Protective device evaluation study.
3. Protective device coordination study.
4. Arc flash evaluation study.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with equipment specified elsewhere to perform a complete analysis study.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. American National Standards Institute, Inc. (ANSI):

   ANSI Z535.4; Product Safety Signs and Labels.

2. Institute of Electrical and Electronic Engineers (IEEE):

   IEEE 1584; Guide for Performing Arc-Flash Hazard Calculations.

3. National Fire Protection Association (NFPA):

   NFPA 70E; Electrical Safety Requirements for Employee Workplaces.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. The results of the Power System Study shall be summarized in a final report. Three (3) bound copies of the final report shall be submitted.
2. The report shall include the following Sections:
   a. Description, purpose, basis and scope of the study and a single line diagram of that portion of the power system, which is included within the scope of the study.
   b. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties and commentary regarding it.
   c. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection and commentary regarding it.
   d. Fault current calculations including a definition of terms and guide for interpretation of computer printout.
   e. Recommended size for power fuses and recommended settings for ground fault relays and for all adjustable trip relays.
   f. Tabulations of arc flash evaluation study results and commentary regarding results.

g. Sample arc flash warning label.

3. Contractor shall also provide an electronic copy of the report as part of the Record Document process.

B. The study shall be submitted to the Engineer prior to final review of the distribution equipment Shop Drawings, prior to release of equipment for manufacture. If formal completion of the study may cause delay in equipment manufacture, approval from the Architect may be obtained for a preliminary submittal of sufficient data to ensure that the selection of device ratings and characteristics will be satisfactory. Then the formal study will be provided to verify the preliminary findings.

1.4 QUALITY ASSURANCE

A. The system analysis studies shall be performed by the Switchboard/Switchgear Manufacturer or by an approved Independent Testing Company. The analysis shall be stamped by a professional engineer liscenced in the State of California.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 GENERAL

A. The studies shall include all portions of the electrical distribution system from the main normal power services down to and including the 208 VAC distribution system. Normal system connections and those that result in maximum fault conditions shall be adequately covered in the study.

3.2 SHORT CIRCUIT STUDY AND PROTECTIVE DEVICE EVALUATION STUDY

A. The short circuit study shall be performed with the aid of a computer program and shall be in accordance with the latest applicable IEEE and ANSI standards.

B. The study input data shall include the maximum available short circuit contribution, resistance and reactance components of the branch impedance, the X/R ratios, base quantities selected and other source impedance.

C. Short circuit close and latch duty values and interrupting duty values shall be calculated on the basis of maximum available current at each substation bus, switchgear bus, medium voltage controller, switchboard, low voltage motor control center, distribution panelboard, pertinent branch circuit panel and other significant locations through the system. The short circuit tabulations shall include asymmetrical fault currents, symmetrical fault currents and X/R ratios. For each fault location, the total duty on the bus, as well as the individual contribution from each connected branch, shall be listed with its respective X/R ratio.

D. A protective device evaluation study shall be performed to determine the adequacy of circuit breakers, switches, automatic transfer switches and fuses by tabulating and comparing the short circuit ratings of these devices with the calculated fault currents. Appropriate multiplying factors based on system X/R ratios and protective device rating standards shall be applied. Any problem areas or inadequacies in the equipment due to short circuit currents shall be promptly brought to the Architect's attention.

3.3 PROTECTIVE DEVICE COORDINATION STUDY

A. A protective device coordination study shall be performed to provide the necessary calculations and logic decisions required to select or to check the selection of power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, ground fault relays and low voltage breaker trip characteristics and settings. The studies shall be in accordance with the latest applicable IEEE and ANSI standards.

B. The coordination study shall include all medium and low voltage classes of equipment from the building or plant service protective devices down to and including the largest rated device in the low voltage motor control centers and panelboards. The phase and ground overcurrent protection shall be included as well as settings of all other adjustable protective devices, including the ground fault system devices.

C. The time-current characteristics of the specified protective devices shall be drawn on log-log paper. The plots shall include complete titles, representative one-line diagram and legends, significant motor starting characteristics, complete parameters of transformers, complete operating bands of low voltage circuit breaker trip curves and fuses. The coordination plots shall indicate the types of protective devices selected, proposed relay taps, time dial and instantaneous trip settings, transformer magnetizing inrush and ANSI transformer withstand parameters, cable thermal overcurrent withstand limits and significant symmetrical and asymmetrical fault currents. All restrictions of the National Electrical Code shall be adhered to and proper coordination intervals and separation of characteristic curves shall be maintained. The coordination plots for phase and ground protective devices shall be provided on a system basis. A sufficient number of separate curves shall be used to clearly indicate the coordination achieved.

D. The selection and settings of the protective devices shall be provided separately in a tabulated form listing circuit identification, IEEE device number, current transformer ratios and connection, Manufacturer and type, range of adjustment and recommended settings. A tabulation of the recommended power fuse selection shall be provided for the medium voltage fuses where applied in the system. Any discrepancies, problem areas or inadequacies shall be promptly brought to the Engineer's attention.

3.4 ARC FLASH EVALUATION STUDY

A. An arc flash evaluation study shall be performed to identify the shock hazard and appropriate personnel protective equipment (PPE) required at each switchboard, distribution board, panelboard, etc. in accordance with the referenced standards.

B. The arc flash evaluation study shall include all voltage classes of equipment from the service entrance down to and including the panelboards.

C. The company performing the arc flash evaluation study shall provide arc flash and shock hazard warning labels for all equipment evaluated. Labeling shall be as follows:

1. Label type:
    a. 4” x 6” for Hazard Class 1 or less.
    b. 5” x 7” for Hazard Class greater than 1.
    c. White vinyl or polyester with orange warning symbol and black text.
    d. Industrial grade self-adhesive backing.
    e. Printed information shall be from the evaluation study results.
    f. Labeling shall be by Created with Brady “PowerMark” Sign, Label Maker or approved equal.
2. Hazard Class 1 label information:
    a. Equipment name.
    b. Available short circuit current.
    c. Flash protection boundary.
    d. Incident energy at 18 inches expressed in cal/cm^2.
    e. PPE required.

3. Hazard Class greater than 1 label information:
    a. Equipment name.
    b. Available short circuit current.
    c. Flash protection boundary.
    d. Incident energy at 18 inches expressed in cal/cm².
    e. PPE required.
    f. Voltage shock hazard.
    g. Limited shock approach boundary.
    h. Restricted shock approach boundary.
    i. Prohibited shock approach boundary.

D. Labels shall be affixed to all equipment covered under the evaluation study.

3.5 PROTECTIVE DEVICE TESTING, CALIBRATION AND ADJUSTMENT

A. The equipment Manufacturer shall provide the services of a qualified field Engineer and necessary tools and equipment to test and calibrate the protective relays, ground fault relays and circuit breaker trip devices as recommended in the Power System Study.

END OF SECTION – 26 00 60

SECTION 260090

ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor and equipment necessary to complete the demolition required for the item specified under this Division, including but not limited to:

1. Selective Electrical demolition

1.2 SYSTEM DESCRIPTION

A. Disconnection, removal and relocation of all wiring, light fixtures, outlets, conduit and all other types of electrical equipment as described on Drawings.

B. Purpose is to remove, relocate and extend existing installations to accommodate new construction.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment necessary for patching and extending Work, as specified in other Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly review conditions in the area of demolition prior to commencing Work to ensure complete understanding of existing installation in relationship to demolition Work.

3.2 GENERAL REQUIREMENTS

A. Remove all wiring, light fixtures, outlets, conduit and all other types of electrical equipment indicated to be removed. Devices that are to be removed may require reworking conduit and wiring in order to maintain service to other devices. If removed devices are on walls or ceilings that are to remain, blank coverplates are to be installed on outlet boxes.

B. Where remodeling interferes with circuits in areas that are otherwise undisturbed, circuits shall be reworked as required.

C. Existing devices and circuiting that are indicated are indicated only for informational purposes. Contractor shall visit the Project site and shall verify conditions as they exist and shall remove, relocate and/or rework any electrical equipment or circuits affected (whether indicated or not) due to removal of existing walls, ceilings, etc. Coordinate all Work with that of other trades.

D. All equipment, fixtures, devices, etc., which are removed shall be delivered to the Owner for disposition. All items which are removed and not wanted by the Owner and which are not reused shall become the property of the Contractor and shall be legally removed from the Project site.

E. Cutting and patching necessary for the removal of Electrical Work shall be included.

F. Remove and replace lighting fixtures, rework, relocate or replace conduit and wiring and do other Work required by the installation of new ductwork, piping, etc., above the ceiling. Coordinate with other trades and verify the extent of the Work.

3.3 LIGHT FIXTURES

A. Disconnect and remove abandoned light fixtures. Remove conduits, wiring, boxes, brackets, stems, hangers and other accessories.

3.4 OUTLETS

A. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

3.5 CONDUIT

A. Remove abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors and patch surfaces.

3.6 WIRING

A. Removed abandoned wiring to source of supply.

3.7 EXISTING SYSTEMS

A. Electrical distribution system: Disable system only to make switchovers and connections. Obtain permission from Owner's designated representative at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to Work area.

B. Fire alarm system: Maintain the existing system in service. Disable system only to make temporary connections to maintain service in areas adjacent to Work area(s). Notify Owner and Fire Supervisory Service at least 24 hours before partially or completely disabling the system.

C. Telephone system: Maintain the existing system in service throughout construction. Disable system only to make temporary connections where necessary to maintain service in areas adjacent to Work area(s). Notify Owner and Telephone Utility at least 24 work week hours before partially or completely disabling the system.

3.8 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment that shall remain.

END OF SECTION – 26 00 90

SECTION 260519

BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Building wire.
2. Cable.
3. Wiring connections and terminations.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Federal Specifications (FS):

FS J-C-30A;	Cable and Wire, Electrical (Power, Fixed Installation).
FS W-S-610C;	Splice Conductor.
FS HH-I-595C;	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic.

2. Underwriters Laboratories, Inc. (UL):

UL 4;	Armored Cable.
UL 44;	Thermoset-Insulated Wires and Cables.
UL 62;	Flexible Cord and Fixture Wire.
UL 83;	Thermoplastic-Insulated Wires and Cables.
UL 183;	Manufactured Wiring Systems.
UL 310;	Electrical Quick-Connect Terminals.
UL 486A & B;	Wire Connectors.
UL 486C;	Splicing Wire Connectors.
UL 486D;	Insulated Wire Connector Systems for Underground Use or in Damp or Wet Locations.
UL 493;	Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables.
UL 510;	Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
UL 854;	Service-Entrance Cables.
UL 1569;	Metal-Clad Cables.
UL 1581;	Reference Standard for Electrical Wires, Cables and Flexible Cords.

3. National Electrical Manufacturer Association (NEMA):

NEMA WC-5;	Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
NEMA WC-7;	Cross-Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

4. Institute of Electrical and Electronic Engineers (IEEE):

IEEE 82;	Test Procedure for Impulse Voltage Tests on Insulated Conductors.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Submit Manufacturer's installation instructions.
4. Final test results.

1.4 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

C. Independent Testing Agency qualifications: Refer to Section 260010: Basic Electrical Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Building wire:
    a. Cerrowire
    b. General Cable
    c. Southwire Company
    d. Stabiloy (aluminum only)
    e. United Wire and Cable
2. Metal-CladArmored Cable:
    a. AFC Cable Systems
    b. AFC Cable Systems – MC Luminary Cable (0-10V)
    c. Southwire Company
3. Flexible Cords and Cables:

a. Carol Cable Company
b. Cerrowire
c. PWC Corp

4. Wiring connectors and terminations:
a. 3M Company.
b. Ideal.
c. Blackburn-Holub.
d. Burndy.
e. Thomas & Betts Corp.
f. Beau Barrier.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 BUILDING WIRE

A. Conductor material:
1. Provide annealed copper for all wire, conductor and cable, unless otherwise indicated.
2. Copper wire AWG #8 and larger shall be stranded, unless otherwise indicated.
3. Copper wire AWG #10 and smaller may be solid or stranded as best suited for the installation.

B. Insulation material:
1. All insulated wire, conductor and cable shall be 600 volt rated unless otherwise noted on the Drawings.
2. Thermoplastic-insulated building wire: NEMA WC 5.
3. Rubber-insulated building wire: NEMA WC 3.
4. Copper feeders and branch circuits larger than #6 AWG: Type THW, XHHW or dual rated THHN/THWN.
5. Copper feeders and branch circuits #6 AWG and smaller: Type TW, THW, XHHW or dual rated THHN/THWN.
6. Feeders and branch circuits for direct-current (DC) in wet locations: Type XHHW-2
7. Service Entrance: Type RHW or THWN.
8. Control Circuits: Type THW or dual rated THHN/THWN.
9. Identify system conductors as to voltage and phase connections by means of color-impregnated insulation.

2.3 METAL-CLAD CABLE (MC)

A. MC cable shall be an armored assembly of two or more dual rated THHN annealed copper conductors with a full sized green insulated ground wire.

B. MC cable sheath shall be fabricated in continuous lengths from galvanized steel or aluminum strips, spirally wound and formed to provide an interlocking design.

C. Conductors shall be color-coded for the correct phase and voltage as specified herein.

D. Fittings: Connectors shall be of the single screw clamp variety with steel or cast malleable iron bodies and threaded male hubs with insulated throats. Fittings shall be UL listed for use with MC cable type specified.

E. MC cable used for 0-10V signal wiring shall have the 0-10V wires twisted at a different twist ratio than that of the current carrying conductors.

2.4 FLEXIBLE CORDS AND CABLES (TYPE'S')

A. Provide flexible cords and cables of size, type and arrangement as indicated on the Drawings.

B. Type 'S' flexible cords and cables shall be manufactured in accordance with NEC Article 400 and composed of two or more conductors and a full size green insulated ground wire with an outer jacket of rubber or neoprene as noted.

C. Flexible cords and cables shall be fitted with wire mesh strain relief grips either as a integral component of the connector or as an independently supported unit.

D. Suspended flexible cords and cables shall incorporate safety spring(s) unless otherwise noted.

2.5 WIRING CONNECTIONS AND TERMINATIONS

A. Bolted pressure connectors: Provide wide range-taking connectors with cast bronze compression bolts, designed for parallel taps, tees, crosses or end-to-end connections.

B. Electrical spring wire connectors:

1. Provide multi-part construction incorporating a non-restricted, zinc coated square cross-section steel spring enclosed in a steel sheet with an outer jacket of plastic and insulating skirt.

2. Self-striping pigtail and tap U-contact connectors shall not be used.

C. Push-in wire connectors:

1. Multi-port push-in wire connectors for a maximum of 8-wires, as required for specific application. Connectors are manufactured to accommodate a wide range of sizes with either solid or stranded conductors, up to a maximum wire size of #10 AWG. Low insertion force required for ease of installation.

2. Housing shall be 105 degrees C and transparent for visual connection verification.

3. 600 volt maximum rating with copper contacts.

4. UL Listed to 486C and UL 467 Listed for grounding and bonding applications.

D. Compression type terminating lugs:

1. Provide tin-plated copper high-compression type lugs for installation with hand or hydraulically operated circumference-crimping tools and dies as stipulated by the lug Manufacturer or as indicated on Drawings. Notch or single point type crimping is NOT acceptable.

2. Two hole, long barrel lugs shall be provided for size (4/0) and larger wire where terminated to bus bars. Use minimum of three crimps per lug, on sizes where possible.

E. Splicing and insulating tape: Provide black, ultraviolet proof, self-extinguishing, 7 mil thick vinyl general purpose electrical tape with a dielectric strength of 10,000 volts suitable for temperatures from minus 18 degrees C to 105 degrees C. Federal Spec. HH-I-595, Scotch 33+ or equal minimum.

F. Insulating putty:

1. Provide pads or rolls of non-corrosive, self-fusing, one-eighth inch thick rubber putty with PVC backing sheet. Scotch vinyl mastic pads and roll or equal.

2. Use putty suitable for temperatures from minus 17.8 degrees C to 37.8 degrees C with a dielectric strength of 570-volts/mil minimum.

G. Insulating resin:

1. Provide two-part liquid epoxy resin with resin and catalyst in pre-measured, sealed mixing pouch. Scotchcast 4 or equal for wet or underground vaults, boxes, etc. splices or terminations.

2. Use resin with a set up time of approximately 30 minutes at 21.1 degrees C and with thermal and dielectric properties equal to the insulating properties of the cables immersed in the resin.

H. Terminal strips:

1. Provide box type terminal strips in the required quantity plus 25% spare. Install in continuous rows in terminal cabinets.

2. Use the box type terminal strips with barrier open backs and with ampere ratings as required.

3. Identify all terminals with numbering sequence being used for a particular system.

I. Crimp type connectors:

1. Provide insulated fork or ring crimp terminals with tinned electrolytic copper-brazed barrel with funnel wire entry and insulation support

2. Fasten crimp type connectors or terminals using a crimping tool recommended by the connector Manufacturer.

3. Provide insulated overlap splices with tinned seamless electrolytic copper barrel with funnel wire entry and insulation support.

4. Provide insulated butt splices with tinned seamless electrolytic copper barrel with center stop, funnel wire entry and insulation support.

J. Cable ties: Provide harnessing and point-to-point wire bundling with nylon cable ties. All cable ties shall be installed using tool supplied by Manufacturer of ties.

K. Wire lubricating compound:

1. UL listed for the wire insulation and conduit type and shall not harden or become adhesive.

2. Shall not be used on wire for isolated type electrical power systems.

L. Bolt termination hardware:

1. Bolts shall be plated, medium carbon steel heat-treated, quenched and tempered equal to ASTM A-325 or SAE grade 5; or silicon bronze alloy ASTM B-9954 Type B.

2. Nuts shall be heavy semi-finished hexagon, conforming to ANSI B18.2.2, threads to be unified coarse series (UNC), class 2B steel or silicon bronze alloy.

3. Flat washers shall be steel or silicon bronze, Type A plain standard wide series, confirming to ANSI B27.2. SAE or narrow series shall not be used.

4. Belleville conical spring washers shall be hardened steel, cadmium plated or silicon bronze.

5. Each bolt connecting lug(s) to a terminal or bus shall not carry current exceeding the following values:

a. 1/4" bolt - 125 amps

b. 5/16" bolt - 175 amps

c. 3/8" bolt - 225 amps

d. 1/2" bolt - 300 amps

e. 5/8" bolt - 375 amps

f. 3/4" bolt - 450 amps

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of wire and cable installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 APPLICATION

A. All wire, conductor and cable with their respective connectors, fittings and supports shall be UL listed for the installed application and ambient condition.

B. Feeders and branch circuits in wet locations shall be rated 75 degree C.

C. Feeders and branch circuits in dry locations shall be rated 90 degree C.

D. Minimum conductor size:

1. Provide minimum AWG #12 for all power and lighting branch circuits.

2. Provide minimum AWG #14 for all line voltage signal and control wiring unless otherwise indicated.

E. Color coding:

1. For 120/208 volt, 3 phase, 4 wire systems:

a. Phase A - Black

b. Phase B - Red

c. Phase C - Blue

d. Neutral - White

e. Ground - Green

2. For 277/480 volt, 3 phase, 4 wire systems:

a. Phase A - Brown

b. Phase B - Orange

c. Phase C - Yellow

d. Neutral - Gray

e. Ground - Green

3. Switch leg individually installed shall be the same color as the branch circuit to which they are connected, unless otherwise noted.

4. Travelers for 3-way and 4-way switches shall be a distinct color and pulled with the circuit switch leg or neutral.

3.3 WIRING METHODS

A. Install wires and cables in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.

B. Install all single conductors in raceway system, unless otherwise noted.

C. Parallel circuit conductors and terminations shall be equal in length and identical in all ways.

D. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than #10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.

E. 20 amp power and lighting branch circuit containing no more than four (4) current carrying conductors (phases and neutrals). Use #10 AWG conductor for 120/208 volt circuits located outside a 75 foot radius of panel source and for 277 volt branch circuits located outside a 200 foot radius of panel source, unless otherwise noted.

F. 20 amp power and lighting branch circuits containing no more than eight (8) current carrying conductors (phases and neutrals). Use #10 AWG conductors for 120/208 volt circuits located outside a 65 foot radius of panel source and for 277/480 volt circuits located outside a 150 foot radius of panel source.

G. Provide #10 AWG pig tails on all 20A and 30A wiring devices served by #8 AWG conductors and larger.

H. Splice cables and wires only in outlet boxes, junction boxes, pull boxes, manholes or handholes. Group and bundle with tie wrap each neutral with it's associated phase conductor where more then one neutral is present in a conduit.

I. Install cable supports for all vertical feeders in accordance with the NEC Article 300. Provide split wedge type fittings, which firmly clamp each individual cable and tighten due to cable weight.

J. Neatly form, train and tie the cables in individual circuits. For panelboards, cabinets, wireways, switches and equipment assemblies.

K. Seal cable or wire, entering a building from underground or exiting walk-in cold box or freezer, between the wire or cable and conduit, where it exits the conduit, with a non-hardening approved compound, i.e. duct seal or equal.

L. Provide UL-listed factory-fabricated, solderless metal connectors of size, ampacity rating, material, type and class for applications and for services indicated. Use connectors with temperature ratings equal to or greater than the wires that are being terminated.

M. Stranded wire shall be terminated using fitting, lugs or devices listed for the application. However, in no case shall stranded wire be terminated solely by wrapping it around a screw or bolt.

N. Flexible cords and cables supplied, as part of a pre-manufacturer fixture or unit assembly shall be installed according to Manufacturers published installation instructions.

3.4 WIRING INSTALLATION IN RACEWAYS

A. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical Work likely to injure conductors has been completed. Pull all conductors into a raceway at the same time. Exercise care in pulling conductors so that insulation is not damaged. Use UL listed, non-petroleum base and insulating type pulling compound as needed.

B. Completely mandrel all underground or concrete encased conduits prior to installing conductors.

C. Completely and thoroughly swab raceway system before installing conductors.

D. Do not use block and tackle, power driven winch or other mechanical means for pulling conductors of size smaller than AWG #1.

E. Wire pulling:

1. Provide installation equipment that will prevent the cutting or abrasion of insulation during pulling of cables.

2. Use rope made of nonmetallic material for pulling feeders.
3. Attach pulling lines for feeders by means of either woven basket grips or pulling eyes attached directly to the conductors.
4. Pull in together multiple conductors or cables in a single conduit.

F. Install and test all cables in accordance with Manufacturer's instructions and warranty.

3.5 MC CABLE INSTALLATION

A. The Drawings indicate above suspended ceiling power distribution junction boxes for conversion from “pipe and wire” to MC cable wiring system. Install these boxes such that they are accessible from below. MC cable shall be run to each device as described in documents. MC cable runs have not been indicated. Refer to Shop Drawings for installation.

B. Install MC cable in accordance with Manufacturers instructions and in strict accordance with NEC Article 334. Follow Manufacturer's explicit instructions when connecting the cable to fittings and boxes. Connectors shall be firmly secured to the cable, but not over-tightened. Connector shall be firmly attached to the metal boxes.

C. Support cables every 6 feet and within 12 inches of boxes, per NEC Article 334, using separate spring metal clip or metal cable ties (not steel tie wire) for each cable. Cables shall not be bundled together.

D. Provide separate drop wire above accessible ceiling, to support MC cables. Suspended ceiling drop wire may not be used to directly support MC cables.

E. Do not rest cables on ceiling tiles or allow contact with mechanical piping systems.

F. Bend the cable per NEC Article 334.

G. Provide separate sleeves and/or fire barriers where cable penetrated firewalls, unless cable is UL listed for the application.

H. MC Cable may be used for 20A and 30A branch circuiting, under the following conditions.

1. Above accessible ceiling space.
2. In rooms with accessible ceiling space, MC cable may be routed to each individual device in the room. Do not route MC Cable horizontally in the walls from device to device. Do not use MC Cable in areas where the ceiling is not accessible, or where the ceiling is open to structure.
3. Do not use MC Cable for branch circuit home-runs.

3.6 WIRE SPLICES, JOINTS AND TERMINATION

A. Join and terminate wire, conductors and cables in accordance with UL 486A, C, NEC and Manufacturer's instructions.

B. Thoroughly clean wires before installing lugs and connectors.

C. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

D. Splices and terminations shall be made mechanically and electrically secure.

E. Where it's determined that unsatisfactory splice or terminations have been installed, remove the devices and install approved devices at no addition cost.

F. Terminate wires in Terminal Cabinets, relay and contactor panels, etc. using terminal strip connectors.

G. Insulate spare conductors with electrical tape and leave sufficient length to terminate anywhere in the panel or cabinet.

H. Install cable ties and maintain harnessing.

I. Encapsulate splices in exterior outlets, pullboxes and junction boxes using specified insulating resin kits. Make all splices watertight for exterior equipment and equipment in pump rooms.

J. Make up all splices and taps in accessible junction or outlet boxes with connectors as specified herein. Pigtails and taps shall be the same color as the feed conductor. Form conductor prior to cutting and provide at least six (6) inches of tail and neatly packed in box after splice is made up.

K. Branch circuits (#10 AWG and smaller):

1. Connectors: Solderless, screw-on, reusable spring pressure cable type, 600 volt, 105-degree C. with integral insulation, approved for copper conductors.

2. The integral insulator shall have a skirt to completely cover the stripped wires.

3. The number, size and combination of conductors as listed on the Manufacturers packaging shall be strictly complied with.

L. Feeder circuits: (#6 to 750 MCM)

1. Join or tap conductors from #6 AWG to 750 MCM using bolted pressure connectors or insulate mechanical compression (hi-press) taps with pre-molded, snap-on insulating boots or specified conformable insulating pad and over wrapped with two half-lapped layers of vinyl insulating tape starting and ending at the middle of the joint.

2. Terminate conductors from size #6 AWG to 750 MCM copper using bolted pressure or mechanical compression lugs in accordance with Manufacturer recommendation or as specified elsewhere.

3. Field installed compression connectors for cable sizes 250 MCM and larger shall have not less than two clamping elements or compression indents per wire.

4. Insulate splices and joints with materials approved for the particular use, location, voltage and temperature. Insulate with not less than that of the conductor level that is being joined.

M. Termination hardware assemblies:

1. AL/CU lugs connected to aluminum plated or copper buss, shall be secured using a steel bolt, flat washer (two per bolt), Belleville washer and nut.

2. Copper lugs connected to copper bus, shall be secured using silicon bronze alloy bolt, flat washer (two per bolt), Belleville washer and nut.

3. The crown of Belleville washers shall be under the nut.

4. Bolt assemblies shall be torque to Manufacturer recommendation. Where manufacture recommendation are not obtainable, the following values shall be used:

a. 1/4" - 20 bolt at 80-inch pounds torque.

b. 5/16" - 18 bolt at 180-inch pounds torque.

c. 3/8" - 16 bolt at 20-foot pounds torque.

d. 1/2" - 13 bolt at 40-foot pounds torque.

e. 5/8" - 11 bolt at 55-foot pounds torque.

f. 3/4" - 10 bolt at 158-foot pounds torque.

3.7 IDENTIFICATION

A. Refer to Section 260553: Electrical Identification for additional requirements.

B. Securely tag all branch circuits. Mark conductors with specified vinyl wrap-around markers. Where more than two conductors run through a single outlet, mark each conductor with the corresponding circuit number.

C. Color code conductors size #8 and larger using specified phase color markers and identification tags.

D. Provide all terminal strips with each individual terminal identified using specified vinyl markers.

E. In manholes, pullboxes and handholes, provide tags of the embossed brass type and also show the cable type and voltage rating. Attach the tags to the cables with slip-free plastic cable lacing units.

3.8 FIELD QUALITY CONTROL

A. Independent testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing required herein. Independent Testing Agency shall meet the requirements as outlined in Section 260010: Basic Electrical Requirements.

B. Prefunctional testing:

1. Visual and mechanical inspection:

a. Compare cable data with Contract Documents.

b. Inspect exposed sections of wires and cables for physical damage and proper connections.

c. Verify tightness of accessible bolted connections with calibrated torque wrench in accordance with Manufacturer's published data.

d. Inspect compression applied connectors for correct cable match and indention.

e. Verify visible cable bend meet or exceed ICEA and Manufacturer's minimum allowable bending radius.

f. If cables are terminated through window type current transformers, make an inspection to verify neutral and ground conductors are correctly placed for operation of protective devices.

g. Ensure wire and cable identification has been installed as specified herein.

2. Electrical testing:

a. Contractor shall perform feeder and branch circuit insulation test after installation and prior to connection to utilization devices such as fixtures, motors or appliances. Testing shall be as follows:

1) 100% of all feeders 100 amp rated and above.

2) 50% of all feeders smaller than 100 amps.

3) 10% of all branch circuits at each individual panelboard.

b. Perform insulation-resistance test using megohm meter with applied potential of 1000V DC for a continuous duration of 60 seconds. Test conductors phase-to-phase and phase-to-ground. Conductors shall test free from short-circuit and ground faults.

c. Perform continuity test of all feeder and branch circuits to ensure correct cable connections. Test all neutrals for improper grounds.

d. Contractor shall furnish instruments, materials and labor for these tests.

3. Test values: Investigate resistance values less than 50 megohms.

4. Furnish test results in typewritten report form for review and inclusion in the operation and maintenance manuals.

END OF SECTION – 26 05 19

SECTION 260526

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Power system grounding.
2. Site lighting grounding.
3. Telecommunication system grounding.
4. Electrical equipment and raceway grounding and bonding.
5. Safety ground grid and/or mat.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 05: Building Steel.
2. Division 22: Cold Water Piping.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Underwriters Laboratories, Inc. (UL):

UL 467;	Grounding and Bonding Equipment.

2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

IEEE No. 142;	Recommended Practice for Grounding of industrial and Commercial Power Systems.
IEEE No. 81	Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.

1.3 SYSTEM DESCRIPTION

A. Ground the electrical service system neutral at service entrance equipment as described herein and indicated on Drawings.

B. Ground each separately derived system neutral as described herein and indicated on Drawings.

C. Provide telecommunications system grounding conductor as described herein and indicate on Drawings.

D. Provide a safety ground grid and/or mat beneath all electrical switchgear operating at 1000 volts and above, and at emergency generator. Grid/mat shall be poured in the concrete floor slab and constructed as specified herein.

E. Except as otherwise indicated, the complete electrical installation including the neutral conductor, metallic conduits and raceways, cable trays, boxes, cabinets and equipment shall be completely and effectively grounded in accordance with all code requirements, whether or not such connections are specifically indicated or specified.

F. Resistance:

1. Resistance from the main switchboard ground bus through the ground electrode to earth shall not exceed 5 OHMS unless otherwise noted.

2. Resistance from the farthest panelboard, switchboard, etc. ground bus through the ground electrode to earth shall not exceed 20 OHMS

1.4 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

3. Submit Manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Ground Rods:

a. Weaver.

b. Erico "Cadweld" Products, Inc.

2. Ground Wells:

a. Christy Concrete Products, Inc.

b. Forni Corp.

3. Ground Bushings, Connectors, Jumpers and Bus:

a. O-Z/Gedney.

b. Thomas & Betts Corp.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 GROUND CONDUCTORS

A. Refer to Specification Section 260519: Building Wire and Cable for conductor specifications.

B. General purpose insulated:

1. UL approved and code sized copper conductor, with dual rated THHN/THWN insulation, color identified green.

2. Where continuous color-coded conductors are not commercially available, provide a minimum 4" long color band with green, non-aging, plastic tape in accordance with NEC/CEC.

C. Bare conductors in direct contact with earth or encased in concrete: #2/0 AWG copper minimum, U.O.N.

D. Bonding pigtails: Insulated copper conductor, identified green, sized per code and provide with termination screw or lug. Provide solid conductors for #10 AWG or smaller and stranded conductors for #8 AWG or larger.

2.3 DRIVEN (GROUND) RODS

A. Copper clad steel, minimum 3/4-inch diameter by 8 feet long, unless otherwise noted.

2.4 GROUND WELL BOXES FOR GROUND RODS

A. Precast concrete box nominal 9" throat diameter x 14" deep with light duty concrete cover for non-traffic areas or steel plate for traffic areas. Cover shall be embossed or engraved with "GROUND ROD".

2.5 INSULATED GROUNDING BUSHINGS

A. Plated malleable iron or steel body with 150 degree Centigrade molded plastic insulating throat and lay-in grounding lug.

2.6 CONNECTIONS TO PIPE

A. For cable to pipe: UL and NEC/CEC approved bolted connection.

2.7 CONNECTIONS TO STRUCTURAL STEEL, GROUND RODS OR SPLICES

A. Where required by the Drawings, grounding conductors shall be spliced together, connected to ground rods or connected to structural steel using exothermic welds or high pressure compression type connectors.

1. Exothermic welds shall be used for cable-to-cable and cable-to-ground rod and for cable to structural steel surfaces. Exothermic weld kits shall be as manufactured by Cadweld or equal. Each particular type of weld shall use a kit unique to that type of weld.

2. High-pressure compression type connectors shall be used for cable-to-cable and cable-to-ground rod connections.

2.8 EXTRA FLEXIBLE, FLAT BONDING JUMPERS

A. Where required by Code, indicated on the Drawing, and specified herein.

2.9 BUILDING GROUND BUS REQUIREMENTS

A. Main building power system ground bus:

1. Provide one 24" wide x 4" high x 1/4" thick copper bus bar as a minimum. Mount on wall in main electrical room utilizing insulating stand-offs at 18" above finished floor.

2. Furnish complete with cast copper alloy body lugs for connecting grounding system conductors. Attach lugs to bus with appropriate size cadmium bronze bolt, flat washer and Belleville washer. Torque all lug connections.

3. All holes shall be drilled and tapped for single-hole lugs. Provide 6 spare lugs and lug spaces.

B. Building power system reference ground bus:

1. The reference ground bus is furnished as part of the main electrical switchboard for the building, along with neutral disconnect and bus, and is in addition to the main building power system ground bus outlined above. The building grounding electrode shall make a direct connection to the building referenced ground bus in the main switchboard.

2. Provide a #2/0 AWG copper ground conductor connection between the building reference ground bus in switchboard and the main building ground bus wall mounted in main electrical room.

C. Telecommunication system ground bus requirements:

1. Main telecommunication system ground bus: Provide one 18" wide x 4" high x 1/4" thick copper bus bar as a minimum. Mount on wall in MDF room utilizing insulating stand-offs at 18" above finished floor.

2. Telecommunication system ground bus: Provide one 12" wide x 4" high x 1/4" thick copper bus bar as a minimum. Mount on wall in the IDF room utilizing insulating stand-offs at 18" above finished floor.

3. Furnish complete with cast copper alloy body lugs for connecting grounding system conductors. Attach lugs to bus with appropriate size cadmium bronze bolt, flat washer and Belleville washer. Torque all lug connections.

4. All holes shall be drilled and tapped for single-hole lugs. Provide 3 spare lugs and lug spaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of grounding system installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 INSTALLATION

A. Grounding electrodes:

1. Metal underground water pipe: Cold water metal piping system: Where the underground cold water service line is metal, indirect contact with the earth for 10 feet or more, the Contractor shall install a grounding electrode conductor from the main incoming cold water line ahead of the meter and extend to the main building reference ground bus in the main electrical room. The electrode shall be sized per NEC/CEC Article 250. Electrode connection should be accessible.

2. Concrete encased grounding electrode (UFER ground): Provide a #2/0 AWG minimum bare copper conductor encased along the bottom of concrete foundation or footings which are in direct contact with the earth and where there is no impervious water-proofing membrane between the footing and the soil. The electrode shall extend through a horizontal length of 30 feet minimum and shall be encased in not less than 2 or more than 5 inches of concrete separating it from surrounding soils. The electrode shall emerge from the concrete slab through a protective non-metallic sleeve and shall be extended to the main building reference ground bus.

3. Supplementary grounding electrode (ground ring, grid and driven rods): Provide, as indicated on the Drawings, driven ground rod(s) installed in listed ground well box(s) and filled with gravel after connection is made. Interconnect ground rod with structural steel and adjacent rods with minimum #4 AWG bare copper conductor. Ground rod shall not be less than 10 foot from any other electrode of another electrical system or from adjacent ground rod(s).

B. Grounding electrode conductor: Provide grounding electrode conductor as indicated on the Drawings or sized per NEC/CEC Article 250, whichever is greater.

C. Power system grounding:

1. Provide, unless otherwise indicated, a main building power system ground bus mounted on the wall in the main electrical room. Connect the following items using NEC/CEC sized copper grounding conductors to lugs on the main building ground bus:
    a. Grounding conductor from building reference ground bus in main service switchboard.
    b. Bonding conductor to metallic cold water piping system.
    c. Bonding conductor to building structural steel.
    d. Separately derived system grounding conductors in same room.
2. At the building power system reference ground bus in the main service switchboard, connect the grounding electrode conductor from concrete encased UFER ground or other grounding electrode systems as indicated on the Drawing or herein.

D. Separately derived electrical system grounding:
1. Ground each separately derived system per requirements in NEC/CEC Article 250 as a minimum, unless greater requirements are required elsewhere in the Contract Documents.
2. Transformers: Provide a dual rated four or six-barrel grounding lug with a 5/8"-11 threaded hole. Drill enclosure with 11/16" bit and attach lug to enclosure utilizing a torque bolt and a dragon tooth transition washer or equal. Connect the following when present:
    a. Grounding electrode conductor from supplemental ground rods.
    b. Building steel.
    c. Cold water pipe.
    d. Primary feeder ground.
    e. Secondary feeder ground.
    f. Main bond jumper.
    g. Isolated ground conductor.

E. Equipment bonding/grounding:
1. Provide a NEC/CEC sized insulated copper ground conductor in all 120VAC through 600 VAC feeder and branch circuit distribution conduits and cables.
2. Provide a separate grounding bus at panelboards, and switchboards. Connect all metallic enclosed equipment so that with maximum fault current flowing, shall be maintained at not more than 35 volts above ground.
3. Conduit terminating in concentric, eccentric or oversized knockouts at panelboards, cabinets, gutters, etc. shall have grounding bushings and bonding jumpers installed interconnecting all such conduits.
4. Provide bonding jumpers across expansion and deflection couplings in conduit runs, pipe connections to water meters, dielectric couplings in metallic cold water piping system.
5. Provide internal ground wire in flexible conduit connected at each end via grounding bushing.
6. Provide external ground wire wrapped around flexible conduit and terminate to connectors designed for the purpose.

F. Site lighting grounding: Bond all metallic light poles and bollards. Provide ground rods where indicated on the Drawings.

G. Telecommunication system grounding:

1. In addition to grounding noted on the Drawings for the power systems, provide a telecommunication system ground riser for interconnecting the MDF and the IDF rooms.
2. Riser shall consist of the following:
    a. Provide a main telecommunication system ground bus wall mounted in the MDF room at the ground floor of building.
    b. Provide telecommunication system ground bus wall mounted in each IDF room and at MPOE room.
    c. From the main telecommunication system ground bus provide one #1/0 THHN in 1-1/4" conduit to the main electrical room and terminate conductor at the main building power system ground bus.
    d. At the IDF room, provide one #1/0 THHN in 1-1/4” conduit from the telecommunication system ground bus to the main telecommunication system ground bus in the MDF room.

3.3 FIELD QUALITY CONTROL

A. Independent Testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing required herein.

B. Prefunctional testing:
1. Provide Testing Agency with Contract Documents for their review prior to the commencement of ground testing.
2. Visual and mechanical inspection:
    a. The Testing Agency shall inspect the grounding electrode and connections prior to concrete encasement, burial or concealment.
    b. Check tightness and welds of all ground conductor terminations.
    c. Verify installation complies with the intent of the Contract Documents
3. Obtain and record ground resistance measurements both from electrical equipment ground bus to the ground electrode and from the ground electrode to earth. Furnish and install additional bonding and add grounding electrodes as required complying with resistance limits specified under this Section of the Specification.
4. A typewritten record of measured resistance values shall be submitted for review and included with the operation and maintenance manual furnished to the Owner at the time of Project closeout and before certificate of final payment is issued.

END OF SECTION – 26 05 26

SECTION 260529

ELECTRICAL HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Conduit supports.
2. Equipment supports.
3. Fastening hardware.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 03: Cast-in-place concrete. Concrete equipment pads.
2. Division 05: Miscellaneous metals. Hangers for electrical equipment.
3. Division 09: Ceiling suspension systems. Slack fixture support wires.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Underwriters Laboratories, Inc. (UL):

UL 2239; Hardware for the Supports of Conduit, Tubing and Cable.

1.3 SYSTEM DESCRIPTION

A. Provide devices specified in this Section and related Sections for support of electrical equipment furnished and installed under Division 26.

B. Provide support systems that are adequate for the weight of equipment, conduit and wiring to be supported.

1.4 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein.
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Submit Manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Concrete fasteners:

a. Hilti Kwik Bolt TZ

b. Phillips "Red-Head".

c. Remington.

d. Ramset.

2. Concrete inserts and construction channel:

a. Unistrut Corp.

b. GS Metals "Globe Strut."

c. Thomas & Betts "Kindorf" Corp.

3. Conduit straps:

a. O-Z/Gedney.

b. Erico "Caddy" Fastening Products.

c. Thomas & Betts "Kindorf" Corp.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 CONCRETE FASTENERS

A. Provide expansion-shield type concrete anchors.

B. Provide powder driven concrete fasteners with washers. Obtain approval by Architect and Structural Engineer prior to use.

2.3 CONCRETE INSERTS

A. Provide pressed galvanized steel, concrete spot insert, with oval slot capable of accepting square or rectangular support nuts of ¼ inch to ½ inch diameter thread for rod support.

2.4 THREADED ROD

A. Provide steel threaded rod, sized for the load unless otherwise noted on the Drawings or in the Specifications.

2.5 CONSTRUCTION CHANNEL

A. Provide 1-1/2 inch by 1-1/2 inch, 12 gauge galvanized steel channel with 17/32-inch diameter bolt holes and 1-1/2 inch on center in the base of the channel.

2.6 CONDUIT STRAPS

A. One hole strap, steel or malleable iron, with malleable iron clamp-back spacer for surface mounted wall and ceiling applications.

1. Use malleable strap with spacers for exterior and wet locations.

2. Use steel strap without spacers for interior locations.

B. Steel channel conduit strap for support from construction channel.

C. Steel conduit hanger for pendant support with threaded rod

D. Steel wire conduit support strap for support from independent #12 gauge hanger wires.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of supporting device installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

A. Coordinate size, shape and location of concrete pads with Division 03, Cast-in-place concrete.

B. Layout support devices to maintain headroom, neat mechanical appearance and to support the equipment loads.

C. Where indicated on the Contract Documents, install freestanding electrical equipment on concrete pads.

3.3 INSTALLATION

A. Furnish and install supporting devices as noted throughout Division 26.

B. Electrical device and conduit supports shall be independent of all other system supports that are not structural elements of the building, unless otherwise noted.

C. Fasten hanger rods, conduit clamps, outlet and junction boxes to building structure using precast inserts, expansion anchors, preset inserts or beam clamps.

D. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster or gypsum board partitions and walls.

E. Use expansion anchors or preset inserts in solid masonry walls.

F. Use self-drilling anchors, expansion anchor or preset inserts on concrete surfaces.

G. Use sheet metal screws in sheet metal studs and wood screws in wood construction.

H. Do not fasten supports to piping, ductwork, mechanical equipment, conduit or acoustical ceiling suspension wires.

I. Do not drill structural steel members unless first approved in writing by the Architect or Structural Engineer.

J. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

K. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide additional support backing in stud walls prior to sheet rocking as required to adequately support cabinets and panels.

L. Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

3.4 ERECTION OF METAL SUPPORTS

A. Cut, fit and place miscellaneous metal fabrications accurately in location, alignment and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS "Structural Welding Code."

3.5 WOOD SUPPORTS

A. Cut, fit and place wood grounds, nailers, blocking and anchorage accurately in location, alignment and elevation to support and anchor electrical materials and equipment.

3.6 ANCHORAGE

A. All floor mounted, free standing electrical equipment such as transformers, etc. shall be securely fastened to the floor structure.

B. Anchorage of electrical equipment shall comply with the seismic requirements as outlined in Section 260010: Basic Electrical Requirements.

END OF SECTION – 26 05 29

SECTION 260531

CONDUIT

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Rigid steel conduit and fittings.
2. PVC insulated rigid steel conduit and fittings.
3. Intermediate metal conduit and fittings.
4. Electrical metallic tubing and fittings.
5. Flexible metallic conduit and fittings.
6. Liquidtight flexible metallic conduit and fittings.
7. Miscellaneous conduit fittings and products.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 01: Cutting and patching.
2. Division 07: Sheet metal flashing and trim.
3. Division 09: Painting. Exposed conduit and other devices.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Federal Specifications (FS):

FS WW-C-563;	Electrical Metallic Tubing.
FS WW-C-566;	Specification for Flexible Metal Conduit.
FS WW-C-581;	Specification for Galvanized Rigid Conduit.
FS W-C-1094A;	Conduit and Conduit Fittings Plastic, Rigid.

2. American National Standards Institute, Inc. (ANSI):

ANSI C80.1;	Rigid Steel Conduit, Zinc-Coated.
ANSI C80.3;	Electrical Metallic Tubing, Zinc Coated.

3. Underwriters Laboratories, Inc. (UL):

UL 1;	Flexible Metal Conduit.
UL 6;	Rigid Metal Conduit.
UL 360;	Liquid-Tight Flexible Steel Conduit.
UL 514B;	Conduit, Tubing and Cable Fittings.
UL 635;	Insulating Bushings.

UL 797; Electrical Metallic Tubing - Steel.

UL 1242; Intermediate Metal Conduit - Steel.

4. National Electrical Manufacturer Association (NEMA):

NEMA RN1; PVC Externally coated Galvanized Rigid Steel Conduit.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Submit Manufacturer's installation instruction. Provide written instructions for raceway products requiring glues, special tools or specific installation techniques.

1.4 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted and approved.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Metal conduit:
    a. Allied Tube and Conduit Co.
    b. Triangle PWC, Inc.
    c. Western Tube and Conduit Corp.
    d. Spring City Electrical Manufacturing Co.
    e. Occidental Coating Co. (OCAL).
    f. Alflex Corp.
    g. American Flexible Metal Conduit Co.
    h. Anaconda.
2. Fittings:
    a. Appleton Electric Co.
    b. OZ/Gedney.
    c. Thomas & Betts Corp.
    d. Spring City Electrical Manufacturing Co.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 GALVANIZED RIGID STEEL CONDUIT (GRS)

A. Conduit: Full weight, threaded, hot-dip galvanized steel, conforming to ANSI C80.1 and UL 6.

B. Standard threaded couplings, locknuts, bushings and elbows: Only materials of steel or malleable iron are acceptable. Locknuts shall be bonding type with sharp edges for digging into the metal wall of an enclosure.

C. Three piece couplings: Electroplated, cast malleable iron.

D. Insulating bushings: Threaded polypropylene or thermosetting phenolic rated 150 degree C minimum.

E. Insulated grounding bushings: Threaded cast malleable iron body with insulated throat and steel "lay-in" ground lug with compression screw.

F. Insulated metallic bushings: Threaded cast malleable iron body with plastic insulated throat rated 150 degrees C.

G. All fittings and connectors shall be threaded.

2.3 PVC INSULATED GALVANIZED RIGID STEEL CONDUIT (PVC GRS)

A. Conduit: Full weight, threaded, hot-dip galvanized steel, conforming to ANSI C80.1 and NEMA RN-1 with nominal 20 or 40 mil thermoplastic vinyl coating, heat fused and bonded to the exterior of the conduit.

B. Fittings: Conduit couplings and connectors shall be as specified for galvanized rigid steel conduit and shall be factory PVC coated with an insulating jacket equivalent to that of the coated material.

2.4 INTERMEDIATE METAL CONDUIT (IMC)

A. Conduit: Hot dip galvanized steel meeting the requirements of NEC Article 345 and conforming to ANSI C80.6 and UL 1242.

B. Fittings: Conduit couplings, connector and bushing shall be as specified for galvanized rigid steel conduit. Integral retractable type IMC couplings are also acceptable.

2.5 ELECTRICAL METALLIC TUBING (EMT)

A. Conduit: Shall be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam and hot dip galvanized after fabrication. Conduit shall conform to ANSI C80.3 Specifications and shall meet UL requirements.

B. Set screw type couplings: Electroplated, steel or cast malleable iron, UL listed concrete tight. Use set screw type couplings with four setscrews each of conduit sizes over 2 inches. Setscrews shall be of case hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.

C. Set screw type connectors: Electroplated steel or cast malleable iron UL listed concrete tight with male hub and insulated plastic throat, 150 degree C temperature rated. Setscrew shall be same as for couplings.

D. Raintight couplings: Electroplate steel or cast malleable iron; UL listed raintight and concrete tight, using gland and ring compression type construction.

E. Raintight connectors: Electroplated steel or cast malleable iron, UL listed raintight and concrete tight, with insulated throat, using gland and ring compression type construction.

2.6 FLEXIBLE METALLIC CONDUIT (FMC)

A. Conduit: Shall be fabricated in continuous lengths from galvanized steel strip, spirally wound and formed to provide an interlocking design and conforming to UL 1.

B. Fittings: Connectors shall be of the single screw clamp variety with steel or cast malleable iron bodies and threaded male hubs with insulated throats. Exception: Pressure cast screw-in

connectors shall be acceptable for fixture connection in suspended ceilings and cut-in outlet boxes within existing furred walls.

2.7 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC)

A. Conduit: Shall be fabricated in continuous lengths from galvanized steel strips, interlocking spirally wound, covered with extruded liquidtight jacket of polyvinyl chloride (PVC) and conforming to UL 360. Provide conduit with a continuous copper-bonding conductor wound spirally between the convolutions.

B. Fittings: Connector body and gland nut shall be of cadmium plated steel or cast malleable iron, with tapered, male, threaded hub; insulated throat and neoprene "O" ring gasket recessed into the face of the stop nut. The clamping gland shall be of molded nylon with an integral brass push-in ferrule.

2.8 MISCELLANEOUS CONDUIT FITTINGS AND PRODUCTS

A. Watertight conduit entrance seals: Steel or cast malleable iron bodies and pressure clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Fittings shall be supplied with neoprene sealing rings between the body and PVC sleeve.

B. Watertight cable sealing bushings: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel sealing screws and zinc plated cast malleable iron locking collar.

C. Expansion fittings: Multi-piece unit comprised of a hot dip galvanized malleable iron or steel body and outside pressure bussing designed to allow a maximum of 4" conduit movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. Unit shall be UL listed for wet or dry locations.

D. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve with internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling shall accommodate .75-inch deflection, expansion or contraction in any direction and allow 30-degree angular deflections. Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber jacket and stainless steel jacket clamps. Unit shall comply with UL467 and UL514. Manufacturer shall be OZ/Gedney Type DX, Steel City Type EDF or equal.

E. Fire rated penetration seals:

1. UL building materials directory classified.

2. Conduit penetrations in fire rated separation shall be sealed with a UL classified fill, void or cavity material.

3. The fire rated sealant material shall be the product best suited for each type of penetration and may be a caulk, putty, composite sheet or wrap/strip.

F. Standard products not herein specified:

1. Provide listing of standard electrical conduit hardware and fittings not herein specified for approval prior to use or installation, i.e. locknuts, bushings, etc.

2. Listing shall include Manufacturers name, part numbers and a written description of the item indicating type of material and construction.

3. Miscellaneous components shall be equal in quality, material and construction to similar items herein specified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of conduit system installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 APPLICATION

A. Galvanized rigid steel conduit (GRS) shall be used in the following applications:

1. For feeders and branch circuits located indoors, concealed or exposed above suspended ceilings, in damp/wet locations, in crawl spaces, in attics, chases, furred spaces, equipment rooms, loading docks or in hazardous locations in accordance with NEC and local Codes.

2. For feeders and branch circuits concealed in concrete floors and walls when not in contact with earth.

B. PVC insulated galvanized rigid steel conduit shall be used in the following applications:

1. Use 40-mil coating for feeders and branch circuits in damp or wet locations.

2. Use 20 or 40 mil for feeders and branch circuits concealed in concrete walls or slabs in contact with earth.

3. Use 20 or 40-mil for runs beneath floor slabs on grade.

4. Use 40-mil for all below grade penetrations through floor slabs on grade or exterior walls.

C. Intermediate metal conduit (IMC): Shall be used for the same application as galvanized rigid steel conduit as specified herein.

D. Electrical metallic tubing (EMT): Shall be used exposed or concealed for interior electrical feeders 4" and smaller, interior power and lighting branch circuits and low tension distribution system where run above suspended ceilings, in concrete slabs and walls not in contact with earth; in stud walls, furred spaces and crawl spaces. EMT shall not be installed exposed below 6 feet above the finish floor except within electrical, communication or signal rooms or closets.

E. Flexible metallic conduit (FMC): Shall be used only in dry locations for connections from an adjacent outlet box or conduit to all motors, transformers, vibrating equipment or machinery, controllers, solenoid valves, float and flow switches or similar devices and to lighting fixtures installed in suspended ceilings, minimum sizes shall be 3/8" for lighting fixtures and control wiring and 1/2" for motor and transformer connections. U.O.N.

F. Liquidtight flexible metallic conduit (LFMC): Shall be used in wet or damp locations for connections from adjacent outlet box or conduit to all motors, transformers, vibrating equipment or machinery, controllers, solenoid valves, float and flow switches or similar devices. These areas are typically food preparation and dishwashing areas, sump wells, loading docks, pump rooms, exterior areas, etc. Minimum sizes shall be 1/2".

3.3 PREPARATION

A. Locations of conduit runs shall be planned in advance of the installation and coordinated with ductwork, plumbing, ceiling and wall construction in the same areas and shall not unnecessarily cross other conduits or pipe, nor prevent removal of ceiling tiles or panels, nor block access to mechanical or electrical equipment.

B. Where practical, install conduits in groups in parallel vertical or horizontal runs and at elevations that avoid unnecessary offsets.

C. All conduits shall be run parallel or at right angles to the centerlines of columns and beams, whether routed exposed, concealed above suspended ceiling or in concrete slabs.

D. Conduits shall not be placed closer than 12 inches to a flue, parallel hot water, steam line or other heat producing source or three inches from such lines when crossing perpendicular to the runs.

E. Exposed conduit installation shall not encroach into the ceiling height headroom of walkways or doorways. Where possible, install horizontal raceway runs above water and below steam piping.

F. The largest trade size conduits in concrete floor and wall slabs shall not exceed 1/3 the floor or wall thickness and conduits shall be spaced a minimum of three conduit diameters apart unless otherwise noted on the Drawings. All conduits shall be installed in the center of concrete slabs or wall and shall not be placed between reinforcing steel and the bottom of floor slabs.

G. In long runs of conduit, provide sufficient pull boxes inside buildings to facilitate pulling wires and cables, with spacing not to exceed 150 feet. Support pull boxes from structure independent of conduit supports. These pull boxes are not indicated on the Drawings.

H. Provide all reasonably inferred standard conduits fitting and products required to complete conduit installation to meet the intended application whether noted, indicated or specified in the Contract Documents or not.

I. Connect recessed lighting fixtures to conduit runs with maximum six feet of flexible metal conduit.

3.4 INSTALLATION

A. Install conduit in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.

B. Minimum Conduit Size: Unless otherwise noted herein or on Drawings, minimum conduit size shall be 1/2" for interior applications and 3/4" for exterior and underground applications.

C. All conduit sizes indicated on the Drawings are sized for copper conductors with THHN/THWN insulation. If conductor type or size is changed the Contractor shall be responsible for resizing conduits upward to meet Code.

D. In general, all conduit work shall be concealed where possible. Exceptions shall be electrical, communication and mechanical rooms, exposed ceiling areas, and parking garages.

E. Conduit connections to motors and surface cabinets shall be concealed, with the exception of electrical, communication and mechanical rooms, or unless exposed Work is clearly called for on the Drawings.

F. Install conduits in complete runs before pulling in cables or wires.

G. Install conduit free from dented, bruises or deformations. Remove and replace any damaged conduits with new undamaged material.

H. Conduits shall be well protected and tightly covered during construction using metallic bushings and bushing "pennies" to seal open ends.

I. In making joints in rigid steel conduit, ream conduit smooth after cutting and threading. Coat all field-threaded joints with UL approved conductive type compound to ensure low resistance ground continuity through conduit and to prevent seizing and corrosion.

J. Clean any conduit in which moisture or any foreign matter has collected before pulling in conductors. Paint all field-threaded joints to prevent corrosion.

K. In all empty conduits or ducts, install a “True Tape” conduit measuring tape line to provide overall conduit length for determining length of cables/conductors for future use.

L. Conduit systems shall be mechanically and electrically continuous throughout. Install code size, insulated, copper, green-grounding conductors in all conduit runs for branch circuits and feeders. This conductor is not indicated on the Drawings. Refer to Section 260526: Grounding and Bonding.

M. Metallic conduit shall not be in contact with other dissimilar metal pipes (i.e. plumbing).

N. Make bends with standard conduit bending hand tool or machines. The use of any item not specifically designed for the bending of electrical conduit is strictly prohibited.

O. A run of conduit between terminations at wire pulling points shall not contain more than the equivalent of four quarter bends (360 degrees, total).

P. Emergency power raceway system: Install entirely independent of other raceway systems, except where specifically allowed by NEC Article 517.

3.5 PENETRATIONS

A. Locate penetrations and holes in advance where they are proposed in the structural sections such as footings, beams, wall, etc. Penetrations are acceptable only when the following occurs:

1. Where indicated on the Structural Drawings.

2. As approved by the Structural Engineer prior to construction and after submittal of Drawing showing location, size and position of each penetration.

B. Cutting or holes:

1. Cut holes through concrete, masonry block or brick floors and floors of structure with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed, except where permitted by the Structural Engineer as required by limited working space. Obtain the approval of the Structural Engineer prior to drilling through structural sections.

2. Provide sleeves or “can outs” for cast-in-place concrete floors and walls. Following conduit installation, seal all penetrations using non-iron bearing, chloride free, non-shrinking, dry-pack grouting compounds; or fire rated penetration-sealing materials.

3. Cut holes for conduit penetrations through non-concrete and non-masonry walls, partitions or floors with a hole saw. The hole shall be only as large as required to accommodate the size of the conduit.

4. Provide single piece escutcheon plates around all exposed conduit penetrations in public places.

C. Sealing:

1. Non-rated penetrations: Pack opening around conduits with non-flammable insulating material and seal with gypsum wallboard taping compound.

2. Fire stop: Where conduits, wireways and other electrical raceways pass through fire rated partitions, walls, smoke partitions or floor; install a UL classified fire stop material to provide an effective barrier against the spread of fire, smoke and gases. Completely fill and seal clearances between raceways and openings with the fire stop material.

D. Waterproofing: At floor, exterior wall and roof conduit penetrations, completely seal clearances around the conduit and make watertight as specified in Division 07: Sealants and Caulking.

1. Install specified watertight conduit entrance seals at all below grade wall and floor penetrations. Conduits penetrating exterior building walls and building floor slab shall be PVC coated rigid galvanized steel.

2. For roof penetrations furnish and install roof flashing, counter flashing and pitch-pockets as specified under Roofing and Sheet Metal Sections of the Specifications.

3. Provide membrane clamps and cable sealing fittings for any conduit that horizontally penetrates the waterproof membrane.

4. Conduits that horizontally penetrate a waterproof membrane shall fall away from and below the penetration on the exterior side a minimum of two times the conduit diameters.

3.6 CONCEALED IN CONCRETE

A. Install conduits approximately in the center of the slab so that there will be a minimum of 3/4-inch of concrete around the conduits.

B. Installation of conduit in structural concrete that is less than three inches thick is prohibited. Topping slabs, maintenance pads and curbs are exempted.

C. Tie conduits to reinforcing rods or otherwise secure them to prevent sagging or shifting during concrete placement. Run conduit larger than 1-inch trade size, parallel with or at right angles to the main reinforcement; where at right angles to the reinforcement, the conduit shall be close to one of the supports of the slab.

D. Where nonmetallic conduit or tubing is used, raceways must be converted to PVC coated rigid steel conduit before rising above floor.

E. Make couplings and connections watertight.

F. Protect stub-ups from damage where conduits rise from floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

3.7 TERMINATIONS AND JOINTS

A. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings except as otherwise indicated.

B. Raceways shall be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.

C. Conduits shall be securely fastened to cabinets, boxes and gutters using two locknuts and an insulating bushing or specified insulated connectors. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors. Install grounding bushings or bonding jumpers on all conduits terminating at concentric or eccentric knockouts.

D. Conduit terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.

E. Stub-up connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used 6 inches above the floor. Where equipment connections are not made under this contract, install screwdriver operated threaded flush plugs with floor.

F. Install specified cable sealing bushings on all conduits originating outside the building walls and terminating in switchgear, cabinets or gutters inside the building. Install cable sealing bushings or raceway seal for conduit terminations in all grade level or below grade exterior pull, junction or outlet boxes.

G. Raceway seal: Inject into wire filled raceways, a pre-formulated rigid 2 lbs. density polyurethane foam which expands a minimum 35 times it's original bulk. Foam shall have the physical properties of water vapor transmission of 1.2 to 3.0 perms; water absorption less than 2% by volume, fungus and bacterial resistant. Foam shall permanent seal against water, moisture, insects and rodents. Install raceway sealing foam at the following points:

1. Where conduits pass from warm locations to cold locations to prevent passage of water vapor (such as refrigerated spaces, constant temperature rooms, air-conditioned spaces, etc.).

2. Where conduits enter buildings from below grade.

H. Install expansion couplings where any conduit crosses a building separation or expansion joint as follows:

1. Conduits three inches and larger, shall be rigidly secured to the building structure on opposite sides of a building expansion joint and provided with expansion or deflection couplings. Install the couplings in accordance with the Manufacturer's recommendations.

2. Conduits smaller than three inches shall be rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 15 inches of slack flexible conduit. Flexible conduit shall have a copper green ground-bonding jumper installed. For concrete embedded conduit, use expansion and deflection couplings as specified above for three inches and larger conduits.

I. Use short length (maximum of 6ft) of the appropriate FMC or LFMC conduit for connections to motors and other electrical equipment subject to movement, vibration, misalignment, cramped quarters or noise transmission. Provide liquidtight flexible metal conduit for installation in exterior locations, moisture or humidity-laden atmosphere, corrosive atmosphere, water hose or spray wash-down operations and locations subject to seepage or dripping of oil, grease or water. Provide a green ground wire with FMC or LFMC conduit.

3.8 SUPPORTS

A. Provide supports for raceways as specified in Section 260529: Electrical Hangers and Supports.

B. All raceways systems shall be secured to building structures using specified fasteners, clamps and hangers spaced according to the NEC.

C. Support single runs of conduit using one-hole pipe straps. Where run horizontally on walls in damp or wet locations, install "clamp backs" to space conduit off the surface.

D. Multiple conduit runs shall be supported using "trapeze" hangers fabricated from specified construction channel, mounted to 3/8-inch diameter, threaded steel rods secured to building structures. Fasten conduit to construction channel with standard one-hole pipe clamps or the equivalent. Provide lateral seismic bracing for hangers.

E. Individual 1/2" and 3/4" conduits installed above suspended ceilings may be attached to the ceiling's hanger wire using spring steel support clips provided that not more than two conduits are attached to any single support wire.

F. Support exposed vertical conduit runs at each floor level, independent of cabinets or switches to which they run, by means of acceptable supports.

G. Fasteners and supports in solid masonry and concrete:

1. Use steel or malleable iron concrete inserts set in place prior to placing the concrete.

2. After concrete installation:

a. Steel expansion anchors not less than ¼ inch bolt size and not less than 1-1/8 inch embedment.

b. Power set fasteners not less than ¼ inch diameter with depth of penetration not less than three inches.

c. Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.

H. Hollow masonry: Toggle bolts are permitted. Bolts supported only by masonry block are not acceptable.

I. Metal structures: Use machine screw fasteners or other devices specifically designed and approved for the application.

END OF SECTION – 26 05 31

SECTION 260533

BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Wall and ceiling outlet boxes.
2. Pull and junction boxes.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 08: Access doors. Wall and ceiling access doors.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.

1. American National Standards Institute/National Electrical Manufacturer Association:

ANSI/NEMA OS-1;	Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
ANSI/NEMA OS-2;	Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
NEMA 250;	Enclosures for Electrical Equipment (1000 volts maximum).

2. Underwriters Laboratories (UL):

UL 50;	Enclosures for Electrical Equipment.
UL 514A;	Metallic Outlet Boxes.
UL 1773;	Termination Boxes.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Submit Manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Outlet boxes:
    a. Bowers
    b. Hubbel
2. Weatherproof Outlet Boxes and Box Extension Adapters:
    a. Bell
    b. Red Dot
    c. Carlon
3. Floor boxes:
    a. Legrand.
    b. Hubbell Inc.
    c. Steel City
4. Junction and Pullboxes:
    a. Circle AW Products.
    b. Hoffman Engineering Co.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 OUTLET BOXES

A. Standard outlet box:

1. Provide galvanized, one-piece die formed or drawn steel, knockout type box of size and configuration best suited to the application indicated on the Drawings.
2. 4-inch square by 1-1/2 inch deep shall be minimum box size.
3. ANSI/NEMA OS 1.

B. Concrete box:

1. Provide galvanized steel, 4-inch octagon rings with mounting lugs, backplate and adapter ring as required.
2. Select height as necessary to position knockouts above concrete reinforcing steel.
3. ANSI/NEMA OS 1.

C. Tile box:

1. Provide outlet boxes for installation in tile or concrete block walls.
2. Standard outlet boxes with raised, square corners and device covers are acceptable.
3. ANSI/NEMA OS 1.

D. Cast metal outlet body:

1. Provide four inch round, galvanized cast iron alloy with threaded hubs and mounting lugs as required.
2. Provide boxes with cast cover plates of the same material as the box and neoprene cover gaskets.

E. Conduit outlet body: Provide Cadmium plated cast iron alloy, oblong conduit outlet bodies with threaded conduit hubs and neoprene gasket, cast iron covers.

2.3 PULL AND JUNCTION BOXES

A. Sheet metal pull and junction box:

1. Provide standard outlet or concrete ring boxes wherever possible; otherwise use minimum 16 gauge galvanized sheet metal, NEMA 1 boxes, sized to Code requirements with covers secured by cadmium plated machine screws located 6 inches on centers.

2. ANSI/NEMA OS 1.

B. Cast metal pull and junction box: Provide standard cast malleable iron outlet or device boxes wherever possible; otherwise use cadmium plated, cast malleable iron boxes with bolt-on, interchangeable conduit hub plates with neoprene gaskets.

C. Flush mounted pullboxes and junction boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.

2.4 FLOOR BOXES

A. Refer to Section 262726: Wiring Devices for floor mounted service boxes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of box installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

A. Install all outlet boxes flush with building walls, ceilings and floors except where boxes are installed in mechanical and electrical rooms, in cabinetry, above accessible ceilings or where exposed Work is called for on the Drawings.

B. Locate pullboxes and junction boxes in concealed locations above removable ceilings or exposed in electrical rooms, utility rooms or storage areas.

C. Install outlet boxes at the locations and elevations indicated on the Drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.

D. Locate switch outlet boxes on the latch side of doorways unless otherwise indicated.

E. Locate outlet boxes above hung ceilings having concealed suspension systems, adjacent to openings for removable recessed lighting fixtures.

F. Do not install outlet boxes back-to-back, separate boxes by at least 6". In fire rated walls separate boxes by at least 24" and wall stud.

G. Adjust position of outlet boxes in finished masonry walls to suit masonry course lines. Coordinate cutting of masonry walls to achieve neat openings for boxes.

3.3 INSTALLATION

A. Install boxes in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.

B. Locate electrical boxes as indicated on Drawings and as required for splices, taps, wire pulling, equipment connections and Code compliance.

C. Install junction or pullboxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Note that these boxes are not indicated on the Drawings.

D. Install raised covers (plaster rings) on all outlet boxes in stud walls or in furred, suspended or exposed concrete ceilings. Covers shall be of a depth to suit the wall or ceiling finish.

E. Leave no unused openings in any box. Install close-up plugs as required to seal openings.

F. Provide cast metal boxes with gasketed cast metal cover plates where boxes are exposed in damp or wet locations.

G. Provide precast concrete boxes in exterior planting areas, walkways, roads etc.

H. Provide an access panel in permanent ceiling or wall where boxes are installed and will be inaccessible.

I. For boxes mounted in exterior walls, make sure that there is insulation behind outlet boxes to prevent condensation in boxes.

J. For outlets mounted above counters, benches or backsplashes, coordinate location and mounting heights with built-in units. Adjust mounting height to agree with required location for equipment served.

K. Use conduit outlet bodies to facilitate pulling of conductors or to make changes in conduit direction only. Do not make splices in conduit outlet bodies.

L. Add additional sheet rock as necessary to maintain original fire rating of walls where boxes are installed.

M. Install galvanized steel coverplates on boxes in unfinished areas, above accessible ceilings and on surface mounted outlets.

3.4 SUPPORTS

A. Provide boxes installed in metal stud walls with brackets designed for attaching directly to the studs or mount boxes on specified box supports.

B. Mount boxes, installed in suspended ceilings of gypsum board or lath and plaster construction, to 16 gauge metal channel bars attached to main ceiling runners.

C. Support boxes independently of conduit system.

D. Support boxes, installed in suspended ceilings supporting acoustical tiles or panels, directly from the structure above wherever pendant mounted lighting fixtures are to be installed from the box.

E. Support boxes, mounted above suspended acoustical tile ceilings, directly from the structure above.

END OF SECTION – 26 05 33

SECTION 260536

CABLE TRAYS

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Cable trays.
2. Cable tray accessories.
3. Wire basket cable support system and accessories.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.

1. National Electrical Manufacturer Association (NEMA):

NEMA VE 1;	Cable Tray Systems

2. American Society for Testing Materials (ASTM):

ASTM A123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A510	General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
ASTM A633	Electrodeposited Coatings of Zinc and Steel

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing and physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Submit Manufacturer's installation instruction: Provide written instructions for cable tray products special installation techniques.
4. Complete bill of material listing all components.
5. Shop Drawings: Indicate layout, dimensions, support locations and mounting details.
6. Furnish structural calculations for equipment support as described in Section 260010: Basic Electrical Requirements.

1.4 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following.

1. Instructions for routine maintenance to include bolt-tightening procedures.

2. Pictorial parts list and part numbers.

3. Telephone numbers for the authorized parts and service distributors.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. GS Metals Corp. "Globetray".

2. B-Line Systems, Inc.

3. Chalfant.

4. MP Husky Corp.

5. PW Industries, Inc.

6. Mono-Systems, Inc. (center support)

7. Cablofil EZ Tray

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 LADDER-TYPE CABLE TRAY

A. Assembly: Shall be complete to include tray, accessories, fittings and supports as required. Cable tray shall be NEMA VE 1; Class 12C.

B. Construction: Cable tray, accessories and fittings shall be constructed of galvanized steel. Cable tray bottom shall be ladder type with rungs spaced 12 inches on center.

C. Size: Cable tray size and length shall be as indicated on Drawings.

D. Inside radii of fittings: 12 inches.

E. Accessories and fittings: Manufacturer's standard clamps, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors and ground straps.

2.3 WIRE BASKET SYSTEM SECTIONS AND COMPONENTS

A. General: Provide wire basket of type and sizes indicated; with connector assemblies, clamp assemblies, connector plates, splice plates and splice bars. Construct units with round edges and smooth surfaces, in compliance with applicable standards and with the following additional construction features.

B. Construction:

1. Wire basket system shall be made of high strength steel wires and formed into a standard 2” x 4” wire mesh pattern with intersecting wires welded together. All wire ends along system sides shall be rounded during fabrication.

2. All straight section longitudinal wires shall be straight, with no bends.

3. Wire basket size shall be 2” deep x 18” wide x 118” long.

4. Wire diameter: 0.177 inches, minimum.

5. All fitting shall be field formed as needed to accommodate layout as indicated.
6. All splicing assemblies shall be the bolted type using serrated flange locknuts.
7. Hardware, including splice connectors and support components shall all be furnished by Manufacturer.

C. Materials and finishes:

1. Hot-dip galvanized after fabrication:
   a. Straight sections shall be made from steel meeting the minimum mechanical properties of ASTM A510 and shall be coated after the wire basket system has been fabricated in accordance with ASTM A123 (CSA Type 1).
   b. All hot-dip galvanized after fabrication sections must be returned to the point of manufacture after coating for inspection and removal of all icicles and excess zinc.
2. Electro-galvanized zinc: Support accessories and miscellaneous threaded hardware shall be coated in accordance with ASTM B633 SC3. All threaded components shall be coated in accordance with ASTM B633 SC1.

D. Support system:

1. Wire basket shall be pendant hung via threaded rods and expansion anchors to form a trapeze system with construction channel.
2. Wire basket under floor support stand designed to elevate basket 4” off the floor.
3. No hardware required to mount basket to bracket. Simply bend tabs of bracket down around wires.
4. Attach bracket to floor using ¼” x 1” long expansion anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of cable tray installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

A. Location of cable tray shall be planned in advance of the installation and coordinated with ductwork, plumbing, ceiling and wall construction in the same areas and shall not unnecessarily cross other conduits or pipe, nor prevent removal of ceiling tiles or panels, nor block access to mechanical or electrical equipment. Provide offsets as required to avoid obstruction of cable tray with other trades.

B. Exposed cable trays shall be run parallel or at right angles to the centerlines of columns and beams.

C. Cable trays shall not be placed closer than 12 inches to a flue, parallel hot water, steam line or other heat producing source or three inches from such lines when crossing perpendicular to the runs.

D. When cable tray is utilized for telecommunication cabling, it shall not be placed closer than 3 inches to any branch circuit power raceway.

3.3 INSTALLATION

A. Install cable tray in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.

B. Shall conform to NEMA VE 1 requirements.

C. Support cable tray at each connection point, at the end of each run and at other points to maintain spacing between supports of 8 feet maximum.

D. Cable tray support shall be a trapeze type hanger system consisting of two (2) 3/8" threaded rods supported from structure above with 1 5/8" x 1 5/8" construction channel span between. Channel shall have 1" slots spaced 2" on center and be mounted with open side down. Mount cable tray on trapeze hanger using hold-down clamps to secure.

E. Provide lateral bracing support along cable tray spaced at a maximum of 30'-0" on center. Bracing shall consist of 1 5/8" x 1 5/8" construction channel attached to one side of trapeze channel and installed at a 45-degree angle up to structural slab. Anchor bracing channel to slab with expansion bolts. Alternate bracing on both sides of cable tray.

F. Use expansion connectors where indicated in NEMA VE 1.

G. Provide bonding continuity between cable tray sections and fittings and ground per NEC.

3.4 PENETRATION

A. Cable trays penetrating fire rated walls shall be the solid-bottom-type with a flanged-solid cover and extend 18 inches beyond wall on both sides. Cover shall be sealed and non-removable.

B. Wall shall be patched around cable tray per the requirements of Division 07.

C. Provide fire rated fire-stop pillows within solid cable tray to maintain fire separation rating of wall. Install pillows per the requirements of the Manufacturer in quantities as required based on opening size. Pillows shall be Nelson type PLW fire-stop or approved equal.

END OF SECTION – 26 05 36

SECTION 260543

UNDERGROUND DUCTS AND STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Underground conduits and ducts.
2. Handhole and pullboxes.
3. Excavation, trenching and backfill.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 31 - Earthwork: General requirements for Excavation and Backfill and related items for ducts, manholes, pullboxes and handholes.
2. Division 03 - Cast-in-place concrete: Protective envelope for ducts.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Federal Specifications (FS):

FS W-C-1094A;	Conduit and Conduit Fittings Plastic, Rigid.

2. American Concrete Institute (ACI):

ACI 318;	Building Code Requirements for Structural Concrete

3. American National Standards Institute, Inc. (ANSI):

ANSI C80.1;	Rigid Steel Conduit, Zinc-Coated.

4. American Society for Testing And Materials (ASTM):

ASTM C31;	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C39;	Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C172;	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C192;	Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C231;	Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C478;	Specification for Precast Reinforced Concrete Manhole Sections
ASTM C805;	Test Method for Rebound Number of Hardened Concrete
ASTM C857;	Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

ASTM C858;	Specification for Underground Precast Concrete Utility Structures
ASTM C877;	Specification for External Sealing Bands for Concrete Pipe, Manholes and Precast Box Sections
ASTM C891;	Practice for Installation of Underground Precast Concrete Utility Structures
ASTM C990;	Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C1037;	Practice for Inspection of Underground Precast Concrete Utility Structures
ASTM C1064;	Standard Test Method for Temperature of Freshly Mixed Concrete
ASTM C1231;	Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinder
ASTM C1611;	Standard Test Method for Slump Flow of Self-Consolidating Concrete

5. Underwriters Laboratories, Inc. (UL):

UL 6;	Rigid Metal Conduit.
UL 651;	Schedule 40 and 80 Rigid PVC Conduit.
UL 651A;	Type EB and A Rigid PVC Conduit and HDPE Conduit.

6. National Electrical Manufacturer Association (NEMA):

NEMA RN1;	PVC Externally-coated Galvanized Rigid Steel Conduit.
NEMA TC 2;	Electrical Plastic Tubing and Conduit.
NEMA TC 3;	PVC Fittings for use with Rigid PVC Conduit.
NEMA TC6;	PVC Plastic Utilities Duct (EB and BD Type).

1.3 DEFINITIONS

A. Duct: Electrical conduit and other raceway, either metallic or nonmetallic, used underground embedded in earth.

B. Duct bank: Two or more conduits or other raceway installed underground in same trench.

C. Handhole: An underground junction box in a duct or duct bank.

1.4 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

3. Shop Drawings showing details and design calculations for precast handholes, including reinforced steel. Stamp Drawings with seal of registered professional Structural Engineer.

4. Submit Manufacturer's installation instructions.

5. Complete bill of material listing all components.

6. Certificate for concrete and steel used in underground precast concrete utility structures, according to ASTM C858.
7. Inspection report for factory inspections, according to ASTM C1037.
8. Coordination Drawings showing duct profiles and coordination with other utilities and underground structures. Include plans and section drawn to accurate scale.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted and approved.

C. Precast concrete vaults shall be designed and fabricated by an experienced and acceptable precast concrete manufacturer. The manufacturer shall have been regularly and continuously engaged in the manufacture of precast concrete units similar to that indicated in the project specifications or drawings for at least 10 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Underground precast concrete utility structures:
    a. Oldcastle Enclosure Solutions.
    b. Jensen Precast.
2. Conduits, ducts and fittings:
    a. Prime Conduit.
    b. JM Eagle.
    c. Cantex.
    d. Occidental Coating Company (OCAL).

B. Substitution: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 CONDUIT AND DUCT

A. Refer to 260531: Conduit.

B. PVC insulated galvanized rigid steel conduit (PVC GRS):

1. Conduit: Full weight, threaded, hot-dip galvanized steel, conforming to ANSI C80.1 and NEMA RN-1 with nominal 20 or 40 mil thermoplastic vinyl coating, heat fused and bonded to the exterior of the conduit.
2. Fittings: Conduit couplings and connectors shall be steel or malleable iron as required with factory PVC coating and insulated jacket equivalent to that of the coated material.

C. Rigid non-metallic conduit (PVC):

1. Conduit:
    a. Rigid polyvinylchloride, schedule 40 or 80 conforming to NEMA TC2 and UL 651. UL listed for exposed and direct-burial applications and for 90 degrees C conductor insulation. Conduit shall include an integral bell fitting at one end.

b. Rigid polyvinylchloride, type EB or DB conforming to NEMA TC 6 and UL 651. UL listed for concrete encased burial and direct burial applications and for 90 degree C conductor insulation. Conduit shall include an integral bell fitting at one end.

2. Fittings: Couplings, adaptors, transition fittings, bell ends, etc., shall be molded PVC, slip on and solvent weld type. Schedule 40 or 80 conforming to NEMA TC 3 and type EB or DB conforming to NEMA TC 9.

3. Factory elbows: Minimum radius bends shall be 36 inches.

D. Duct supports: Rigid PVC spacers selected to provide minimum duct spacing and concrete cover depths, while supporting ducts during concrete pour.

E. Duct sealing compound: Non-hardening, safe for human skin contact, not deleterious to cable insulation, workable at temperatures as low as 35 degree F, withstands temperature of 300 degrees F without slump and adheres to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, cable sheaths and jackets, etc.

2.3 PULLBOXES AND HANDHOLES

A. Construction: High densities precast reinforced concrete box, extension, base and cover. Furnish box with end and side knockouts and non-settling shoulders. Cover shall have hold-down bolts and two lifting eyes.

B. Size: As indicated on the Drawings.

C. Cover markings: Covers shall read "ELECTRICAL" or "SIGNAL" as appropriate.

D. Rated covers: Use cast iron lid with H20 traffic rating when subject to vehicular traffic.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of duct and manhole installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 EARTHWORK

A. Excavation and backfill: Conform to Division 31, Earthwork.

B. Excavation for underground electrical structures: Conform to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot; plus a sufficient distance to permit placing and removal of concrete formwork, installation or services, other construction and for inspection.

1. Excavate, by hand, areas within drip-line of large trees. Protect the root system for damage and dry-out. Maintain moist conditions for root system and over exposed roots with burlap. Paint root cuts of 1 inch in diameter and larger with emulsified asphalt tree paint.

2. Take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed.

C. Trenching: Excavate trenches for electrical installation as follows:

1. Excavate trenches to the uniform width, sufficiently wide to provide ample working room and a minimum of 6 to 9 inches clearances on both sides of raceways and equipment.

2. Excavate trenches to depth indicated or required.

3. Limit the length of open trench to that in which installations can be made and the trench backfilled within the same day.

4. Where rock is encountered, carry excavation below required elevation and backfill with a layer of crushed stone or gravel prior to installation of raceways and equipment. Provide a

minimum of 6 inches of stone or gravel cushion between rock bearing surface and electrical installations.

D. Backfilling and filling: Place soil materials in layers to required sub-grade elevations for each area classification, using materials and methods specified in Division 31: Earthwork.

1. Under building slabs, use drainage fill materials.

3.3 CONDUIT AND DUCT INSTALLATION

A. Install duct lines in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Application:

1. Direct burial ducts: Schedule 40, minimum 24-inches below finished grade.

2. Below building slab-on-grade: Schedule 40, minimum 4-inches below bottom of slab except that bends and penetrates through floor slab shall be PVC coated galvanized rigid steel.

3. Penetrations of building and equipment slabs: PVC insulated rigid steel.

C. Slope duct to drain towards handholes and away from building and equipment entrances. Pitch not less than 4-inches per 100-feet. Curved sections in duct lines shall consist of long sweep bends with a minimum radius of 25-feet in the horizontal and vertical directions. The use of manufactured bends is limited to building entrances and equipment stub-ups.

D. Underground conduit stub-ups to inside of building and exterior equipment shall be PVC insulated rigid steel.

E. Make joints in ducts and fittings watertight according to Manufacturer's instructions. Stagger couplings so those of adjacent ducts do not lie in the same plane.

F. Terminate duct lines at handholes with end bells spaced 10-inches on center for 5-inch ducts and varied proportionately for other duct sizes. Change from regular spacing to end-bell spacing 10-feet from the end bell without reducing duct line slope and without forming trap in the line.

G. Separation between direct buried duct lines shall be 3-inches minimum for like systems and 12 inches minimum between power and signal ducts.

H. For direct burial installations install continuous warning strip of heavy gage plastic imprinted "electrical ducts below", approximately 12-inch wide at 12-inches above ducts.

I. Mandrel all ducts upon completion of installation and prior to pulling cables.

3.4 HANDHOLE AND PULL BOX INSTALLATION

A. Install handholes in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.

B. Handholes shall be installed flush with finished grade or surface. Install on a level 6-inch bed of well-tamped gravel or crushed stone.

C. Orientation of handholes shall be coordinated in advance with Landscape Architect and arranged to minimize connecting duct bends and deflections.

3.5 FIELD QUALITY CONTROL

A. Testing: Demonstrate capability and compliance with requirements upon completion of installation of underground duct and structures.

1. Duct integrity: Rod ducts with a mandrel 1/4-inch smaller in diameter than internal diameter of ducts. Where rodding indicates obstructions in ducts, remove the obstructions and retest.

3.6 CLEANING

A. Pull brush through full length of ducts. Use round bristle brush with a diameter 1/2-inch greater than internal diameter of duct.

B. Clean internal surfaces of handholes. Remove foreign material.

END OF SECTION – 26 05 43

SECTION 260546

SIGNAL SYSTEMS RACEWAY

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Signal terminal backboards.
2. Signal systems pullboxes.
3. Telecom/data cabling, fire alarm, security, fire alarm/life safety clock, intercom, public address systems conduit, cable tray, "J" hooks and outlets.

B. Related work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1. Division 06: Rough Carpentry.

1.2 SYSTEM DESCRIPTION

A. Provide a complete raceway system as indicated on Drawings and herein for the signal systems referenced above. Raceway systems shall include conduit, cable tray, "J" hooks, pullboxes, junction boxes, supports, fittings, coverplates, terminal backboards, pull ropes and other material as required for a complete installation.

1.3 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.1 TERMINAL BACKBOARD

A. Refer to Division 06: Rough Carpentry.

B. 4' wide x 8' high x 3/4" thick fire retardant plywood backboard.

2.2 BOXES

A. Refer to Section 260533: Boxes.

B. Outlet boxes:

1. Standard electrical knockout boxes 4 11/16" square by 2-1/8" deep.
2. Single gang plaster ring, unless otherwise noted or required for device mounting, in depth to match wall finish.

C. Pullboxes: Standard knockout type boxes sized as indicated on Electrical Drawings.

2.3 OUTLET COVERPLATES

A. Refer to Section 262726: Wiring Devices.

B. Where devices or coverplates are not being furnished under another Section, provide blank coverplates.

2.4 CONDUIT

A. Refer to Section 260531: Conduit.

B. Provide a conduit system sized and in layout indicated on Electrical Drawings or Shop Drawings by equipment Manufacturer.

C. Include all fittings and supports as required for a complete system.

2.5 CABLE TRAYS

A. Refer to Section 260536: Cable Trays.

B. Provide a cable tray system for the distribution of signal systems cabling sized and in layout indicated on Electrical Drawings. Cable tray shall support only the signal system cables specifically noted for application in their individual Specification Section.

C. Include all accessories, fittings and supports as required for a complete system.

2.6 "J" HOOK HANGER

A. Manufacturers:

1. Equal products by the following Manufacturers will be considered providing that all features of the specified product are provided:

a. Unistrut Corporation.

b. B-Line Systems, Inc.

2. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

B. "J" hook hanger:

1. Assembly: Shall be complete to include "J" hook with plastic coating, "T" bolt and nut.

2. Construction: "J" hook, bolt and nut shall be electroplated steel. "J" hook shall be coated in plastic.

3. Size: 1/4 inch thick x 1 1/2 inch wide x 8 inches in diameter, minimum dimensions.

2.7 PULL ROPE

A. Provide a polyethylene pulling rope in all empty conduits.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of signal systems raceway installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 INSTALLATION

A. Provide a complete raceway system installation for the signal systems as indicated on Drawings and specified herein, to include all necessary fittings and supports.

B. Refer to applicable Sections referenced above for specific installation requirements of equipment specified herein.

C. Minimum conduit size for signal system shall be 3/4 inch, but not less than size indicated on Drawings.

D. Refer to system Shop Drawings prepared by Manufacturer for conduit routing and sizes.

E. Conduits terminating at signal terminal backboard shall extend a minimum of 4" above finished floor. For conduits terminating overhead provide a construction channel, in length as required,

across the top of backboard to fasten-down conduits. All conduits terminating at backboard shall be provided with insulated bushings.

F. Install fire retardant plywood backboard per the requirements of Division 06 - Rough Carpentry. Provide in length as indicated on Drawings.

G. Install a pull rope in all empty conduits.

H. Wall mounted outlets and/or device served by cable routed exposed above the suspended ceiling shall consist of an outlet box with plaster ring, 1 1/4" EMT conduit from box to stub-out above ceiling and a insulated throat connector at each end.

I. Cable tray shall be installed per Specification Section 260536: Cable Trays and as indicated on Drawings.

3.3 "J" HOOK HANGERS

A. Layout:

1. Location of "J" hook hangers shall be planned in advance of the installation and coordinated with ductwork, plumbing, ceiling and wall construction in the same areas. Installation shall not unnecessarily cross other conduits or pipes, nor prevent removal of ceiling tiles or panels, nor block access to mechanical or electrical equipment. Provide offsets as required to avoid obstructions with other trades.

2. "J" hook hanger runs shall not be placed closer than 12 inches to a flue, parallel hot water, steam line or other heat producing source or 3 inches from such lines when crossing perpendicular to the runs.

3. "J" hook hanger runs shall not be placed closer than 3 inches to any feeder or branch circuit power raceway.

B. Installation:

1. Support "J" hook hangers with 1/2 inch threaded rod from structure above via expansion anchors suitable for construction.

2. Space hangers 4 feet on center within the layout indicated on the Drawings.

C. Penetrations:

1. "J" hook hanger cables penetrating fire rated walls shall be installed in a solid-bottom type cable tray with flanged solid cover. Cable shall extend beyond wall 18 inches on both sides. Cable tray shall be 3" high x 12" wide. Cover shall be sealed and non-removable.

2. Wall shall be patched around cable tray per the requirements of Division 07.

3. Provide fire rated firestop pillows within solid cable tray to maintain fire separation rating of wall. Install pillows per the requirements of the Manufacturer in quantities as required based on opening size. Pillows shall be Nelson type PLW firestop or approved equal.

3.4 EXPOSED SIGNAL CABLE ROUTING ABOVE CEILING

A. General:

1. Cable shall be suitable for exposed installations above suspended ceilings. Provide plenum rated cable where ceiling space is utilized for return air plenum.

2. Install cable in conduit above non-accessible ceilings, in walls and exposed locations.

B. Cable Support:

1. Support cables leaving cable tray"J" hook hanger system at a maximum spacing of 6 feet on center.

2. Support cables using spring metal cable clips or metal cable ties for each cable. Suspended ceiling support wires may be used to directly support a maximum of two cables.
3. Provide separate drop wires above accessible ceiling to support more than two cables.
4. Do not attach cables to conduits, ducts or pipes.
5. Do not rest cables on ceiling tiles or allow contact with mechanical piping system.
6. Provide separate sleeves and/or fire barriers where individual cables penetrate firewalls.

END OF SECTION – 26 05 46

SECTION 260553

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Electrical equipment nameplates.
2. Panelboard directories.
3. Wire and cable identification.
4. Buried electrical line warnings.
5. Junction box identification.
6. Inscribed device coverplates.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 09: Painting.

1.2 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein.
2. Schedules for nameplates to be furnished.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Conduit and wire markers:
    a. Thomas & Betts Corp.
    b. Brady.
    c. Griffolyn.
2. Inscription Tape:
    a. Kroy.
    b. Merlin.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 NAMEPLATES

A. Type NP: Engraved, plastic laminated labels, Signs and Instruction Plates. Engrave stock melamine plastic laminate 1/16-inch minimum thickness for signs up to 20 square inches or 8 inches in length; 1/8 inch thick for larger sizes. Engraved nameplates shall have white letters and be punched for mechanical fasteners.

B. Color and letter height as specified in Part 3: Execution.

2.3 LEGEND PLATES

A. Type LP: Die-stamped metal legend plate with mounting hole and positioning key for panel mounted operator devices, i.e. motor control pilot devices, hand-off-auto switches, reset buttons, etc.

B. Stamped characters to be paint filled.

2.4 BRASS TAGS

A. Type BT: Metal tags with die-stamped legend, punched for fastener.

B. Dimensions: 2" diameter 19 gauge.

2.5 PANELBOARD DIRECTORIES (400 AMP OR LESS)

A. Directories: A 6" x 8" minimum size circuit directory frame and card with clear plastic covering shall be provided inside the inner panel door.

B. Circuit numbering: Starting at the top, odd numbered circuits in sequence down the left hand side and even numbered circuits down the right hand side. Multi-section panelboards shall have continuous consecutive circuit numbers, i.e. Section 1 (circuit numbers 1-42), Section 2 (circuit numbers 43-84), Section 3 (circuit numbers 85-126).

2.6 WIRE AND TERMINAL MARKERS

A. Provide self-adhering, pre-printed, machine printable or write-on, self-laminating vinyl wrap around strips. Blank markers shall be inscribed using the printer or pen recommended by Manufacturer for this purpose.

2.7 CONDUCTOR PHASE MARKERS

A. Colored vinyl plastic electrical tape, 3/4" wide, for identification of phase conductors. Scotch 35 Brand Tape or equal.

2.8 UNDERGROUND CONDUIT MARKER

A. 6-inch wide, yellow polyethylene tape, with continuous black imprinting reading "Caution - Buried Electric Line Below".

2.9 INSCRIBED DEVICE COVERPLATES

A. Coverplate material shall be as specified in Section 262726: Wiring Devices.

B. Methods of inscription: (Unless otherwise noted)

1. Type-on-tape:
    a. Imprinted or thermal transfer characters onto tape lettering system.
    b. Tape trimmer.
    c. Matte finish spray-on clear coating.
2. Engraving:
    a. 1/8" high letters.
    b. Paint filled letters finished in black.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of identification device installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 NAMEPLATES

A. Installation:

1. Degrease and clean surfaces to receive nameplates.
2. Install nameplates parallel to equipment lines.
3. Secure nameplates to equipment fronts using machine screws.

B. Provide type 'NP' color coded nameplates that present, as applicable, the following information:

1. Equipment or device designation:
2. Amperage, KVA or horsepower rating, where applicable.
3. Voltage or signal system name.
4. Source of power or control.

C. Nameplates for power system distribution equipment and devices are to be black.

D. Nameplates for signal systems equipment and devices are to be black except as follows:

1. Fire alarm and life safety - Red.

E. Minimum letter height shall be as follows:

1. For Switchboards, panelboards, etc.: ½ inch letters to identify equipment designation. Use ¼ inch letters to identify voltage, phase, wires, etc.
2. For individual circuit breakers, switches and motor starters in Switchboards, Distribution panelboards, use 3/8-inch letters to identify equipment designation. Use 1/8-inch letters to identify all other.
3. For individual mounted circuit breakers, disconnect switches, enclosed switches and motor starters use 3/8-inch letters to identify equipment designation. Use 1/8" letters to identify all other.
4. For transformers use 1/2 inch letters to identify equipment designation. Use ¼ inch letters to identify primary and secondary voltages, etc.
5. For equipment cabinets, terminal cabinets, control panels and other cabinet enclosed apparatus use 3/8-inch letters to identify equipment designation.

3.3 LEGEND PLATES

A. Provide panel-mounted operators devices such as pilot lights, reset buttons, “HAND-OFF-AUTO” switches, etc.

3.4 BRASS TAGS

A. Provide type BT tags for individual ground conductors to exposed ground bus indicating connection i.e. "UFER", "Cold water bond", etc.

B. Provide tags for all feeder cables in underground vaults and pull boxes.

C. Provide tags for empty conduits in underground vault, pull boxes and stubs.

3.5 PANELBOARD DIRECTORIES (400 AMP OR LESS)

A. Provide typewritten directories arranged in numerical order denoting loads served by room number or area for each circuit.

B. Verify room numbers or area designation with Project Manager.

C. Mount panelboard directories in a minimum 6" x 8" metal frame under clear plastic cover inside every panelboard.

3.6 WIRE AND CABLE IDENTIFICATION

A. Provide wire markers on each conductor in panelboards, pull boxes, outlet and junction 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 equipment Manufacturer's Shop Drawings for control wiring.

B. Provide colored phase markers for conductors as noted in Section 260519: Building Wire and Cable. Apply colored, pressure sensitive plastic tape in half-lapped turns for a distance of 3 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Do not cover cable identification markings by taping.

3.7 UNDERGROUND CONDUIT MARKERS

A. During trench backfilling, for exterior underground power, signal and communications lines, install continuous underground plastic line marker, located directly above line at 6 to 8 inches below finished grade. Where multiple lines installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches; install a single line marker.

3.8 JUNCTION BOX IDENTIFICATION

A. The cover of junction, pull and connection boxes for both power and signal systems, located above suspended ceilings and below ceilings in non-public areas, shall be clearly marked with a permanent ink felt pen. Identify the circuit(s) (panel designation and circuit numbers) contained in each box, unless otherwise noted or specified.

3.9 INSCRIBED DEVICE COVERPLATE

A. General:

1. Lettering type: Helvetica, 12 point or 1/8" high.
2. Color of characters shall be black.
3. Locate the top of the inscription ½” below the top edge of the coverplate.
4. Inscription shall be centered and square with coverplate.

B. Application:

1. Provide inscribed coverplates for devices as outlined below:
    a. Outlets in surface raceways.
    b. Network Lighting Control Switches and Dimmers
    c. Special purpose switches, i.e. projection screens, shades, exhaust fans, etc.
2. Type-on-tape inscriptions shall be provided for the following devices:
    a. Receptacles.
    b. Outlets in surface raceways.
    c. Telecommunication outlets.
3. Type-on-tape installation:
    a. Tape shall be trimmed to the height of the letters.
    b. Trim tape length to 1/4 inch back from each edge of coverplate.

c. Contractor hands shall be clean or covered with surgical type glove prior to application of tape. Tape installations with visible fingerprints or smudges will not be acceptable.

END OF SECTION – 26 05 53

SECTION 260800

ELECTRICAL COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the start-up and commissioning of the electrical systems, including but not limited to:

1. Lighting system.
2. Lighting control systems.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 01: Commissioning.
2. Division 22: Plumbing Commissioning.
3. Division 23: HVAC Commissioning.
4. Division 25: Controls Commissioning.

C. Perform commissioning of electrical systems as directed by the Owner's Commissioning Authority in accordance with the Contract Documents. The Contractor shall coordinate all commissioning activities with the Commissioning Authority.

D. Work required in this Section will add to the requirements of work specified in other Division 26 Sections.

E. Electrical commissioning requires the participation of all parties related to the Division 26 contract to ensure that systems are operating in a manner consistent with the Contract Documents. The parties shall consist of, but not be limited to the following:

1. Contractor.
2. Special systems Subcontractors or Distributors.
3. Independent Testing Agency.
4. Factory-authorized service representatives.

F. Additionally, there is participation required from parties outside of Division 26 contract to ensure that their systems are operating or monitoring in accordance with a sequence of operation consistent with the Contract Documents. The parties shall consist of, but not be limited to the following:

1. Division 21: Fire Sprinkler System – For monitoring and alarm annunciation of sprinkler system components via the fire alarm/life safety system.
2. Division 14: Elevators – For control interface requirement with ATS during emergency power operation.
3. Division 14: Elevators - For control and communication interface via fire alarm/life safety system to include elevator recall and alternate floor, life safety speaker and fireman's phone jack.
4. Divisions 22, 23 and 25: HVAC, Plumbing and Controls – To ensure that under emergency power system operations all systems function per the sequence of operation.

5. Division 23: HVAC – For control and monitoring of fan and fire/smoke damper system via the fire alarm/life safety system per the sequence of operation.
6. Division 25: Controls – For control of lighting system via the EMCS system as outlined in the Contract Documents.
7. Division 25: Controls – For monitoring of electrical systems via the EMCS system as outlined in the Contract Documents.

G. The commissioning responsibilities applicable to each of the parties indicated above are as follows:

1. One representative from each of the above parties shall attend a commissioning scope meeting and all other meetings necessary to facilitate the commissioning process.
2. Contractor shall provide the Commissioning Authority with normal cut sheets and Shop Drawing submittals of all commissioned equipment.
3. Provide additional requested documentation, prior to normal O&M manual submittals, to the Commissioning Authority for development of startup and functional testing procedures.
    a. Typically this will include detailed Manufacturer installation and startup, operating, troubleshooting and maintenance procedures, full factory testing reports (if any) and full warranty information with the responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, startup and checkout materials that are shipped with the equipment, including field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Authority.
    b. The Commissioning Authority may request further documentation necessary for the commissioning process.
4. Contractor shall assist in clarifying the operation and control of commissioned equipment in areas where the Specifications, Drawings or equipment documentation is not sufficient for writing detailed testing procedures.
5. Develop a full startup and initial checkout plan using Manufacturer's startup procedures and the equipment verification and checklists for all commissioned equipment. Submit to Commissioning Authority for review and approval prior to startup.
6. During the startup and initial checkout process, execute the electrical related portions of the prefunctional checklist for all commissioned equipment.
7. Perform and clearly document all completed startup system operational checkout procedures, providing a copy to the Commissioning Authority.
8. Address current architectural/engineering punch list items before functional testing.
9. Ensure that the appropriate technicians are available and present to execute the startup and functional testing of commissioned equipment for the duration required to complete the necessary tests, adjustments and problem solving.
10. Perform functional testing under the direction of the Commissioning Authority for specified equipment. Assist the Commissioning Authority in interpreting the monitored data, as necessary.
11. Provide assistance to the Commissioning Authority in preparing the building integration test procedures.
12. Correct deficiencies as interpreted by the Commissioning Authority and retest the equipment.
13. Prepare O&M manuals according to the Contract Documents, including clarifying and updating to correspond with as-built conditions.

14. Provide training of the Owner's operating personnel as specified.

H. The commissioning process does not take away from or reduce the responsibility of the installing Contractor to provide a finished and fully functioning installation.

1.2 REFERENCES

A. The system shall be tested in strict accordance with the latest edition of the following applicable Specifications and standards and any other applicable standards, except as otherwise indicated or specified:

1. National Fire Protection Association (NFPA).
2. National Electrical Code (NEC).
3. InterNational Electrical Testing Association, Inc. (NETA).
4. American National Standards Institute, Inc. (ANSI).
5. National Electrical Manufacturer Association (NEMA).
6. Institute of Electrical and Electronic Engineers (IEEE).
7. Insulated Cable Engineers Association (ICEA).
8. Occupational Safety and Health Administration (OSHA).
9. Factory Mutual (FM) Standards.

1.3 DEFINITIONS

A. Commissioning Authority: The Owner's independent representative hired to provide technical verification that the project meets the intended design/ criteria per the contract documents. The Commissioning Authority generally provides the services of a Project Manager, Engineers and Inspectors to perform their required scope.

B. Commissioning Schedule: Is a checklist itemizing all equipment to be commissioned, which specifically tracks and verifies the construction progress including submittals, factory tests, equipment arrival, equipment installation, test procedures, checklists, field testing, training and O&M manuals.

C. Prefunctional Testing:

1. Verification and Checklist: Is a summary verification checklist indicating equipment conformance with that specified and reviewed in submittal process, equipment nameplate, site preparation, installation, terminations, etc. prior to equipment startup.
2. Pre-startup: The required initial power-on checks and procedures prior to operating of the equipment. This is the initial startup test performed in conjunction with the manufacturer's recommended start-up procedures. Startup used to establish basic performance parameters and to verify performance data.

D. Functional Testing: Testing to verify equipment or system operation, parameters, electrical characteristics, visual and mechanical inspection, continuity, calibration, etc. as defined in the individual Sections of these Specifications.

1. Start-up: The required initial power-on checks and procedures prior to operating of the equipment. This is the initial startup test performed in conjunction with the manufacturer's recommended start-up procedures. Startup used to establish basic performance parameters and to verify performance data.
2. Electrical Testing: Testing to verify equipment or system operation, parameters, electrical characteristics, visual and mechanical inspection, continuity, calibration, etc. as defined in the individual Sections of these Specifications.

E. Building Integration Test: Testing to verify equipment or system integration with other building systems for overall sequence of operation, performance parameters, etc. to ensure different systems operate together per the design intent.

1.4 SYSTEM DESCRIPTION

A. Commissioning is a systemic process of ensuring that all building systems perform interactively according to the design intent and the Owner's operational needs. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, submittals, control system calibration, equipment checklist, startup, functional testing, building integration tests, O&M manuals and training.

B. Commissioning on this Project is intended to achieve the following specific objectives according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the Manufacturer's recommendations, to industry accepted standards and in compliance with the Specifications, and that they receive adequate operational checkout by installing Contractors.

2. Verify and document proper performance of equipment and systems.

3. Verify that O&M documentation left on Project site is complete.

4. Verify that the Owner's operating personnel are adequately trained.

C. Commissioning process:

1. The Owner shall provide the services of a Commissioning Authority to develop the commissioning plan and to direct, review and approve the commissioning Work.

2. The following is an overview of the anticipated commissioning tasks during construction:

a. Commissioning during construction shall begin with a scope meeting conducted by the Commissioning Authority where the commissioning process is reviewed with all commissioning team members.

b. Additional meetings shall be required throughout construction, scheduled by the Commissioning Authority with necessary parties attending, to plan, scope, coordinate, schedule activities and resolve problems.

c. Equipment documentation shall be submitted to the Commissioning Authority during normal submittal process, including detailed startup procedures.

d. The Contractor shall assist the Commissioning Authority in the preparations of the Equipment Commissioning Schedule with list of equipment to be commissioned, location, and target dates for submittals, factory tests, arrival, installation, verification/pre-startup, functional test, training, and O&M manuals.

e. The Commissioning Authority shall work with the Contractors in developing startup plans and startup documentation formats.

f. The checkout and performance verification shall proceed from simple to complex; from component level to equipment to systems and inter-system levels with verification/checklists being completed before functional testing.

g. The Contractors, under their own direction, shall execute and document the equipment verification and pre-startup checklists. The Commissioning Authority shall document that the equipment verification and pre-startup checklists were completed according to the approved plans. This may include the Commissioning Authority witnessing the checklist process.

h. The Contractors, along with the Commissioning Authority as a witness, shall execute and document the startup and functional testing. The Commissioning Authority shall

document that the startup and functional testing were completed according to the approved plans.

i. The Commissioning Authority develops building integration test procedures for review by the Contractors.

j. The building integration test procedures are executed by the Contractors, under the direction of and documented by the Commissioning Authority.

k. Items of non-compliance in material, installation, startup, testing, etc shall be corrected at the Contractor's expense and the system retested.

l. The Commissioning Authority reviews the O&M documentation submitted by the Contractor for completeness.

m. The Commissioning Authority reviews, pre-approves and coordinates the training process provided by the Contractor and verifies that it was completed.

1.5 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Provide a complete list of equipment to be commissioned per the requirements of the Division 26 Specifications.

2. Manufacturer's written instruction manuals applicable to commissioned equipment to include special inspection, detailed startup procedures and testing requirements.

3. Upon completion of equipment verification and pre-startup checklist, have all parties sign-off on checklist form and submit to Commissioning Authority.

4. Provide Commissioning Authority with startup plan for all equipment to be commissioned.

5. Upon completion of startup and functional testing for commissioned equipment or systems, have form signed-off by all parties and provide test form to the Commissioning Authority.

6. Submit schedule for training of all commissioned equipment for coordination and approval by Owner's operating personnel.

B. Provide qualifications for independent Testing Agency.

1.6 QUALITY ASSURANCE

A. Provide testing equipment and accessories that are free of defects and are certified for intended use.

B. Provide testing equipment with current calibration labels.

C. Independent Testing Agency:

1. Testing firm shall be a financially stable organization and able to function as an unbiased testing authority, professionally independent of Manufacturers, Suppliers and installers of equipment or systems evaluated by the Testing Agency.

2. Test firm shall also be a member of the International Electrical Testing Association (NETA), specializing in the testing of equipment or apparatus specified in this Division with a minimum of 5 years experience.

3. Testing firm shall be regularly engaged in testing of electrical equipment, devices, installations and systems.

4. Testing firm shall meet Federal Occupational Safety and Health Administration (OSHA) requirements for accreditation of independent testing laboratories.

5. Testing firm shall use technicians who are regularly employed by the firm for testing services.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. The Contractor shall provide all standard testing equipment required to perform startup, initial checkout, required functional testing and commissioning. Also, the Contractor shall provide two-way radios to facilitate communications during commissioning.

B. Special equipment, tools and instruments (only available from vendors, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance within the specified tolerances. All equipment should be calibrated according to the Manufacturer's recommended intervals.

PART 3 - EXECUTION

3.1 MEETINGS

A. Within 90 days of commencement of construction, the Commissioning Authority will schedule, plan and conduct a commissioning scope meeting with the entire commissioning team in attendance. The Commissioning Authority will distribute meeting minutes to all parties. Information gathering from this meeting will allow the Commissioning Authority to prepare and finalize the commissioning plan, which will also be distributed to all parties.

B. Other meetings will be planned and conducted by the Commissioning Authority as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular Contractors. The Commissioning Authority will plan these meetings and will minimize unnecessary time being spent by Contractors. These meetings may be held monthly, until the final three months of construction when they may increase in frequency to one per week.

3.2 EXAMINATION

A. Inspect commissioned equipment and confirm that it is clean and ready for operation. All shipping tags removed, nameplate installed and equipment manuals in place.

B. Verify that startup plan and equipment verification/startup checklist are completed and approved for commissioned equipment prior to beginning functional testing.

C. Verify that startup and functional testing are complete prior to starting the building integration test.

3.3 PREPARATION

A. Provide required personnel with tools and equipment necessary to perform functional testing.

B. Provide equipment factory representative for startup and commissioning Work as necessary or as required by the Specifications.

C. Provide certified independent Testing Agency personnel for startup and commissioning Work as required by the Specifications.

D. Provide any necessary temporary power provisions, load banks, diesel fuel, equipment and sundries to complete startup and commissioning Work.

3.4 REPORTING

A. The Commissioning Authority will regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through memos, progress reports, etc.

B. Testing or review approvals and non-conformance and deficiency reports are made regularly with the required action by the Contractor.

3.5 EQUIPMENT VERIFICATION AND PRE-STARTUP CHECKLISTS

A. The following procedures apply to all systems and all equipment to be commissioned.

B. Contractor will perform equipment verification and pre-startup checklist to ensure that the equipment and systems are in compliance with that specified, submitted and reviewed, and per the Manufacturers written instructions for installation. The checklist for given equipment must be completed and signed-off by all parties prior to formal functional testing of equipment.

C. The Commissioning Authority shall witness, at their discretion, the equipment verification and pre-startup checklist. The primary role of the Commissioning Authority in this process is to ensure that there is written documentation that equipment installation meets the requirements of the contract documents prior to further testing. Parties responsible for checklists are identified in the commissioning scope meeting and in the checklist forms.

D. Equipment verification:

1. The Contractor shall verify the equipment condition and conformance to the submittal when it arrives on site.

2. The Contractor shall maintain a record of installation and coordination to verify the proper installation of equipment and system.

3. Nameplate information shall be verified against that of the equipment submittal.

E. Pre-startup checklist:

1. The Contractor shall complete the pre-startup checklist items outlined in the Specification along with any items recommended by the manufacturer.

2. Checklist shall be completed and reviewed by the Commissioning Authority.

3. All parties shall sign-off on the checklist when complete and prior to commencing equipment startup.

3.6 STARTUP AND FUNCTIONAL TESTING

A. At the conclusion of the Commissioning equipment verification and startup checklist, and sign-off by all parties, the system and/or equipment will be released for startup and functional testing.

B. The following procedures apply to all systems and equipment to be commissioned.

C. The Contractor will perform the startup and functional testing to be witnessed by the Commissioning Authority. The testing for a given system or equipment must be successfully completed prior to formal acceptance or proceeding to building integration test.

D. Startup:

1. The Contractor and Commissioning Authority shall develop a startup protocol to identify the procedure for starting new equipment, scheduling startup tests and the minimum requirements to start equipment. In general the startup protocol shall include the following requirements:

a. Equipment shall not be energized for startup until the equipment verification and pre-startup checklist is signed-off by all parties, signifying the equipment readiness for startup test.

b. Startup tests shall be conducted to verify the basic equipment operation is satisfactory and to prepare equipment for functional testing.

c. The Contractor will verify the completion of preliminary steps, (checklists, schedule manufacturer's representative, completion of necessary controls, etc) and advise team when the equipment is ready.

d. The startup test shall be scheduled and conducted using the Test Agency (or other designated party) recording required data as well as the initial test readings when applicable.

e. Manufacturers shall be present for all items requiring manufacturer's startup. The Contractor copies the manufacturer's startup and initial checkout procedures from O&M manuals and includes with checklist. Items on the manufacturer's startup sheet do not need to be completed if these same items also appear on the Commissioning checklist.

E. Functional testing:

1. Functional testing will be complete and approved by the Commissioning Authority prior to substantial completion. This does not mean all items on the test must have been passed, but the essential function for safety and operating control must be verified as meeting the design intent.

2. Objective:

a. The objective of the functional testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient are identified and corrected, improving the operation and functioning of the systems.

b. Each system shall be operated through all modes of operation where there is a specified system response. Verification of each sequence in the sequence of operation is required. Proper responses to such modes and conditions shall also be tested.

3. The Commissioning Authority shall direct and verify functional tests unless this responsibility is specifically assigned to the Contractor.

4. The Contractor shall verify sequences and operations in the functional test procedures prior to notifying the Commissioning Authority the system is ready for functional testing.

5. Non-conformance:

a. The Commissioning Authority will record the results of the functional test on the test forms. All deficiencies or non-conformance issues shall be noted and reported to the Contractor on a standard non-compliance form.

b. Corrections of minor deficiencies identified may be made during the tests at the discretion of the Commissioning Authority. In such cases the deficiency and resolution will be documented on the procedure form.

c. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Authority will not be pressured into overlooking deficient Work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the Contractor.

d. As tests progress and a deficiency are identified, the Commissioning Authority shall discuss the issue with the executing Contractor:

1) When there is no dispute on the deficiency and the Contractor accepts responsibility to correct it:

a) The Commissioning Authority documents the deficiency and the Contractor's response with their intentions to correct and continues on with the testing. After the day's Work, the Commissioning Authority submits the non-compliance reports to the Contractor. The Contractor corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested and submits it back to the Commissioning Authority.

b) The Commissioning Authority reschedules the test and the test is repeated.

2) If there is a dispute, regarding whether it is a deficiency or determining who is responsible:

a) The deficiency shall be documented on the non-compliance form with the Contractor's response and a copy given to the Contractor.

b) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the Architect/Engineer. Final acceptance authority is with the Project Manager.

c) The Commissioning Authority documents the resolution.

d) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and submits it to the Commissioning Authority.

e) The Commissioning Authority reschedules the test and the test is repeated.

3.7 BUILDING INTEGRATION TEST

A. The test procedures for the building integration test shall be developed and prepared by the Commissioning Authority with the assistance of the Contractor.

B. Integrated building tests are intended to verify the operation of all building system's under condition to simulate as closely as possible actual building operations.

C. Interactive test of all Division 26 systems and/or equipment in conjunction with other effective Division of Work simultaneously to simulating anticipated building operating conditions and parameters, in varying modes of operation, primarily to verify continuous operation and baseline operation data as a building whole.

D. Resolution of deficiencies will follow the same general procedure as used for functional testing. In the case of integrated tests identification of deficiencies and determination of solution will occur on a daily basis.

3.8 TRAINING

A. The Contractor shall be responsible for training coordination, scheduling and ultimately to ensure that the training is completed in accordance with the Specifications.

B. The Commissioning Authority shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.

C. The Contractor shall have the following training responsibilities:

1. Provide the Commissioning Authority with a training plan two weeks before the planned training.

2. Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment.

3. Training shall normally start with classroom sessions, followed by hands-on training on each piece of equipment or system, which shall illustrate the various modes of operation.
4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manuals, Specifications or sequence of operation, the system will be repaired or adjusted as necessary and the demonstration repeated.
5. The appropriate trade or Manufacturer's representative shall provide the instructions and hands-on training on each major piece of equipment or system. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific equipment or system is required. More than one party may be required to execute the training.
6. The training sessions shall follow the outline in the Table of Contents of the O&M manuals and illustrate whenever possible the use of the O&M manuals for reference.
7. Training shall include:
    a. Use of printed installation, operation and maintenance instruction material included in the O&M manuals.
    b. A review of the written O&M instructions emphasizing safe and proper operating procedures, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include startup, operation in all modes possible, shutdown and emergency procedures.
    c. Discussion of relevant safety issues and concerns.
    d. Discussion of warranties and guarantees.
    e. Common troubleshooting problems and solutions.
    f. Explanatory information included in the O&M manuals and location of all plans and manuals in the facility.
    g. Discussion of any peculiarities of equipment or system installation or operation.
8. Training shall occur after functional testing is complete, unless approved otherwise by the Commissioning Authority.

END OF SECTION – 26 08 00

SECTION 260943

NETWORK ADDRESSABLE LIGHTING CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Lighting Control local network.
2. Lighting Control Panel
3. Power Packs or 'Room Controllers'
4. Occupancy Sensors.
5. Daylight Sensors.
6. Wall Switches and Dimmers
7. Interface Modules.
8. Network Controllers and other Network Components
9. Configuration Tools.
10. Power supplies.
11. Equipment enclosures.
12. Low-voltage cable interconnection between components.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 23

REFERENCES

C. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. National Electrical Manufacturer Association (NEMA):

NEMA 250;	Enclosures for Electrical Equipment.
NEMA ICS 1;	Industrial Control and Systems.
NEMA ICS 4;	Terminal Blocks and Industrial use.
NEMA ICS 6;	Enclosures for Industrial Controls and Systems.

2. Underwriters Laboratories, Inc. (UL):

UL 50;	Cabinets and Boxes.
UL 773A;	Nonindustrial Photoelectric Switches for Lighting Control.
UL 916;	Energy Management.

SYSTEM DESCRIPTION

D. The Lighting Control and Automation system as defined under this section covers the following equipment:

1. Lighting Control Panel:
    a. Each LCP relay shall be programmed for individual or grouped "ON/OFF" control as desired by users. Circuits swept "OFF" at evening hours, weekends and holidays shall have manual override capabilities, which shall automatically be swept "OFF" again at the end of 1 hour(s). Time delays shall be programmable from two (2) minutes to twenty-four (24) hours.
    b. Individual LCP relays shall be capable of programming to "flicker" five (5) minutes prior to each "OFF" sweep to allow for sufficient time to override.
2. Room Controllers or Power Packs – Self-configuring, digitally addressable one, two or three relays controllers with 0-10 volt control for ballasts (if applicable) and single relay application-specific plug load controllers.
3. Occupancy Sensors – Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
4. Daylight Sensors – Single-zone closed loop and multi-zone open loop daylighting sensors with two-way active infrared (IR) communications can provide switching or dimming control for daylight harvesting.
5. Configuration Tools – Handheld remote for room configuration provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow send and receive of room variables and store of occupancy sensor settings. Computer software also customizes room settings.
6. Handheld remotes for personal control – One-button dimming, two-button on/off, or five-button scene remotes provide control using infrared communications. Remote may be configured in the field to control selected loads or scenes without special tools.
7. Lighting Control Local Network – Free topology, plug-in wiring system (Cat 5 or 5e) for power and data to room devices.
8. Network Bridge – provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS).
9. Segment Manager – provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.

LIGHTING CONTROL APPLICATIONS

E. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:
    1. Space Control Requirements – Provide occupancy/vacancy sensors with Manual-ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, open plan system and training room. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.
    2. Bi-Level Lighting – Provide multi-level controls in all spaces except toilet rooms, storerooms, library stacks, or applications where variable dimming is used.
    3. Task Lighting / Plug Loads – Provide automatic shut off of non essential plug loads and task lighting in all spaces except toilet rooms and storerooms. Provide Automatic-ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area.

4. Daylit Areas – All luminaries within 15’ of windows or within 7’ of skylights (the daylit zone) shall be controlled separately from luminaires outside of daylit zones. Luminaires closest to the daylight aperture shall be controlled separately from luminaires farther from the daylight aperture, within the daylight zone.
5. Daytime setpoints for total ambient illumination (combined daylight and electric light) level that initiate dimming shall be programmed to be not less than 125% of the nighttime maintained designed illumination levels.
6. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.
7. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.

F. Additional controls.

1. Provide occupancy/vacancy sensors for any enclosed office, conference room, meeting room, and training room. For spaces with multiple occupants or where line-of-sight may be obscured, provide ceiling- or corner-mounted with manual-on switches.
2. Conference, meeting, training, auditoriums, and multipurpose rooms shall have controls that allow for independent control of each local control zone. Rooms larger than 300 square feet shall instead have at least four (4) pre-set lighting scenes unless otherwise specified. Occupancy / vacancy sensors shall be provided to extinguish all lighting in the space.

SUBMITTALS

G. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Describe system operation, equipment and dimensions and indicate features of each component.
3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
4. Shop Drawings to include:
5. Plot plans and building floor plans, showing location of and conduit routing to all devices.
    a. Point-to-Point wiring diagram in block or riser format showing all low-voltage lighting control components, conduit and wire types and sizes with cable legend.
    b. Include elevations of main controller and relay panels.
6. Furnish structural calculations for equipment anchorage as described in Section 260010: Basic Electrical Requirements.
7. Submit Manufacturer's installation instructions.
8. Complete bill of materials listing all components.
9. Warranty.

OPERATION AND MAINTENANCE MANUAL

H. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements to include the following:

1. Operation and maintenance manuals shall include the following:
2. A detailed explanation of the operation of the system.
3. Instructions for routine maintenance.
4. Pictorial parts list and part numbers.
5. Schematic Drawings of wiring system, including relay panels, switches, controller, photocell, power supplies, etc.
6. Telephone numbers for the authorized parts and service distributors.
7. Final testing report.

QUALITY ASSURANCE

I. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

J. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PRODUCT DELIVERY, STORAGE AND HANDLING

K. Delivery: Low-voltage lighting control components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

L. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

M. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

MAINTENANCE

N. Spare Parts:

1. Provide 3 additional spare parts of each of the following product to be used for maintenance. Provide 25’ terminated cable for each device.
    a. Room Controller/Power Pack, single relay, 0-10V
    b. Room Controller/Power Pack, dual relay, 0-10V
    c. Occupancy Sensor
    d. Daylight sensor
    e. Wall Dimmer Switch
    f. Scene Control Switch
    g. On/Off Switch
    h. Network Bridge

WARRANTY

O. Units and components offered under this Section shall be covered by a 5 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PRODUCTS

MANUFACTURERS

P. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Wattstopper ‘DLM’ (District Standard)

Q. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

GENERAL

R. The components of the low-voltage lighting control system shall be Specification grade and shall be supplied by a single Manufacturer.

S. Thoroughly review the operational and performance requirements of the system with the Manufacturer to verify the wiring and equipment requirements.

T. Refer to the lighting control riser diagram on Drawings for major components and interconnections as well as system overview.

U. Refer to low-voltage lighting control panel schedules on Drawings for list of low-voltage relays and circuits controlled.

V. Refer to low-voltage switching station schedule on Drawings for switching requirements.

W. The system shall interface with the EMCS system of Division 23.

LIGHTING CONTROL PANEL

X. Modular relay panels shall consist of the following:

1. Cabinet: NEMA 1 enclosure sized to accept up to 48 relays. Enclosure shall be 24" wide, with a height as required. Provide relays as indicated on the drawings.
2. Interior: Bracket and circuit board back-panel with pre-mounted relays. Interiors shall be sized to accept the above quantity of relays and will provide true "ON/OFF" indication of relay status through LED’s mounted on the circuit board. Each relay shall be capable of direct "ON/OFF" control by a low-voltage switch.
3. Control relays: Heavy-duty momentary pulsed mechanically latching contactors. Operating voltage is 24 VAC; contacts are rated at 20 amps, 120 or 277 VAC ballast load.
4. Power supply: Transformer assembly with two 40 VA transformers with separate secondaries; one providing power to relays, LED’s and associated low-voltage switches and sensors, the second providing power to optional automation cards. Transformers include internal overcurrent protection with automatic reset and metal oxide varistor protection against powerline spikes. 115 VAC, 50/60Hz +/- 10%.
5. Programmable intelligence cards: Provide one panel intelligence card for each panel to provide control logic and memory for operating panels independently. Intelligence card shall also support communications links over an RS-232 port and data line. Provide one relay driver card for every group of 12 relays or 3 programmable switches required.
6. Programmable BMS interface module: Provide panel intelligence card at each panel to provide control logic and memory for integration with the building lighting system for scheduling and time clock functions.
7. Cover: Standard surface mount, hinged, lockable cover with windows for viewing relay status indicators. A wiring schedule directory card shall be affixed to the rear of the cover.

Y. Programmable system switch panel: Programmable System Switch panels shall be capable of receiving 16 switch inputs. These inputs may be either 3 wires maintained (form C contact), momentary, or network (Cat 5) switch type. The System Switch panel shall transmit the switch ID (address/input) and the action “ON/OFF” whenever a switch changes state. The program installed on each panel intelligence card will determine the response to these switch inputs. Each switch panel shall have a two-digit address.

Z. Switches: Low-voltage switches with ganged coverplate where grouped. Color shall match that of wire devices.

SINGLE / DUAL RELAY WALL SWITCH OCCUPANCY SENSORS

AA. Manual-ON, Automatic-OFF passive infrared (PIR) wall switch occupancy sensor Furnish the Company's model which suits the electrical system parameters, and accommodates the square-foot coverage and wattage requirement for each area (and type of lighting) controlled.

BB. Manual-ON, Automatic-OFF ultrasonic wall switch occupancy sensor with Furnish the Company's model which suits the electrical system parameters, and accommodates the square-foot coverage and wattage requirement for each area (and type of lighting) controlled.

CC. Manual-ON, Automatic-OFF dual technology (passive infrared and ultrasonic) wall switch occupancy sensor Furnish the Company's model which suits the electrical system parameters, and accommodates the square-foot coverage and wattage requirement for each area (and type of lighting) controlled.

WALL OR CEILING MOUNTED OCCUPANCY SENSOR SYSTEM

DD. Wall or ceiling mounted (to suit installation) passive infrared (PIR), ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor. Furnish the Company's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.

EE. Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:

1. Digital calibration and pushbutton programming for the following variables:
    a. Sensitivity – 0-100% in 10% increments
    b. Time delay – 1-30 minutes in 1 minute increments
    c. Test mode – Five second time delay
    d. Detection technology – PIR, Ultrasonic or Dual Technology activation and/or re-activation.
    e. Walk-through mode
    f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the local network.
2. One or two RJ-45 port(s) for connection to local network.
3. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.
4. Device Status LEDs including:
    a. PIR Detection
    b. Ultrasonic detection
    c. Configuration mode
    d. Load binding
5. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
6. Manual override of controlled loads.

FF. Units shall not have any dip switches or potentiometers for field settings.

GG. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology local network. No additional configuration will be required.

DIGITAL WALL SWITCHES

HH. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration; available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening. Wall switches shall include the following features:

1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
2. Removable buttons for field replacement with engraved buttors and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.
3. Red configuration LED on each switch that blinks to indicate data transmission.
4. Blue Load/Scene Status LED on each switch button with the following characteristics:
    a. Bi-level LED
    b. Dim locator level indicates power to switch
    c. Bright status level indicates that load or scene is active
5. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.

II. Two RJ-45 ports for connection to local network.

JJ. Multiple wall switches may be installed in a room by simply connecting them to the free topology local network. No additional configuration will be required to achieve multi-way switching.

KK. The following switch attributes may be changed or selected using a wireless configuration tool:

1. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
2. Individual button function may be configured to Toggle, On only or Off only.
3. Individual scenes may be locked to prevent unauthorized change.
4. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.
5. Ramp rate may be adjusted for each dimmer switch.
6. Switch buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.

HANDHELD REMOTE CONTROLS

LL. Battery-operated handheld switches in 1, 2 and 5 button configuration for remote switching or dimming control. Remote controls shall include the following features:

1. Two-way infrared (IR) transceiver for line of sight communication with local network within up to 30 feet.
2. Blue LED on each button confirms button press.
3. Load buttons may be bound to any load on a room controller and are not load type dependant; each button may be bound to multiple loads.
4. Inactivity timeout to save battery life.

MM. A wall mount holster and mounting hardware shall be included with each remote control

ROOM CONTROLLERS

NN. Room Controllers automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and will not have, dip switches, potentiometers or require special configuration. The control units will include the following features:

1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
2. Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.
3. Device Status LEDs to indicate:
    a. Data transmission
    b. Device has power
    c. Status for each load
    d. Configuration status
4. Quick installation features including:
    a. Standard junction box mounting
    b. Quick low voltage connections using standard RJ-45 patch cable
5. Plenum rated
6. Manual override and LED indication for each load
7. Dual voltage (120/277 VAC, 60 Hz)
8. Zero cross circuitry for each load.

OO. On/Off Room Controllers shall include:

1. One or two relay configuration
2. Efficient 150 mA switching power supply
3. Three RJ-45 local network ports
4. Discrete model listed for connection to receptacles, for occupancy-based control of plug loads within the space.
    a. One relay configuration only
    b. Automatic-ON/OFF configuration

PP. On/Off/Dimming enhanced Room Controllers shall include:

1. Real time current monitoring
2. One, two or three relay configuration
3. Efficient 250 mA switching power supply
4. Four RJ-45 local network ports.
5. One 0-10 volt analog output per relay for control of compatible ballasts and LED drivers.
6. Optional Network Bridge for BACnet MS/TP communications (LMRC-3xx).
7. The following dimming attributes may be changed or selected using a wireless configuration tool:

a. Establish preset level for each load from 0-100%

b. Set high and low trim for each load

c. Set lamp burn in time for each load up to 100 hours

8. Discrete model listed for connection to receptacles, for occupancy-based control of plug loads within the space.

a. One relay configuration only

b. Automatic-ON/OFF configuration

DIGITAL PHOTOSENSORS

QQ. Digital photosensors work with room controllers to provide automatic switching or dimming daylight harvesting capabilities for any load type connected to a room controller. Closed loop photosensors measure the ambient light in the space and control a single lighting zone. Open loop photosensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones. Photosensors shall be interchangeable without the need for rewiring.

RR. Digital photosensors include the following features:

1. An internal photodiode that measures only within the visible spectrum, and has a response curve that closely matches the photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers.

2. Sensor light level range shall be from 1-10,000 footcandles (fc).

3. The capability of switching one-third, one-half or all lighting ON and OFF, or raising or lowering lighting levels, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).

4. For switching daylight harvesting, the photosensor shall provide a deadband or a separation between the “ON Setpoint” and the “OFF Setpoint” that will prevent the lights from cycling after they turn off.

5. For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a user-selectable minimum level.

6. Optional programmable wall switch override to allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise and lower lighting levels for a selected period of time or cycle of occupancy.

7. Infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.

8. Red configuration LED that blinks to indicate data transmission.

9. Blue status LED indicates test mode, override mode and load binding.

10. Recessed switch to turn controlled load(s) ON and OFF.

11. One RJ-45 port for connection to the local network.

12. An adjustable head and a mounting bracket to accommodate multiple mounting methods and building materials. The photosensor may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox.

SS. Closed loop digital photosensors include the following additional features:

1. An internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from bright sources outside of this cone.
2. Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.
3. Automatically establishes setpoints following self-calibration.
4. A sliding setpoint control algorithm for dimming daylight harvesting with a “Day Setpoint” and the “Night Setpoint” to prevent the lights from cycling.

TT. Open loop digital photosensors include the following additional features:

1. An internal photodiode that measures light in a 60 degree angle cutting off the unwanted light from the interior of the room.
2. Automatically establishes setpoints following calibration using a wireless configuration tool or a PC with appropriate software.
3. A proportional control algorithm for dimming daylight harvesting with a “Setpoint” to be maintained during operation.

LIGHITNG CONTROL NETWORK

UU. The lighting control local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building. Digital room devices connect to the network using CAT 5e cables with RJ-45 connectors which provide both data and power to room devices. Features of the local network include:

1. Plug n’ Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
3. Push n’ Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
4. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

CONFIGURATIONS TOOLS

VV. A configuration tool facilitates optional customization of local networks, and is used to set up open loop daylighting sensors. A wireless configuration tool features infrared communications, while PC software connects to each local network via a USB interface.

WW. Features and functionality of the wireless configuration tool shall include:

1. Two-way infrared (IR) communication with IR-enabled devices within a range of approximately 30 feet.
2. High visibility organic LED (OLED) display, pushbutton user interface and menu-driven operation.
3. Read, modify and send parameters for occupancy sensors, daylighting sensors, room controllers and buttons on digital wall switches.
4. Save up to nine occupancy sensor setting profiles, and apply profiles to selected sensors.
5. Temporarily adjust light level of any load(s)on the local network, and incorporate those levels in scene setting.

6. Adjust or fine-tune daylighting settings established during auto-commissioning, and input light level data to complete commissioning of open loop daylighting controls.

NETWORK BRIDGE

XX. The network bridge connects a local network to a BACnet-compliant network for communication between rooms, panels and a segment manager or BAS. Each local network shall include a network bridge component to provide a connection to the local network room devices. The network bridge shall use industry standard BACnet MS/TP network communication.

1. The network bridge may be incorporated directly into the room controller hardware (LMRC-3xx Room Controllers) or be provided as a separate module connected on the local network through an available RJ-45 port.
2. Provide Plug n' Go operation to automatically discover all room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network.
3. The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the lighting control devices on each local network. Standard BACnet objects shall be provided as follows:
    a. Read/write the normal or after hours schedule state for the room
    b. Read the detection state of the occupancy sensor
    c. Read/write the On/Off state of loads
    d. Read/write the dimmed light level of loads
    e. Read the button states of switches
    f. Read total current in amps, and total power in watts through the room controller
    g. Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings
    h. Activate a preset scene for the room
    i. Read/write daylight sensor fade time and say and night setpoints
    j. Read the current light level, in footcandles, from interior and exterior photosensors and photocells
    k. Set daylight sensor operating mode
    l. Read/write wall switch lock status

SEGMENT MANAGER

YY. The lighting control system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser. Each segment manager shall have support for one, two or three segment networks as required and allow for control of a maximum of 127 local networks (rooms) and/or lighting control panels per segment network.

ZZ. Operational features of the Segment Manager shall include the following:

1. Connection to PC or LAN via standard Ethernet TCP/IP.
2. Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser.
3. Log in security capable of restricting some users to view-only or other limited operations.

4. Automatic discovery of all devices on the segment network(s). Commissioning beyond activation of the discovery function shall not be required.
5. After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.
6. Ability to view and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation.
7. Ability to set up schedules for rooms and panels. Schedules shall automatically set controlled zones or areas to either a normal hours or after hours mode of operation.
8. Ability to group rooms and loads for common control by schedules, switches or network commands.
9. Ability to monitor connected load current and display power consumption for areas equipped with room controllers incorporating the integral current monitoring feature.
10. Provide seamless integration with the BAS via BACnet IP

EXECUTION

EXAMINATION

AAA. Contractor shall thoroughly examine Project site conditions for acceptance of low-voltage lighting control installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

INSTALLATION

BBB. When using wire for connections other than the local network (Cat 5e with RJ-45 connectors), provide detailed point to point wiring diagrams for every termination. Provide wire specifications and wire colors to simplify contactor termination requirements

CCC. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.

DDD. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.

1. Adjust time delay so that controlled area remains lighted for 5 minutes after occupant leaves area.

EEE. Provide written or computer-generated documentation on the commissioning of the system including room by room description including:

1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
3. Load Parameters (e.g. blink warning, etc.)

FFF. Re-commissioning – After 30 days from occupancy re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity.

PROGRAMMING

GGG. Programming of the low-voltage lighting control system shall be by a factory-authorized agent of the Manufacturer of the system. All programming, testing, trouble shooting, etc. shall be included in this contract.

FIELD QUALITY CONTROL

HHH. Refer to Specification Section 260800: Electrical Commissioning.

III. Manufacturer's field service: Contractor shall arrange and pay for the services of a factory-authorized service representative to supervise the initial start-up, pretesting and adjustment of the low-voltage lighting control system.

JJJ. At least three weeks prior to any testing, notify the Engineer so that arrangement can be made for witnessing test, if deemed necessary. All pretesting shall have been tested satisfactorily prior to the Engineer's witnessed test.

KKK. Prefunctional resting:

1. Visual and mechanical inspection:
    a. Inspect for physical damage, defects alignment and fit.
    b. Perform mechanical operational tests in accordance with Manufacturer's instructions.
    c. Compare nameplate information and connections to Contract Documents.
    d. Check tightness of all control and power connections.
    e. Check that all covers, barriers and doors are secure.
2. Contractor shall provide all necessary programming assistance to set up and program the low-voltage lighting control equipment.
3. Electrical tests:
    a. The system shall be completely tested in accordance with operational parameters and Manufacturer's instructions. Any problem shall be documented and corrected.
    b. Test all control circuits and verify proper operation of all lighting circuits throughout the control system.
    c. Ensure the lighting zone controls match that of the schedules on the Contract Documents.
    d. Verify the proper integration with the mechanical control system for override control and monitoring of low-voltage lighting control system.
    e. Provide a complete report listing every device, the date it was tested, the results and the date retested (if failure occurred during the previous test). The test report shall indicate that every device tested successfully.

LLL. Contractor shall replace at no costs to the Owner all devices which are found defective or do not operate within factory specified tolerances.

MMM. Contractor shall submit the testing final report for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies and remedies. Test report shall be included in the operation and maintenance manuals.

TRAINING

NNN. Factory authorized service representative shall conduct a 4 hour training session for Owner's Representatives upon completion and acceptance of system. Instruction shall include operation, programming and maintenance of equipment. Each session shall be video-taped, and two DVD copies provided to the owner. Instruction shall include operation, programming and maintenance of equipment.

OOO. Contractor shall schedule training with a minimum of 7 days advanced notice.

END OF SECTION – 26 09 43

SECTION 262213

DRY TYPE TRANSFORMERS

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Dry type ventilated transformers.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 03: Cast-in-place concrete. Equipment housekeeping pad.
2. Division 09: Painting. Touch-up painted surfaces.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.

1. American National Standards Institute (ANSI):

ANSI C57;	Pertaining to Power/Distribution Transformer.

2. Underwriter's Laboratories, Inc. (UL):

UL 486E;	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.
UL 1561;	Dry-Type General Purpose and Power Transformers.

3. National Electrical Manufacturers Association (NEMA):

NEMA ST 20;	Dry Type Transformers.
NEMA TP-1;	Guide for Determining Energy Efficiency for Distribution Transformers.
NEMA TP-2;	Standard Test Method for Measuring Energy Consumption of Distribution Transformers.
NEMA Premium;	Guide for premium efficiency distribution transformers.

4. Department of Energy (DOE):

DOE 78 FR 23335;	Energy Conservation Standards for Distribution Transformers Rulemaking, 78 FR 23335 (April 18, 2013).
10 CFR PART 431;	Title 10 of the Code of Federal Regulations (CFR), Part 431, Subpart K – Distribution transformers with the DOE 2016 Efficiency Amendment.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Shop Drawings: Include type and style, dimensions, insulation class, rated temperature rise, taps provided, voltage, kVA and impedance ratings and characteristics, loss data, efficiency at 25, 50, 75 and 100 percent rated load and sound level.
4. Submit energy efficiency compliance documentation.
5. Submit inrush current design limitation documentation.
6. Furnish structural calculations for equipment anchorage as described in Section 260010: Basic Electrical Requirements.
7. Submit Manufacturer's installation instructions.
8. Final test results.
9. Warranty.

1.4 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:
   1. Detailed explanation of operation of the system.
   2. Instructions for routine maintenance.
   3. Telephone numbers for the authorized parts and service distributors.
   4. Include all service bulletins and torque Specifications for all terminations.
   5. Final testing reports.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

C. Independent Testing Agency qualifications: Refer to Section 260010: Basic Electrical Requirements.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Transformers shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner. Components shall be properly packaged in factory-fabricated containers and mounted on shipping skids.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.7 WARRANTY

A. Units and components offered under this Section shall be covered by a 1 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

1.8 EXTRA MATERIAL

A. Provide one spray can of matching finish paint for touching up damaged surfaces after installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Square D. (District Standard)

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 DRY TYPE TRANSFORMER - GENERAL

A. Rating: Provide kVA rating, primary and secondary voltage, frequency and phase as indicated on the Drawings. The designated rating is for continuous duty without the use of cooling fans unless specifically noted otherwise on the Drawings.

B. Windings: three phase dry type transformers shall be of the two-winding type.

C. Taps: All dry type transformers rated 15 kVA and larger shall have two 2 1/2 percent full capacity taps above normal (FCAN) and four 2 1/2 percent full capacity taps below normal (FCBN) rated primary voltage.

D. Noise attenuation:

1. Isolate core and coil unit from the enclosure by means of vibration absorbing mounts that preclude metal-to-metal contact between the core-coil and the enclosure.

2. Provide sound levels that do not exceed the following maximum levels in accordance with NEMA and ANSI standards:

a. Up to 9 kVA; 0 db

b. 10 to 50 kVA; 45 db

c. 51 to 150 kVA; 50 db

d. 151 to 300 kVA; 55 db

e. 301 to 500 kVA; 60 db

f. 501 to 700 kVA; 62 db

g. 701 to 1000 kVA; 64 db

E. Impedance:

1. Transformer impedance shall conform to NEMA standards. Do not use low impedance type transformers unless the circuits and equipment affected by the larger short circuit currents through such transformers are increased in short circuit current ratings, as required, at no additional cost to the Owner.

2. The following impedance are used as our basis of design:

a. Three phase transformers:

1) 15 kVA: 6.4Z

2) 25 kVA: 5.8Z

3) 30 kVA: 5.2Z
4) 37.5 kVA: 5.5Z
5) 45 kVA: 5.0Z
6) 75 kVA: 4.7Z
7) 112.5 kVA: 5.1Z
8) 150 kVA: 5.3Z
9) 225 kVA: 5.7Z
10) 500 kVA: 5.7Z
11) 750 kVA: 5.5Z
12) 1000 kVA: 5.0Z

F. Basic impulse level (BIL): 10 kV for transformers less than 300 kVA, 30 kV for transformers 300 kVA and larger.

G. Transformers shall have an efficiency compliant with the U.S. Department of Energy (DOE) final rule for the Distribution Transformers Energy Conservation Standard Rulemaking, 78 FR 23335 (April 18, 2013). Transformers built prior to January 1, 2016 will not be considered acceptable unless efficiency compliance documentation is submitted verifying transformer efficiency meets or exceeds the January 1, 2016 energy efficiency levels listed in DOE 78 FR 23335 (April 18, 2013).

H. Transformers shall be designed to limit inrush current to 12-times (12x) the base rated full load current or less.

I. Grounding: Ground core and coil assembly to enclosure by means of a visible flexible copper strap.

J. Enclosures:

1. Material: Code gauge steel.
2. Manufacturers nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.
3. Type: Provide NEMA type as indicated on Drawings or specified herein, drip-proof, self-bracing enclosure designed to prevent accidental contact with electrically energized parts unless otherwise noted.
4. Mounting: Transformers 75 kVA and less shall be suitable for wall, floor, frame or trapeze mounting. Transformers larger than 75 kVA shall be suitable for floor mounting.
5. Finish: Clean, degrease, zinc-phosphate, prime and finish paint steel parts with a baked-on synthetic enamel, ANSI 61 (light gray).
6. Accessories: Provide accessories as indicated on the Drawings.
7. Size: Dimensions and configurations shall conform to the spaces allocated on the Drawings.

2.3 DRY TYPE VENTILATED TRANSFORMERS

A. General:

1. Indoor or outdoor, convection air-cooled, dry type transformers with NEMA Type 1 enclosure unless otherwise noted. Provide NEMA Type 3R Enclosure for all exterior mounted transformers or where indicated on Drawings.
2. Transformers shall have been tested to UL standards and constructed to NEMA standards.

B. Insulation:

1. Insulation system and average winding temperature rise for kVA as follows unless otherwise indicated:

KVA RATING	CLASS H	RISE IN DEGREES
1 - 15	150c	115c
16 - 500	150c	150c

2. Case temperature shall not exceed 40 degrees centigrade rise above ambient at its warmest point.
3. Provide insulating materials that are in accordance with the latest addition of NEMA ST20 Standards for a 220-degree centigrade, UL component recognized insulation system for extended life.

C. Core construction: High grade, non-aging, silicon steel, clamped with structural angles and bolted to the transformer enclosure on vibration isolating pads.

D. Coil construction:

1. Continuous wound with copper wire, without splices except for taps.
2. Pressure type, primary, secondary and tap connections.
3. End fillers or tie downs for maximum strength.
4. Vacuum impregnated with non-hygroscopic, thermosetting varnish.
5. All connections shall be accessible from the front of the transformer to allow rear of transformer to be positioned within six inches of the adjacent wall.
6. Isolate core and coil from enclosure using vibration-absorbing mounts.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of transformer installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

A. Ensure all conduit stub-ups for bottom entry into transformer are in place and located as required per Shop Drawings.

B. Where noted on the Drawings provide a 4 inch high concrete housekeeping pad beneath equipment. Coordinate actual sizes of equipment base with approved Shop Drawings and extend pad 4 inches in all directions beyond overall dimension of base. Provide reinforcing bars as required structurally within pad to ensure proper support of equipment.

3.3 INSTALLATION

A. Install transformer in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Transformers shall be installed to provide adequate air circulation for the removal of the heat they produce, in accordance with Manufacturer recommendations.

C. Transformers not specifically designed for wall mounting, shall be spaced a minimum of 6" from adjacent walls, ceiling and equipment.

D. Transformers shall be anchored and braced to withstand seismic forces as calculated per Section 260010: Basic Electrical Requirements.

E. Loosen and/or remove all shipping bolts in accordance with Manufacturer's instructions.

F. Install the transformers on the noise and vibration isolation pads designed to suppress the transformer noise from the building structure. Select and arrange the pads in accordance with the weight and mounting of the transformers. These pads are in addition to any internal vibration pads. Provide a neoprene sleeve over the portion of the bolt that passes through the transformer base or mounting bracket. Provide a rubber washer between the bolt head and the mounting channel. Use Kinetics Model KIP or equal.

3.4 TERMINATIONS

A. Provide all transformers with lugs for both primary and secondary conductor sizes for conductors indicated on Drawing. Connect lug to termination point with appropriate size bolt, nut flat and Belleville washers.

B. Provide high-pressure compression lugs, for primary and secondary phase and neutral terminations for transformers 45 kVA and larger. Utilize only the tool and dies designed for uses in installing the lugs provided.

C. Use flexible conduit indoors in dry locations or liquidtight flexible conduit in damp/wet locations, two-foot minimum in length, for primary and secondary connections to transformer case. Make connections to side panels of enclosure, except for floor mounted transformers fed from directly below enclosure.

3.5 GROUNDING

A. Provide transformer with a dual rated four-barrel solderless grounding lug with a 5/8"-11 threaded hole. Drill transformer enclosure with 11/16" bit and attach lug to enclosure utilizing a torque bolt and Dragon Tooth transition washer. Connect the following:

1. Primary feeder ground.
2. Secondary feeder ground.
3. Grounding electrode.
4. Main bond jumper to neutral (when present).

3.6 IDENTIFICATION

A. Provide transformer nameplate as described in Section 260533: Electrical Identification.

3.7 FIELD QUALITY CONTROL

A. Independent testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing, calibration and inspection required herein. Independent Testing Agency shall meet the requirements as outlined in Section 260010: Basic Electrical Requirements. Testing Agencies objectives shall be to:

1. Assure transformer installation conforms to specified requirements and operates within specified tolerances.
2. Field test and inspect to ensure operation in accordance with Manufacturer's recommendations and Specifications.
3. Prepare final test report including results, observations, failures, adjustments and remedies.
4. Apply label on transformer upon satisfactory completion of tests and results.
5. Verify ratings and settings and make final adjustments.

B. At least three weeks prior to any testing, notify the Engineer so that arrangement can be made for witnessing test, if deemed necessary. All pretesting shall have been tested satisfactorily prior to the Engineer's witnessed test.

C. The Contractor shall supply a suitable and stable source of electrical power to each test site. The Testing Agency shall specify the specific power requirements.

D. Prefunctional testing:

1. Provide Testing Agency with Contract Documents and Manufacturer instructions for installation and testing.

2. Visual and mechanical inspection:

a. Compare nameplate information and connections to Contract Documents.

b. Inspect for physical damage, defects alignment and fit.

c. Check tightness of all control and power connections.

d. Check that all covers, barriers and doors are secure.

e. Perform specific inspections and mechanical tests as recommended by Manufacturer.

f. Verify seismic bracing is correct.

g. Verify winding core, frame and enclosure grounding are correct.

h. Verify tap connections are as specified.

3. Electrical tests:

a. Perform insulation-resistance tests winding-to-winding and winding-to-ground with test voltage in accordance with Manufacturer’s recommendation.

b. Calculate polarization index.

c. Perform power-factor or dissipation-factor tests in accordance with test equipment Manufacturer’s instructions.

d. Perform turn-ratio test on tap connections. Verify winding polarities are in accordance with nameplate.

e. Perform an excitation-current test on each phase.

f. Measure resistance of each winding at each tap.

g. Verify core is solidly grounded. If core is insulated and removable core ground strap is available, perform core insulation-resistance test at 500V DC.

h. Verify correct secondary voltage phase-to-phase and phase-to-neutral after energization and prior to loading.

i. Perform over-potential test on all high and low voltage windings-to-ground.

4. Test values:

a. Bolt-torque levels shall be in accordance with the Manufacturer’s written instructions.

b. Insulation-resistance test values at one minute should not be less than 500 megohms at 1000 VDC.

c. Polarization index should be compared to Manufacturer’s factory test results. If Manufacturer’s data is not available, acceptance test results will serve as baseline data.

d. Turn-ratio test results should not deviate more than 0.5% from either adjacent coils or calculated ratio.

e. Dissipation-factor/power-factor values should be 5% or less.

f. If winding-resistance test results vary more than 1% from adjacent windings, consult Manufacturer.

g. Typical excitation current test data pattern for three-legged core transformer is two similar current readings and one lower current reading.

h. If core insulation resistance is less than one megohm at 500 VDC, consult Manufacturer.

i. AC over-potential test shall not exceed 75% of factory test voltage for one minute duration. DC over-potential test shall not exceed 100% of factory RMS test voltage for one minute duration. Insulation shall withstand over-potential test voltage applied.

E. Contractor shall replace at no costs to the Owner all devices which are found defective or do not operate within factory specified tolerances.

F. Contractor shall submit the Testing Agency's final report for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies and remedies. Test report shall be included in the operation and maintenance manuals.

3.8 ADJUSTING

A. Adjust primary taps so that secondary voltage is above and within 2 percent of rated voltage.

3.9 CLEANING

A. Prior to energizing of transformer the Contractor shall thoroughly clean the interior of enclosure of all construction debris, scrap wire, etc. using Manufacturer's approved methods and materials.

B. Upon completion of Project prior to final acceptance the Contractor shall thoroughly clean both the interior and exterior of transformer per Manufacturers approved methods and materials. Remove paint splatters and other spots, dirt and debris.

C. Touch-up paint any marks, blemishes or other finish damage suffered during installation.

END OF SECTION – 26 22 13

SECTION 262413

SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Main service switchboard.

2. Outdoor enclosure and accessories.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 03: Cast-in-place concrete. Equipment housekeeping pad.

2. Division 09: Painting. Touch-up of painted surfaces.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Federal Specifications (FS):

FS W-C-375;	Circuit Breakers, Molded Case, Branch Circuit and Service.

2. American National Standards Institute, Inc. (ANSI):

ANSI C12;	Code for Electricity Metering.

3. Underwriters Laboratories, Inc. (UL):

UL 486E;	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.
UL 489;	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures.
UL 869A;	Service Equipment.
UL 891;	Dead-Front Switchboards.
UL 943;	Ground-Fault Circuit Interrupters.
UL 1053;	Ground-Fault Sensing and Relaying Equipment.

4. National Electrical Manufacturer Association (NEMA):

NEMA AB1;	Molded Case Circuit Breakers.
NEMA PB 2;	Deadfront Distribution Switchboards.
NEMA PB 2.1;	General Instruction for Proper Handling, Installation, Operation and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or less.
NEMA PB 2.2;	Application Guide Ground Fault Protective Devices for Equipment.
NEMA SG5;	Power Switchgear Assemblies.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Shop Drawings to include:
    a. Front, plan and side view elevations with overall dimensions.
    b. Conduit entrance locations and requirements.
    c. Nameplate legends; size and number of bus bars per phase, neutral and ground.
    d. Switchboard instrument details and accessories.
    e. Electrical characteristics including voltage, frame size and trip rating and withstand ratings.
3. Outdoor weatherproof equipment enclosure and accessories.
4. Furnish structural calculations for equipment anchorage as described in Section 260010: Basic Electrical Requirements.
5. Submit Manufacturer's installation instructions.
6. Complete Bill of Material listing all components.
7. Final test results.
8. Warranty.

B. Dimensions and configurations of switchboards shall conform to the space allocated on the Drawings. The Contractor shall submit a revised layout if equipment furnished varies in size from that indicated on Drawings for the Engineer's approval.

C. Service entrance switchboard utility metering sections shall be submitted to the local electrical utility company for approval prior to submission to the Engineer. A letter of acceptance from utility company shall be included in submittal package.

1.4 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:

1. A detailed explanation of the operation of the system.
2. Instructions for routine maintenance.
3. Pictorial parts list and part numbers.
4. Pictorial and schematic Electrical Drawings of wiring systems, including operating and safety devices, control panels, instrumentation and annunciators.
5. Telephone numbers for the authorized parts and service distributors.
6. Include all service bulletins and torque Specifications for all terminations.
7. Final testing report.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

C. Independent Testing Agency qualifications: Refer to Section 260010: Basic Electrical Requirements.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Switchboard components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner. Components shall be properly packaged in factory-fabricated containers and mounted on shipping skids.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with NEMA PB2.1 and Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.7 WARRANTY

A. Units and components offered under this Section shall be covered by a 1 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

1.8 SYSTEM START-UP

A. Upon completion of installation, a factory trained dealer service representative shall perform initial start-up of the switchboard. Sufficient time shall be allowed to properly check the system out and perform required minor adjustments before the Engineer's witnessed test shall begin.

1.9 EXTRA MATERIAL

A. Provide one spray can of matching finish paint for touching up damaged surfaces after installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Square D. (District Standard)

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 SWITCHBOARDS - GENERAL

A. Enclosure:

1. Each switchboard shall consist of a dead front, completely metal enclosed self-supporting structure. Construction shall consist of vertical sections of the universal frame type bolted together and braced with self-tapping bolts. Sides, top and rear shall be covered with captive-bolt fastened steel plates having formed edges all around. Front plates shall be sectionalized and removable. All plates shall be fabricated from 12 gage steel and shall have die-formed edges all around. The switchboard frame shall be suitable for use as floor sills in indoor installations. Corners shall be reinforced with rigged gussets internal and external to the structural members. Provide ventilators located on the roof of the switchboard over the overcurrent protective device and bus compartments to ensure adequate ventilation within the enclosure.

2. Switchboards shall have depth as required to house all equipment contained within it. Switchboard shall be constructed so that the back and front of all sections align. Construction of the board shall allow maintenance of incoming line terminations, device connections and all bus bolted connections.
3. All devices shall be accessible and removable from the front unless rear access is indicated on the Drawings.
4. Provide necessary hardware to permit locking every overcurrent protective device handle in the "OFF" position.
5. Provide hinged access doors to all termination, meter and relay compartments with knurled and slotted large head captive-bolts. The design shall allow access to compartments without tools and without removing any panels.
6. Furnish cable pull sections or top cable pull boxes where indicated on the Drawings complete with cable tie down supports. Where cable pull section or pull boxes contain utility service cables, provide utility acceptable sealing means.
7. Switchboard shall be suitable for use as service entrance equipment and be labeled in accordance with UL requirements.
8. Utility metering compartment section shall be fabricated to meet all utility company requirements. Where separate vertical section is required for utility metering, match and align with switchboard enclosure.

B. Bus assembly and terminations:

1. Switchboard bus bars and connections shall consist of high conductivity silver-plated copper (1000 amps per square inch maximum)tin-plated aluminum (750 amps per square inch maximum) mounted on heavy duty glass polyester supports. Bolted connections using Belleville washers are required for all internal connections, including those between protective devices and bus.
2. Bus arrangement shall be Phase A-B-C-N left-to-right, top-to-bottom and front-to-rear as viewed from the front. Horizontal and vertical bus ampere rating shall be uniform from end-to-end.
3. All bussing to and from an overcurrent protective device shall be rated to the frame sizing, not the trip rating.
4. Where "SPACE" is indicated in the switchboards, cross connectors and mounting hardware shall be installed to match the frame size ampere rating noted on the Electrical Drawings. All "SPACES" shall be ready for installation of overcurrent protective devices at a future time.
5. Shipping splits and provisions for future bus extension shall be provided with necessary bus splices.
6. Each switchboard shall contain a full length, bottom/front located copper ground bus that is securely connected to each vertical section. Ground bus shall be sized in accordance with UL 891, Table 25.1.
7. Termination lugs: High compression circumference crimped type rated for use with aluminum/copper conductors.
8. Switchboards shall be fully rated for a minimum of 65,000 AIC.
9. Neutral bus shall be 100 percent rated unless otherwise indicated on the Drawings.
10. Main service switchboards:

a. Removable neutral link: Provide removable bolted bus section for the purpose of disconnecting the ground circuit conductor from the premises wiring at the supply side of the service in accordance with NEC article 230-75.

b. Main bonding jumper: Connection between the grounded circuit conductor and the equipment ground conductor at the supply side of the service. Size in accordance with NEC table 250-94 or 12-1/2% of the area of the largest phase conductor in accordance with NEC article 250-79(c).

C. Switching and overcurrent protective devices:

1. Refer to Section 262816: Overcurrent Protective Devices.

2. Main overcurrent protective devices(s) shall be fixed mounted molded case breaker with interrupting rating and frame and trip ratings as indicated on Drawings.

3. Feeder overcurrent protective device(s) shall be fixed mounted, molded case breaker with frame and trip rating as indicated on Drawings.

4. Devices interrupting rating shall match that of switchboard for which the device is installed.

5. Series ratings of overcurrent protective devices is not acceptable unless specifically noted on the Drawings.

6. Devices shall be manually operated unless shunt trip and/or electrically operated devices are indicated on Drawings.

D. Ground fault protection:

1. General: A solid-state, zone-interlocked, ground fault protection system shall be provided integral on the main ,tieand the feeder device(s) as indicated on Drawings. It shall consist of integral phase current sensors, appropriate solid-state relaying equipment to provide the desired ground fault current sensitivity and time-current response characteristics. Provide neutral ground fault current transformer for four wire systems. Provisions shall be made for wiring devices for coordination between the main ,tieand the feeder devices.

2. Device settings: Adjustable pickup current sensitivity for ground fault currents from 200 amperes to 1200 amperes shall be provided. A calibrated dial shall be provided for setting the current pickup point in the field. Time delay shall be adjustable from 0 to 60 cycles. Settings for individual relays shall be as directed by the short circuit/coordination study specified in Section 260060: Power System Study. A locking screw shall be provided to retain both adjustments at desired setting.

3. All overcurrent devices shall be independently time coordinated irrespective of zone interlocking to allow the last downstream level of ground fault devices to be time coordinated, i.e. it shall NOT revert to the lowest time setting.

E. Instrumentation and controls:

1. Switchboards shall have a digital meter unit as indicated on the Drawings. 3% accuracy class current transformers (one per phase), potential transformers and fuses shall be furnished as required. Meter unit shall indicate amperage (Phase A, Phase B, Phase C), voltage (Phase A-N, B-N, C-N, A-B, B-C, C-A), power factor, KW loading, KW-hour and maximum demand KW. Esterline Angus, Panelmaster #290-R45A4-1-5, Power Measurement LTD. #3710 ACM or equal shall manufacture instrument. Instrument readings shall be true RMS and accurate within +1%.

2. Meter potential circuits shall be fused. Potential transformers if required for the monitoring devices shall be provided with fuses in the primary.

3. All internal devices (relays, transformers, etc.) shall be tagged as to rating and function with permanently fastened engraved nameplates.

4. Control and signal circuits: Control devices, i.e.: contactors, relays, time clocks, etc. shall be mounted in a separate compartment that is fully barrier from the overcurrent protective device compartments. Control devices shall be accessible through a separate hinged cover panel.

5. Relays: All relays shall be industrial control grade with a "ON" indicating neon light, hold down springs, minimum of 10 amp rated contacts and a minimum of four form C contacts. Relays used for control power transfer shall have 20 amp rated contacts. Do NOT use paralleled relays for relays with greater than 4 poles; use relays with the required number of poles. This is to prevent the situation where one relay fails and half of the intended function is lost; which could be dangerous.

F. Refer to Electrical Drawings for the following:

1. Mounting style; voltage; terminal lug size, location and quantity; bus ampacity; interrupting capacity of bus and overcurrent protective devices, quantity, poles and rating of overcurrent protective devices. Note that the AIC value noted on the Drawings for distribution equipment is the minimum rating of all components; values are in RMS symmetrical amps.

2. If indicated on the Electrical Drawings, provide contactors, relays, time clocks, etc. mounted within switchboard.

G. Miscellaneous requirements:

1. Circuit numbering: Starting at the top, odd numbered circuits in sequence down the left hand side and even numbered circuits down the right hand side.

2. Nameplates: Engraved nameplates shall be provided for each device and all "SPACES" located in the switchboard. An engraved nameplate shall also be provided indicating the switchboard designation. See Section 260553: Electrical Identification for requirements.

3. All control wires shall be labeled with wire markers and referenced to the control wiring diagrams. Provide colored wires with colored stripes to facilitate trouble-shooting and locating both ends of wires. Do not use wires with all the same wire color. Use fork, crimp type terminations on all control wires.

4. Provide a test block and plugs for voltage and current monitoring at each main switch. Provide engraved legend plates to indicate function of each test point.

5. Vertically mounted mains shall have the operating handle in the up position when energized.

H. Weatherproof outdoor enclosure and accessories:

1. Provide a NEMA 3R non-walk-in type weatherproof housing with hinged lockable access doors. Each section shall have a minimum of 13-inch deep vestibule. Provide a latch for each door to ensure adequate closing pressure to seal against harmful weather.

2. Provide each section of the switchboard with the following items with power obtained from a control power transformer and circuit breaker within the switchboard.

a. Thermostatically controlled space heater.

b. VAC industrial grade fluorescent lights inside each section vestibule.

c. One 120 VAC GFCI type duplex outlet with weatherproof cover. Connect to 120 VAC light circuit.

3. The weatherproof housings shall be provided with lifting eyes.

I. Finish:

1. Five step zinc phosphate pre-treatment, one coat of rust inhibiting dichromate primer and one coat of baked-on enamel finish, ANSI 61 (light gray).

2. A seven step spray wash, electroplate primer with final baked-on enamel finish; ANSI 61 (light gray) is an acceptable finish alternative.

2.3 INDIVIDUALLY FIXED MOUNTED DEVICE SWITCHBOARD CONSTRUCTION

A. Overcurrent protective devices shall be individually mounted with line and load bus connections. Devices shall be front removable and load connection rear accessible.

B. Insulated rigid bus connection shall extend from the load side of individually mounted overcurrent protective devices into rear compartment where outgoing cable connections may be made without reaching into or near the main horizontal or vertical bus. Provide molded removable covers at all joints.

C. Distribution sections shall be sectionalized to provide a front device section, an intermediate bus section and a rear feeder cable section. There shall be a vertical barrier of glass polyester between the device compartment and the bus compartment.

D. Provide a rear compartment vertical insulating barrier between the cable compartment and the main bus to protect against inadvertent contact with main or vertical bus bars.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of switchboard installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

A. Ensure all conduit stub-ups for bottom entry into switchboard are in place and located as required per Shop Drawings.

B. Embed in concrete two (2) 4-inch minimum channel iron sills, front and back edges of equipment, arranged per Manufacturer's recommendations. Install sills flush in finished surface in contact with equipment mounting frame.

3.3 INSTALLATION

A. Install switchboards in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Handling, storage, installation and energize of switchboards shall be carried out in accordance with latest edition of NEMA Publications PB 2.1.

C. Freestanding switchboards shall be accurately aligned, leveled and bolted in place on full-length channels securely fastened to concrete floor.

D. Switchboards shall be anchored and braced to withstand seismic forces as calculated per Section 260010: Basic Electrical Requirements.

E. Provide mounting hardware brackets, bus bar drilling and filler pieces for all unused spaces.

F. "Train" interior wiring; bundle and clamp, using specified plastic wire wraps specified under Section 260519: Building Wire and Cable.

G. Replace any panel pieces, doors or trims having dents, bends, warps or poor fit that may impede ready access, security or integrity.

H. Conduits terminating in concentric, eccentric or oversized knockouts at switchboards shall have ground bushings and bonding jumpers installed interconnecting all such conduits and the switchboards.

I. Check and tighten all bolts and connections with a torque wrench using Manufacturer's recommended values.

J. Visually inspect switchboards for rust and corrosion if signs of rust and corrosion are present, board shall be restored to new condition or replaced.

K. In damp and wet locations mount switchboard with a minimum 1 inch of air space between enclosure and the wall or other supporting material.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's field service: Contractor shall arrange and pay for the services of a factory-authorized service representative to supervise the initial start-up, testing and adjustment of the switchboard.

B. Independent testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing, calibration and inspection required herein. Independent Testing Agency shall meet the requirements as outlined in Section 260010: Basic Electrical Requirements. Testing Agencies objectives shall be to:

1. Assure switchboard installation conforms to specified requirements and operates within specified tolerances.
2. Field test and inspect to ensure operation in accordance with Manufacturer's recommendations and Specifications.
3. Prepare final test report including results, observations, failures, adjustments and remedies.
4. Apply label on switchboard upon satisfactory completion of tests and results.
5. Verify ratings and settings and make final adjustments.

C. At least three weeks prior to any testing, notify the Engineer so that arrangement can be made for witnessing test, if deemed necessary. All pretesting shall have been tested satisfactorily prior to the Engineer's witnessed test.

D. The Contractor shall supply a suitable and stable source of electrical power to each test site. The Testing Agency shall specify the specific power requirements.

E. Testing of overcurrent protective devices shall be done only after all devices are installed and system is energized.

F. Prefunctional testing:

1. Provide Testing Agency with Contract Documents and Manufacturer instructions for installation and testing.
2. Visual and mechanical inspection:
    a. Compare nameplate information and connections to Contract Documents.
    b. Inspect for physical damage, defects alignment and fit.
    c. Verify appropriate anchorage, required clearances and correct alignment.
    d. Inspect doors, panels and sections for paint, dents, scratches, fit and missing hardware
    e. Check tightness of all control and power connections.
    f. Check that all covers, barriers and doors are secure.
    g. Verify correct barrier installation.
    h. Verify that relays and overcurrent protective devices meet Drawing, power system study and specified requirements.
    i. Perform mechanical operational tests in accordance with Manufacturer's instructions.
    j. Exercise active components.

k. Inspect control power and instrument transformers.

l. Inspect insulators for evidence of physical damage or contaminated surfaces.

m. Ground-fault protection:

1) Verify ground connection is made ahead of neutral disconnect link and on line side of any ground fault sensor.

2) Verify neutral sensors are connected with correct polarity on both primary and secondary.

3) Verify all phase conductors and neutral pass through sensor in same direction for zero sequence systems.

4) Verify grounding conductors do not pass through zero sequence sensors.

5) Verify grounded conductor is solidly grounded.

6) Verify correct operation of self-test panel.

7) Set pickup and time-delay settings in accordance with Specifications. Record operation and test sequences as required by code.

3. Electrical tests:

a. Perform resistance tests through bus joints with low-resistance ohmmeter. Joints that cannot be directly measured due to permanently installed insulation wrap shall be indirectly measured from closest accessible connection.

b. Perform insulation-resistance tests on each bus section, phase-to-phase and phase-to-ground, at 1000V DC for 60 seconds. Investigate resistance values less than 50 megohms.

c. Perform over-potential test on each bus section, each phase-to-ground with phases not under test grounded, in accordance with Manufacturer's published data. Test voltage shall be applied for 60 seconds.

d. Perform insulation-resistance tests at 1000V DC for 60 seconds on control wiring. Do not perform this test on wiring connected to solid-state components.

e. Perform current injection tests on the entire current circuit in each section of switchgear.

1) Perform current tests by primary injection, where possible, with magnitudes such that minimum of 1.0 amp flows in secondary circuit.

2) Where primary injection is impractical, utilize secondary injection with minimum current of 1.0 amp.

3) Test current at each device.

f. Perform tests on all instrument transformers in accordance with Manufacturer's written instructions.

g. Determine accuracy of meters and instruments per Manufacturer's instructions.

h. Perform the following tests on control power transformers:

1) Perform insulation-resistance test. Perform measurements from winding-to-winding and each winding-to-ground. Test voltages shall be determined in accordance with Manufacturer's instructions.

2) Perform secondary wiring integrity test. Disconnect transformer at secondary terminals and connect secondary wiring to correct secondary voltage. Confirm potential at all devices.

3) Verify correct secondary voltage by energizing primary winding with system voltage. Measure secondary voltage with secondary wiring disconnected.

i. Potential transformer circuits:

1) Perform insulation-resistance tests. Perform measurements from winding-to-winding and each winding-to-ground. Test voltages shall be determined in accordance with Manufacturer's instructions.

2) Perform secondary wiring integrity test. Disconnect transformer at secondary terminals and connect secondary wiring to correct secondary voltage.

3) Verify secondary voltage by energizing primary winding with system voltage. Measure secondary voltage with secondary wiring disconnected.

j. Ground resistance:

1) Measure system neutral-to-ground insulation-resistance with neutral disconnect link temporarily removed. Replace neutral disconnect link after test.

2) Measure insulation-resistance of control wiring at 1000 VDC for 60 seconds. Refer to Manufacturer's instruction for devices with solid-state components

k. Ground fault protection system:

1) Perform the following pickup tests using primary injection:

a) Verify relay does not operate at 90% of pickup setting.

b) Verify pickup is less than 125% of setting or 1200 amps, whichever is smaller.

2) For summation type systems using phase-neutral current transformers, verify correct polarities by applying current to each phase-neutral current transformer pair. This test also applies to molded-case breakers using external neutral current transformer.

a) Relay should operate when current direction is the same relative to polarity marks in the two current transformers.

b) Relay should not operate when current direction is opposite relative to polarity marks in the two current transformers.

3) Measure time delay of the relay at 150% or greater of pickup.

4) Verify reduced control voltage tripping capacity at 55% for AC systems and 80% for DC systems.

l. Test overcurrent protection devices per Section 262816: Overcurrent Protective Devices.

4. Test values:

a. Bolt torque levels shall be in accordance with Manufacturer's requirements.

b. Compare bus connection resistances to values of similar connections.

c. Insulation-resistance values for bus, control wiring and control power transformers shall be in accordance with Manufacturer's published data. Values of insulation resistance less than Manufacturer's minimum levels should be investigated. Over-potential tests should not proceed until insulation-resistance levels are raised above minimum values.

d. Insulation shall withstand the over-potential test voltage applied.

e. Determine contact resistance in microhms. Resistance values shall not exceed high limit of normal range as indicated in Manufacturer's published data.

f. System neutral-to-ground insulation shall be a minimum of one megohm.

g. Ground fault protection systems relay timing shall be in accordance with Manufacturer's Specifications, but must also be no longer than one second at 3000 amps.

G. In the event that the system fails to function properly during the testing as a result of inadequate pretesting or preparation, the Contractor shall bear all costs incurred by the necessity for retesting including test equipment, transportation, subsistence and the Engineer's hourly rate.

H. Contractor shall replace at no costs to the Owner all devices which are found defective or do not operate within factory specified tolerances.

I. Contractor shall submit the Testing Agency's final report for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies and remedies. Test report shall be included in the operation and maintenance manuals.

3.5 CLEANING

A. Prior to energizing of switchboard the Contractor shall thoroughly clean the interior of enclosure of all construction debris, scrap wire, etc. using Manufacturer's approved methods and materials.

B. Upon completion of Project prior to final acceptance the Contractor shall thoroughly clean both the interior and exterior of switchboard per Manufacturers approved methods and materials. Remove paint splatters and other spots, dirt and debris.

C. Touch-up paint any marks, blemishes or other finish damage suffered during installation.

3.6 TRAINING

A. Factory authorized service representative shall conduct a 4 hour training seminar for Owner's Representatives upon completion and acceptance of system. Instructions shall include safe operation, maintenance and testing of equipment with both classroom training and hands-on instruction.

B. Contractor shall schedule training with a minimum of 7 days advance notice.

END OF SECTION – 26 24 13

SECTION 262416

PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Branch circuit panelboards.
2. Distribution panelboards (400 amps to 800 amps).

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.

1. Federal Specifications (FS):

FS W-C-375;	Circuit Breakers, Molded Case, Branch Circuit and Service.
FS W-P-115;	Power Distribution Panel.

2. National Electrical Manufacturers Association (NEMA):

NEMA AB 1;	Molded Case Circuit Breakers.
NEMA PB 1;	Panelboards.
NEMA PB 1.1;	Instructions for safety instruction, operation and maintenance of panelboard rated 600 volts or less.

3. Underwriters Laboratories, Inc. (UL):

UL 67;	Panelboards.
UL 486E;	Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.
UL 489;	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures.
UL 870;	Wireways, Auxiliary Gutters and Associated Fittings.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Shop Drawings: Include elevations, cabinet dimensions, gutter sizes, layout of contactors, relays, time clocks, lug sizes, bussing diagrams; make, location and capacity of installed equipment; mounting style; finish and panelboard nameplate inscription.

4. Furnish structural calculations for equipment anchorage as described in Section 260010: Basic Electrical Requirements.
5. Submit Manufacturer's installation instructions.
6. Complete bill of material listing all components.
7. Warranty.

B. Dimensions and configurations of panelboards shall conform to the spaces allocated on the Drawings for their installation. The Contractor shall include with the submittal a layout of the electrical room if it differs from construction documents for review and approval by the Engineer prior to release of order.

1.4 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:

1. A detailed explanation of the operation of the system.
2. Instructions for routine maintenance.
3. Pictorial parts list and parts number.
4. Telephone numbers for authorized parts and service distributors.
5. Final testing reports.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Panelboard components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with NEMA PB1.1 and Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.7 WARRANTY

A. Units and components offered under this Section shall be covered by a 1 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

1.8 EXTRA MATERIAL

A. Turn over two (2) sets of panelboard keys to the Owner at completion of Project. All panelboards shall be keyed alike.

B. Provide one spray can of matching finish paint for touching up damaged surfaces after installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Square D. (District Standard)

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 PANELBOARDS - GENERAL

A. Enclosure:

1. Cabinets shall be NEMA Type 1 enclosure, door and trim of code gauge galvanized steel.

2. Panelboard covers shall be door-in-door construction such that inner door exposes the overcurrent protective devices and the outer door exposes the complete panelboard interior (i.e. branch circuit conductors, lugs, neutral and ground bus, overcurrent protective devices, etc.). Outer door shall have full-length piano hinge and inner door shall have two-point hinges.

3. Provide combination spring catch and lock on inside edge of the inner door trims with flush fitting joint between door and trim. Locks on all panelboards shall be keyed alike. Doors 36 inches and over in height shall be provided with three-point catch and lock. Provide quarter-turn captive bolts on the outer door.

B. Bus assembly and terminations:

1. Bus shall be bolted copper with taps arranged for distributed phase connections to branch circuit devices

2. Cross connectors shall be copper, drilled and tapped for bolt-on device connections, arranged for double row placement of device and designed to permit removal or addition of overcurrent protection devices without disturbing adjacent devices or removing main bus connections.

3. Neutral bus shall be 100 percent rated of phase bus bars and shall have lugs for each outgoing branch circuit or feeder requiring a neutral connection unless otherwise noted.

4. Ground bus shall be full size with lugs for each outgoing branch circuit and feeder.

5. Refer to panelboard schedules on Drawings for bus rating. Bus rating shall match or be greater than main device or main lug rating.

6. As a minimum, bus bars shall be rated 10,000 AIC for 120/208 volt panelboards and 14,000 AIC for 277/480 volt panelboards. Unless otherwise noted.

7. Provide full sized bussing in all sections of multi-section panelboards.

8. No panelboard section shall have greater than 42 poles.

9. Termination Lugs: Rated for use with aluminum/copper conductors.

10. All "SPACES" shall be ready for installation of future overcurrent protective device.

C. Miscellaneous requirements:

1. Circuit numbering: Starting at the top, indicate odd numbered circuits in sequence down the left hand side and even numbered circuits down the right hand side. Multi-section panelboards shall have continuous consecutive circuit numbers, i.e. Section 1 (circuit numbers 1-42), Section 2 (circuit numbers 43-84), Section 3 (circuit numbers 85-126). Provide metal embossed circuit identification of panelboards.

2. Directories: A 6" x 8" minimum size circuit directory frame and card with clear plastic covering shall be provided inside the inner panelboard door to reflect conditions at

completion of Work. Directory shall be typewritten denoting loads served by room number or area for each circuit.

3. Nameplates: Provide engraved nameplate for each panelboard. See Section 260533: Electrical Identification for requirements.

D. Refer to Panelboard Schedules for the following:

1. Mounting style; service voltage; terminal lug size, location and quantity; bus ampacity; interrupting capacity of bus and breakers; quantity, poles and rating of overcurrent protective devices.

E. Overcurrent protective devices:

1. Refer to Section 262816: Overcurrent Protection Devices.

2. Overcurrent protective devices shall be molded case circuit breakers where indicated on panelboard schedules or Electrical Drawings.

3. Main devices shall be hard bus connected to the panelboard bus bars.

4. In all cases, panelboards fed directly from a transformer shall have a main overcurrent protective device. If not indicated on the Drawings or Panelboard Schedules, provide this device sized to provide the full capacity of the transformer rating.

5. Main devices shall be vertically mounted and shall have their operating handle in the up position when energized. Main devices that are mounted in the same manner as the branch devices are NOT acceptable; i.e. main devices shall be individually mounted at the top or bottom of the phase bus bars.

6. Panelboards overcurrent protective devices layout shall conform to the layout indicated on the panelboard schedules.

7. Provide handle ties for single pole circuit breakers that share a neutral conductor.

F. Finish: Five step zinc phosphate pre-treatment, one coat of rust inhibiting dichromate primer and one coat of baked-on enamel finish, ANSI 61 (light gray).

2.3 DISTRIBUTION PANELBOARDS

A. Enclosures shall be sized as required and shall meet the space restriction allocated on Drawings. Panelboard shall comply with NEMA PS 1 and FS W-P-115.

B. Provide necessary hardware to permit locking every overcurrent protective device handle in the "OFF" position.

C. Where "SPACE" is indicated on panelboard schedules or Drawings, install cross connectors and mounting hardware to match the frame size ampere rated noted.

2.4 BRANCH CIRCUIT PANELBOARDS

A. Enclosure shall be 20" wide x 5-3/4" deep, surface or flush mounted and shall comply with NEMA PB 1 and FS W-P-115.

B. Flush panelboards mounted adjacent to each other shall be same physical size.

C. Where "SPACE" is indicated on panelboard schedules or Drawings, install minimum 100-ampere branch circuit cross connectors and mounting hardware. For future device spaces larger than 100 amps, cross connectors shall match the frame size ampere rated noted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of panelboard installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 INSTALLATION

A. Install panelboards in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Set panels plumb and symmetrical with building lines in conformance with PB1.1. Furnish and install all construction channel bolts, angles, etc., required to mount the equipment furnished under this Section.

C. Mounting height shall be 6 feet.

D. Panelboards shall be anchored and braced to withstand seismic forces as calculated per Section 260010: Basic Electrical Requirements.

E. Provide mounting hardware brackets, busbar drillings and filler pieces for all unused spaces.

F. "Train" interior wiring; bundle and clamp, using specified plastic wire wraps specified under Section 260519: Building Wire and Cable.

G. Replace panel pieces, doors or trim exhibiting dents, bends, warps or poor fit that may impede ready access, security or integrity.

H. Conduits terminating in concentric, eccentric or oversized knockouts at panelboards shall have ground bushings and bonding jumpers installed interconnecting all such conduits and the panelboard.

I. Check and tighten all bolts and connections with a torque wrench using Manufacturer's recommended values.

J. Provide four 3/4" spare conduits stubbed-out of flush mounted panelboards to nearest accessible ceiling space.

K. Visually inspect panelboard for rust and corrosion. If signs of rust and corrosion are present, restore or replace panelboard to new condition.

L. In damp and wet locations, mount panelboards with a minimum one inch of air space between cabinet and the wall or other support material.

M. Provide close up plugs in all unused openings in the cabinet.

N. Field install handle ties on single pole circuit breakers that share a neutral conductor.

O. Circuit breakers feeding "Fire Alarm Control Panel(s)" shall be red in color.

3.3 FIELD QUALITY CONTROLS

A. Independent testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing, calibration and inspection required herein. Testing Agencies objectives shall be to:

1. Assure panelboard installation conforms to specified requirements and operates within specified tolerances.

2. Field test and inspect to ensure operation in accordance with Manufacturer's recommendations and Specifications.

3. Prepare final test report including results, observations, failures, adjustments and remedies.

4. Apply label on panelboards upon satisfactory completion of tests and results.

5. Verify ratings and settings and make final adjustments.

B. At least three weeks prior to any testing, notify the Engineer so that arrangement can be made for witnessing test, if deemed necessary. All pretesting shall have been tested satisfactorily prior to the Engineer's witnessed test.

C. The Contractor shall supply a suitable and stable source of electrical power to each test site. The Testing Agency shall specify the specific power requirements.

D. Testing of overcurrent protective devices shall be done only after all devices are installed and system is energized.

E. Prefunctional testing:

1. Provide Testing Agency with Contract Documents and Manufacturer instructions for installation and testing.

2. Visual and mechanical inspection:

a. Inspect for physical damage, defects alignment and fit.

b. Perform mechanical operational tests in accordance with Manufacturer's instructions.

c. Compare nameplate information and connections to Contract Documents.

d. Check tightness of all power connections.

e. Check that all covers, barriers and doors are secure.

3. Electrical tests:

a. Insulation resistance: 1000 volt DC tests for one minute on all 600 volt and lower rated equipment, components, buses, feeder and branch circuits and control circuits. Test phase-to-phase and phase-to-ground circuits showing less than 10 megohms resistance to ground shall be repaired or replaced.

b. Circuit continuity: All feeders shall be tested for continuity. All neutrals shall be tested for improper grounds.

c. Ground resistance: Test resistance to ground of system and equipment ground connection.

d. Test overcurrent protection devices per Section 262816: Overcurrent Protective Devices.

F. In the event that the system fails to function properly during the testing as a result of inadequate pretesting or preparation. The Contractor shall bear all costs incurred by the necessity for retesting including test equipment, transportation, subsistence and the Engineer's hourly rate.

G. Contractor shall replace at no costs to the Owner all devices which are found defective or do not operate within factory specified tolerances.

H. Contractor shall submit the Testing Agency's final report for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies and remedies. Test report shall be included in the operation and maintenance manuals.

3.4 CLEANING

A. Prior to energizing of panelboards the Contractor shall thoroughly clean the interior of enclosure of all construction debris, scrap wire, etc. using Manufacturer's approved methods and materials.

B. Upon completion of Project prior to final acceptance the Contractor shall thoroughly clean both the interior and exterior of panelboards per Manufacturers approved methods and materials. Remove paint splatters and other spots, dirt and debris.

C. Touch-up paint any marks, blemishes or other finish damage suffered during installation.

END OF SECTION – 26 24 16

SECTION 262716

CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Hinged cover enclosures.
2. Cabinets.
3. Terminal blocks and accessories.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. National Electrical Manufacturer's Association (NEMA):

NEMA 250;	Enclosures for Electrical Equipment.
NEMA ICS 1;	Industrial Control and Systems.
NEMA ICS 4;	Terminal Blocks and Industrial use.
NEMA ICS 6;	Enclosures for Industrial Controls and Systems.

2. Underwriters Laboratories (UL):

UL 50;	Enclosures for Electrical Equipment.
UL 65;	Standards for Wired Cabinets.
UL 1059;	Terminal Blocks.
UL 1773;	Termination Boxes.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Describe Project construction, material, finish and any specific features of each component.
3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
4. Submit Manufacturer's installation instructions.
5. Shop Drawings: Indicating wiring diagrams and equipment arrangement within cabinets.
6. Furnish structural calculations for equipment anchorage as described in Section 260010: Basic Electrical Requirements.

1.4 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Hoffman Engineering Co.

2. Circle AW Products.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 CABINETS AND ENCLOSURES

A. Construction: Shall be code gauge galvanized steel with standard concentric knockouts for conduit terminations. Size shall be as indicated on Drawings. Cabinet shall be NEMA 250 Type 1.

B. Finish: Manufacturer's standard gray baked enamel finish.

C. Covers: Continuous hinged steel door, lockable and keyed to match panelboard locks.

D. Mounting:

1. Flush cabinets shall be furnished with concealed trim clamps and shall be not less than 4 inches deep.

2. Surface cabinets shall be furnished with screw cover trim, flush hinged door and shall not be less than 6 inches deep.

2.3 BACKBOARDS

A. Furnish cabinet with 3/4-inch fire retardant plywood mounting backboard on interior unless otherwise indicated on Drawings.

2.4 TERMINAL BLOCKS AND ACCESSORIES

A. Terminal blocks: NEMA ICS 4; UL listed.

B. Power terminals: Unit construction type, closed-back with tubular pressure screw connections, rated 600 volts.

C. Signal and control terminals: See terminal strips in Section 260519: Building Wire and Cable.

D. Identification: Identify terminal strips with permanent numbers.

E. Wiring diagram: Provide wiring diagram in protective pocket on inside front cover of cabinet. Diagram shall indicate control wiring, connections and layout of components within enclosure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of cabinets and enclosures installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 INSTALLATION

A. Set cabinets and enclosures plumb and symmetrical with building lines. Furnish and install all construction channel bolts, angles, etc. required to mount all equipment furnished under this Section of the Specifications.

B. Cabinets and enclosures shall be anchored and braced to withstand seismic forces calculated in accordance with that referenced in Section 260010: Basic Electrical Requirement.

C. "Train" interior wiring, bundle and clamp using specified plastic wire wraps.

D. Replace doors or trim exhibiting dents, bends, warps or poor fit that may impede ready access, security or integrity.

E. Terminate conduit in cabinet with lock nut and grounding bushing.

F. Terminate wiring on terminal blocks and identify each with heat shrink tags.

3.3 CLEANING

A. Touch-up paint any marks, blemishes or other finish damage suffered during installation.

B. Vacuum clean cabinet on completion of installation.

END OF SECTION – 26 27 16

SECTION 262726

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Wall switches.
2. Wall dimmer switches.
3. Occupancy sensor switches.
4. Receptacles.
5. Floor mounted service boxes.
6. Coverplates.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 03: Cast-in-place concrete.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.

1. Federal Specification (FS):

FS W-P-455A;	Plate, Wall Electrical.
FS W-C-596;	Electrical Power Connector, Plug, Receptacle and Cable Outlet.
FS W-S-896;	Switch, Toggle.

2. National Electrical Manufacturer's Association (NEMA):

NEMA WD-1;	General-Purpose Wiring Devices.
NEMA WD-2;	Semiconductor Dimmers for Incandescent Lamps.
NEMA WD-5;	Specific-Purpose Wiring Devices.

3. Underwriter's Laboratories (UL):

UL 20	General-Use Snap Switches.
UL 231;	Power Outlets.
UL 310;	Electrical Quick-Connect Terminals.
UL 498;	Attachment Plugs and Receptacles.
UL 514A;	Metallic Outlet Boxes.
UL 514D;	Cover Plates for Flush-Mounted Wiring Devices.
UL 943;	Ground-Fault Circuit-Interrupters.
UL 1681;	Wiring Device Configurations.

UL 1682;	Plugs, Receptacles and Cable Connectors of the Pin and Sleeve Type.
UL 1686;	Pin and Sleeve Configurations.
UL 1699A;	Outlet Branch Circuit Arc-Fault Circuit-Interrupters.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
3. Provide color finishes for Architect to select from.
4. Submit Manufacturer's installation instructions.

B. Where inscribed device coverplates are noted on the Drawings or in the Specifications, conform to the requirements of Section 260553: Electrical Identification.

1.4 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.5 WARRANTY

A. Occupancy sensors offered under this Section shall be covered by a 1 one year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Switches, receptacles and coverplates:
    a. Pass & Seymour.
    b. Leviton.
    c. Hubbell.
2. Occupancy sensors switches:
    a. WattStopper (District Standard)
3. Floor mounted service boxes:
    a. Legrand.
    b. FSR.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 WALL SWITCHES

A. Standards: Provide general-purpose 120/277 VAC switches that conform to NEMA WD-1 Specifications.

B. Color: Device color shall be as selected by the Architect, unless otherwise noted.

C. Wall switches:

D. Standards: Provide general-purpose 120/277 VAC switches that conform to NEMA WD-1 Specifications.

E. Color: Device color shall be as selected by the Architect, unless otherwise noted.

F. Wall switches:

1. Provide twenty ampere, 120/277 volt, Specification grade, toggle handle style, quick-make slow-break, quiet type snap switch with silver cadmium alloy contacts, binding head terminal screws, back and side wired with totally enclosed case.

2. Single pole, single throw switches: Hubbell #1221 series, Pass & Seymour #20AC1 series or Leviton #1221 series.

3. Double pole, single throw switches: Hubbell #1222 series, Pass & Seymour #20AC2 series or Leviton #1222 series.

4. Three way switches: Hubbell #1223 series, Pass & Seymour #20AC3 series or Leviton #1223 series.

5. Four way switches: Hubbell #1224 series, Pass & Seymour #20AC4 series or Leviton #1224 series.

2.3 OCCUPANCY SENSOR SWITCHES

A. General:

1. Occupancy sensors shall comply with the latest edition of the California Building Energy Efficiency Standards, California Building Code, Part 6 and be certified by The California Energy Commission. All sensors shall be listed in the most current directory of Certified Occupancy Sensing Devices or be on file with the CEC.

2. Occupancy sensors shall be dual-technology type infrared/ultrasonic as specified herein with voltage and wattage rating equal to the lights being controlled.

3. All sensors shall have an adjustable time delay for turning off lights and a sensitivity adjustment.

4. Ceiling mounted sensors shall operate on low voltage as supplied by control unit. Control unit shall contain power supply and relays for switching loads.

5. Units shall be furnished to cover the areas being controlled. No allowance shall be given for providing sensors improperly sized for the square footage of the controlled area.

B. Color: Device color shall be as selected by Architect, unless otherwise noted.

C. Wall mounted single level control sensors:

1. Sensor shall be dual-technology infrared/ultrasonic type with single level switching capability and coverage up to 900 square feet.

2. Operation shall be manual "ON" and manual or automatic "OFF".

3. Time delay adjustment from 30 seconds to 30 minutes. Set adjustment at 4 minutes.

4. Load capacity of 0 to 1800 watts at connected voltage.

5. For use in small utility closets where dual level switching is not indicated.

D. Wall mounted dual level control sensors:

1. Sensor shall be dual-technology infrared/ultrasonic type with dual level switching capability and coverage up to 1000 square feet.
2. Operation shall be manual (in two levels) "ON" and manual (in two levels) or automatic (full) "OFF".
3. Time delay adjustment from 30 seconds to 30 minutes. Set adjustment at 10 minutes. Set sensitivity adjustment at maximum.
4. Load capacity of 50 to 1000 watts at connected voltages.
5. Integral photocell, 2 circuit, compatible with electronic bi-level switching ballast. Provide with ambient light control adjustment.
6. For use in offices where dual level switching is indicated.

E. Ceiling mounted single-directional sensors:

1. Sensor shall be dual-technology infrared/ultrasonic type single-directional with coverage up to 900 square feet.
2. Operation shall be automatic "ON" and automatic "OFF". Provide with a manual override switch.
3. Time delay adjustment from 30 seconds to 30 minutes. Set adjustment at 10 minutes. Set sensitivity adjustment at maximum.
4. Load capacity of 20 amps per power or slave pack at connected voltage.
5. Power pack consisting of Class 2, 24V output transformer and relay in single housing, capable of powering up 2 sensors and mounted inside standard 4 inch square box.
6. For use in small office areas.

F. Ceiling mounted omnidirectional sensors:

1. Sensor shall be dual-technology infrared/ultrasonic type omnidirectional with coverage up to 1000 square feet.
2. Operation shall be automatic "ON" and automatic "OFF". Provide with a manual override switch.
3. Time delay adjustment from 30 seconds to 15 minutes. Set adjustment at 10 minutes. Set sensitivity adjustment at maximum.
4. Load capacity of 15 amps per power or slave pack at connected voltage.
5. Power pack consisting of Class 2, 24V output transformer and relay in single housing, capable of powering up to 2 sensors and mounted inside standard 4-inch square box.

2.4 RECEPTACLES

A. Standards:

1. Provide general purpose 20 ampere, 125/250 VAC receptacles that conform to NEMA WD-1 Specifications. Specialty receptacles shall conform to NEMA WD-5 Specifications as applicable.
2. Provide NEMA 5-20R, specification grade as noted herein, 20 amp, 125 VAC, 2 pole, 3 wire grounding type receptacles.
3. Receptacles shall be the standard conventional style device.

B. Color:

1. Device color shall be as selected by the Architect, unless otherwise noted.

C. General purpose single outlets:

1. Provide self-grounding back and side wired with binding head staked terminal screw.

2. Use Hubbell #5361 series, Pass & Seymour #5361 series Leviton #5361 series.

D. General purpose duplex receptacles:

1. Provide self-grounding, back and side wired with binding head staked terminal screws and break-off strip for two-circuit wiring.

2. Use Hubbell #5362 series, Pass & Seymour #5362 series or Leviton #5362 series.

E. Ground fault circuit interrupting (GFCI) receptacles:

1. Provide 20 amp, 125 VAC, receptacles consisting of NEMA 5-20R duplex device with integral solid state sensing and signaling circuitry capable of detecting and interrupting a maximum 5 milli-amp line-to-ground fault current in approximately 1/40th of a second.

2. Provide visual device with trip indication, manual reset and test mechanisms and with point of use and multi-outlet protection.

3. Use Pass & Seymour #2091-S series, Hubbell GF-5362 series, Leviton #6898 series, for Specification grade GFCI receptacles.

F. Special purpose receptacles: Provide Specification grade devices with the NEMA configuration, voltage and current rating, number of poles and ground provisions as noted on the Drawings.

2.5 FLOOR MOUNTED SERVICE BOXES

A. Multi-service recessed floor box:

1. Combination power and communication cable service floor box with flush cover and recessed compartment for access to service device(s). Box shall be for installation concrete floors.

2. Box shall be constructed of formed steel with provisions for adjustments before and after pour. Access hatch shall be steel and provided with carpet trim and insert. Make allowances for floor finishes if other then carpet. Furnish with specified receptacle(s) and accessories called for on Drawings.

3. Use Hubbell #3SFB-SS series or Walker 'Resource RFB' series.

B. Cast flush floor box:

1. Single or multi-gang floor box for flush applications in concrete floor. Box shall be cast iron with brass coverplates and carpet flange. Furnish with provisions for adjustments before and after pour. Provide with all accessories such as receptacles, compartment dividers, coverplate options, rings, etc. as indicated for application on Drawings.

2. Furnish box in either shallow or deep sizes as determined by the concrete floor depth and in ganged configurations indicated on Drawings.

3. Use Hubbell #B-2400, B-4200 and B-4300 series or Walker #880C series.

2.6 COVERPLATES

A. General:

1. Provide all coverplates with rounded edges and corners, smooth and free of grooves, embossing or other embellishment.

2. Provide mounting screws to match the plate finish.

3. Provide gang type coverplates where two or more devices are installed at one location. Individual gangable coverplates are not acceptable.

4. Provide plates of one design, standard conventional style, throughout the Project unless otherwise specified.

B. Color: Coverplate color shall be as specified by the Architect, unless otherwise noted.

C. Plastic coverplates:

1. Provide smooth, high impact, self-extinguishing thermoplastic coverplates and 0.100 inches thick with rounded edges and corners.

2. Provide openings to accommodate the devices indicated on the Drawings and in the Specifications.

D. Metal coverplates:

1. Provide smooth, type 430 stainless steel coverplates, 0.035" thick with rounded edges and corners.

2. Provide openings to accommodate the devices indicated on the Drawings and in the Specifications.

3. Provide removable plastic film to protect coverplates during installation. Remove film at time of final acceptance.

E. Weatherproof coverplates:

1. Non-public areas:

a. Provide horizontal mounted, weatherproof in-use coverplate for one duplex or one GFCI receptacle. Provide gasketed, spring loaded, vertically self-closing covers suitable for use in damp and wet locations as described in UL 514 and NEC 406. Covers shall allow the use of the device with the cover closed.

b. Furnish base plates, covers, hinge pins, spring and screws of corrosion resistant type 302 stainless steel.

2. Public area receptacles:

a. Provide horizontal mounted weatherproof in-use coverplate for one duplex or one GFCI receptacle. Provide gasketed, spring loaded, lockable, vertically self-closing covers suitable for use in damp and wet locations as described in UL 514 and NEC 406. Covers shall allow the use of the device with the cover closed.

b. Furnish base plates, covers, hinge pins, spring and screws of corrosion resistant type 302 stainless steel.

c. Provide two (2) keys for each locking type coverplate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of wiring device installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

A. Coordinate device heights in vending, kitchen and utility areas with benches and counters.

B. Coordinate switch mounting location with Architectural details. Unless otherwise noted, locate switches on latch side of door.

3.3 INSTALLATION

A. Install wiring devices in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Install devices with the vertical centerline plumb and with all edges of the device flush against the adjacent wall surfaces.

C. Mount switches at 42 inches to center above finished floor unless otherwise noted.

D. Mount receptacles vertically with the centerline 18 inches above finished floor and with grounding slot at bottom.

E. Mount receptacles vertically when mounting above counters, mount with grounding slot to the left.

F. Mount GFCI receptacles in the following locations, whether indicated as GFCI type or not on the drawings:

1. In bathrooms.
2. Where receptacles are installed within 6’0” from edge of sinks.
3. In kitchens above counters.
4. On rooftops.
5. Outdoors.
6. Where serving vending machines.
7. Where serving electric drinking fountains.

G. Provide coverplates for all outlet boxes, switches, receptacles, etc.

H. Install blank coverplates on all outlet boxes in which no device is required or installed.

I. Provide coverplates that completely cover wall opening and seat against wall.

J. Provide stainless steel coverplates for all devices in kitchen/food service equipment areas.

3.4 OCCUPANCY SENSOR SWITCHES

A. Set time delays in sensors in accordance with Owner's directions.

B. Where substituted occupancy sensors are used, it shall be the responsibility of the Contractor to place sensors in the proper place and with proper alignment to cover to all the area intended in the Contract Documents.

C. Provide one power pack with each ceiling mounted occupancy sensor, whether indicated or not on plans, unless wiring details or plans indicate otherwise.

D. Where Drawings indicate ceiling mounted slave units, provide 3 #14 in 1/2" conduit from power pack to slave unit and connect so that input from either master or slave sensor will turn lights on.

E. Install wall mounted devices with the vertical centerline plumb and alleges of device flush against adjacent wall surfaces. Mount devices at 42 inches to center above finished floor unless otherwise noted.

3.5 FLOOR MOUNTED SERVICE BOXES

A. Installation:

1. Install floor boxes to be level or within 1/16" below screed line.
2. Make conduit connections and anchor box to sub-flooring.
3. Core drill hole in floor (core sized based on Manufacturer's installation instructions) for insert of poke-through device.

4. Make conduit connection to poke-through box from floor below.

B. Coordination: Contractor shall mark the location of all floor boxes with paint prior to installation or core drilling for review and approval by Architect.

3.6 FIELD QUALITY CONTROL

A. Electrical testing:

1. Test proper polarity of all receptacles.
2. Test ground continuity of all wiring devices.
3. Test ground fault interrupting device operation.

B. Visual and mechanical inspection:

1. Check proper operation of all switches.
2. Visually inspect and replace damaged or defective devices.

3.7 CLEANING

A. Clean interior of all boxes from dirt and paint prior to installation of devices.

B. Clean wiring devices and coverplates from dirt and paint over spray.

END OF SECTION – 26 27 26

SECTION 262816

OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Fuses.

2. Molded case circuit breakers.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Federal Specification (FS):

FS W-C-375;	Circuit Breakers, Molded Case, Branch Circuit and Service.

2. Underwriters Laboratories, Inc. (UL):

UL 489;	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures.

3. National Electrical Manufacturer Association (NEMA):

NEMA AB 1;	Molded Case Circuit Breakers.

4. Pacific Gas & Electric (PG&E) – Section G2 – Protection and Control Requirements for Generation Entities - Power Generation Interconnection Handbook:

Paragraph G2.14;	Emergency Generator Requirements
Table G2-5;	Section G2 – Protection and Control Requirements for Generation Entities document.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. Describe product operation, equipment and dimensions and indicate features of each component.

3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

4. Provide factory certification of trip characteristics for each type and rating of circuit breaker.

5. Provide current let-through and melting time information for each type and rating of fuses.

6. Submit Manufacturer's installation instructions.

7. Complete bill of material listing all components.

8. Warranty.

1.4 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:

1. A detailed explanation of the operation of the system.
2. Instructions for routine maintenance.
3. Parts list and part numbers.
4. Telephone numbers for authorized parts and service distributors.
5. Final testing reports.

1.5 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Overcurrent Protective Device components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.7 WARRANTY

A. Units and components offered under this Section shall be covered by a 1 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Fuses:
    a. Bussmann Division, Cooper Industries.
    b. Gould Shawmut Co.
2. Circuit breakers:
    a. Square D. (District Standard)

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 FUSES

A. General: All power fuses shall be time-delay, high interrupting (300 K AIC), current limiting type, unless otherwise noted on the Drawings. All fuses shall be the product of a single Manufacturer and shall be selectively coordinated when applied in 2:1 ratios. Types of fuses shall be as follows:

1. Motor branch circuit fuses (0-600 amperes): UL Class J dual element, time delay type fuse. Motor branch circuit fuses shall be sized for Type 2 coordination for the motor controller and back-up motor overload protection and shall be coordinated with motor starter overload relay heaters. See Section 262900: Motor Controls.

B. Control and instrument fuses shall be suitable for installing in blocks or fuseholders. Exact type and rating shall be as recommended by the Manufacturer of the equipment being protected.

2.3 MOLDED CASE CIRCUIT BREAKERS

A. Branch and feeder circuit breakers shall be molded case, bolt on and trip indicating.

B. Where stationary molded case circuit breakers are indicated on the Drawings to be current limiting type, they shall be current limiting as defined by UL 489 and shall not employ any fusible elements.

C. Circuit breakers shall have interrupting capacity not less than that indicated on the Drawings or if not indicated, not less than 14,000 RMS symmetrical amps for 480 volt systems and 10,000 RMS symmetrical amps for 208 volt systems.

D. Covers shall be sealed on non-interchangeable breakers and trip unit covers shall be sealed on interchangeable trip breakers to prevent tampering. Circuit breaker ratings shall be clearly visible after installation or engraved nameplates shall be provided stating the rating. All ferrous parts shall be plated to minimize corrosion.

E. Circuit breakers shall be toggle, quick-make and quick-break operating mechanisms with trip-free feature to prevent contacts being held closed against overcurrent conditions in the circuit. Trip position of the breakers shall be clearly indicated by operating handles moving to a center position.

F. Multipole breakers shall have a single handle to open and close all contacts simultaneously in both manual operation and under automatic tripping. Interpole barriers shall be provided inside the breaker to prevent any phase-to-phase flashover. Each pole of the breaker shall have means for Arc extinguishing.

G. All terminals shall be rated for aluminum or copper wire.

H. Circuit breakers with trip ratings 100 amp and smaller shall be ambient temperature compensated, thermal magnetic type unless otherwise noted. Breakers shall be of full size, 1" per pole type. Panels with more than one branch breaker larger than 100 amps shall be installed in distribution type panels.

I. Circuit breakers with trip ratings 101 amps through 400 amps shall have solid state electronic trips with true RMS reading through the 13th harmonic with 1% accuracy, interchangeable trip via front accessible current plug, adjustable instantaneous and short time be rated as indicated on Drawings at the voltage indicated.

J. Circuit breakers with trip ratings 401 amps through 1200 amps shall have electronic trips with the following characteristics:

1. Electronic true RMS sensing trip, adjustable via current plug.

2. Adjustable long time setting and delay.

3. Adjustable short time pick-up and delay.

4. Adjustable instantaneous pick-up.

5. Mechanical targets on overload, ground fault and short circuit.

K. Accessories: Provide accessories as noted on the Drawings, i.e. shunt-trip, auxiliary contacts, undervoltage trip, alarm switch, etc.

L. Spaces in the boards shall be able to accept any combination of 1, 2 or 3 pole circuit breakers as indicated. Provide all necessary bus, device supports and mounting hardware sized for frame, not trip rating.

M. Series rated breakers are not acceptable unless specifically noted on the Drawings.

N. Refer to the Drawings for breakers requiring ground fault protection. See Section 262413: Switchboards for requirements of ground fault protection system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of overcurrent protective device installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 INSTALLATION

A. Install overcurrent protective devices in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Tighten electrical connectors and terminals; including screws and bolts, in accordance with equipment Manufacturers published torque-tightening values for equipment connectors. Where Manufacturers torque requirements are not indicated tighten connectors and terminals to comply with tightening torque specified in UL Standard 486A.

C. Install overcurrent protective devices and accessories in accordance with Manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. All devices shall be installed in accordance with applicable NEC and NEMA standards for installation.

D. Circuit breakers serving "Fire Alarm Control Panel(s)" shall be red in color.

3.3 FIELD QUALITY CONTROL

A. Independent testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing, calibration and inspection required herein. Testing Agencies objectives shall be to:

1. Assure overcurrent protective device installation conforms to specified requirements and operates within specified tolerances.

2. Field test and inspect to ensure operation in accordance with Manufacturer's recommendations and Specifications.

3. Prepare final test report including results, observations, failures, adjustments and remedies.

4. Verify ratings and settings and make final adjustments.

B. At least three weeks prior to any testing, notify the Engineer so that arrangement can be made for witnessing test, if deemed necessary. All pretesting shall have been tested satisfactorily prior to the Engineer's witnessed test.

C. The Contractor shall supply a suitable and stable source of electrical power to each test site. The Testing Agency shall specify the specific power requirements.

D. Testing of overcurrent protective devices shall be done only after all devices are installed and system is energized.

E. Prefunctional testing:

1. Provide Testing Agency with Contract Documents and Manufacturer instructions for installation and testing.

2. Visual and mechanical inspection:

a. Inspect for physical damage, defects alignment and fit.

b. Perform mechanical operational tests in accordance with Manufacturer's instructions.

c. Compare nameplate information and connections to Contract Documents.

d. Check tightness of all control and power connections.

e. Check that all covers, barriers and doors are secure.

3. Electrical tests:

a. Circuit continuity: All feeders shall be tested for continuity. All neutrals shall be tested for improper grounds.

b. Determine that circuit breaker will trip under overcurrent condition, with tripping time in conformance with NEMA AB 1 requirements.

c. Test all circuit breakers with frame size 225 amps and larger and 10 percent of all circuit breakers with frame sizes less than 225 amps in each panelboard, distribution board, switchboard, etc. unless otherwise noted.

F. Contractor shall replace at no costs to the Owner all devices which are found defective or do not operate within factory specified tolerances.

G. Contractor shall submit the Testing Agency's final report for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies and remedies. Test report shall be included in the operation and maintenance manuals.

3.4 ADJUSTING

A. Adjust circuit breaker trip settings based on recommendations of Section 260060: Power System Study.

B. Adjust circuit breaker trip settings for coordination with other overcurrent protective devices in system.

C. Adjust circuit breaker trip settings for adequate protection from overcurrent and fault currents.

3.5 CLEANING

A. Upon completion of Project prior to final acceptance the Contractor shall thoroughly clean overcurrent protective devices per Manufacturer's approved methods and materials. Remove paint splatters and other spots, dirt and debris.

3.6 TRAINING

A. Factory authorized service representative shall conduct a 4 hour training seminar for Owner's Representatives upon completion and acceptance of system. Instructions shall include safe operation, maintenance and testing of equipment with both classroom training and hands-on instruction.

B. Contractor shall schedule training with a minimum of 7 days advance notice.

END OF SECTION – 26 28 16

SECTION 262819

DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Disconnect Switches.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated on specified:

1. Federal Specifications (FS):

FS W-F-870; Fuseholders (for plug and enclosed cartridge fuses).

FS W-S-865; Switch, Box (enclosed), Surface-Mounted.

2. National Electrical Manufacturer Association (NEMA):

NEMA KS 1; Enclosed Switches.

3. Underwriters Laboratories, Inc. (UL):

UL 512; Fuseholders.

1.3 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. As a minimum the following characteristics shall be indicated:

a. NEMA types.

b. Current rating.

c. Number of poles.

d. Fuse provisions.

e. Enclosure dimensions.

f. Voltage.

g. Horsepower rating (if applicable).

h. Short circuit rating.

3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

4. Submit Manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Square D. (District Standard)

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 DISCONNECT SWITCHES

A. Description: Provide NEMA heavy-duty type switches with dead front construction and padlock provisions for up to three locks in the “OFF” position.

B. Switch interior: Provide switch with switchblades that are fully visible in the “OFF” position when the door is open. Provide UL listed lugs for copper conductors, lugs to be front removable. Provide plated current carrying part.

C. Switch mechanism: Provide switches with a quick-make, quick-break, position indicating, operating handle and mechanism and a dual cover interlock to prevent unauthorized opening of the switch door in the “ON” position or closing of the switch mechanism with the door open. Furnish an electrical interlock to de-energize control wiring when the disconnect switch is opened.

D. Enclosures: Provide switches with hinged cover in NEMA 1 general purpose, sheet steel enclosure for dry locations and NEMA 3R weatherproof galvanized enclosures for exterior, damp or wet locations, unless otherwise noted on the Drawings. Provide an enclosure treated with a rust-inhibiting phosphate primer and finished in gray baked enamel.

E. Ratings: Provide switches that are horsepower rated for 240 VAC or 600 VAC as required for the circuit involved and that meet “I-SQUARED-T” requirements. Fusible switches to have provisions for the types of fuses specified in Section 262816: Overcurrent Protective Devices. UL listed short circuit rating, when equipped with fuses to be 200,000 amperes RMS symmetrical. Furnish with provisions for RK-1 fuses for switches up to 600 amps. 800 amp switches and larger to have provisions for Class L fuses.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of disconnects switch installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

A. Coordinate locations of switches and equipment in the field to provide code required clearances in front of switches and to ensure that switches are insight of the controller as described in NEC Article 430.

3.3 INSTALLATION

A. Install disconnect switches where indicated on the Drawings.

B. Install fuses in fusible disconnect switches.

C. Include construction channel and mounting hardware as required to support disconnect switch.

3.4 IDENTIFICATION

A. Provide engraved, machine screw retained type 'NP' nameplate on each disconnect switch. See Section 260553: Electrical Identification.

3.5 CLEANING

A. Upon completion of Project prior to final acceptance the Contractor shall thoroughly clean both the interior and exterior of enclosure of all construction debris, scrap wire, paint splatters, dirt, etc.

END OF SECTION – 26 28 19

SECTION 264313

SURGE PROTECTIVE DEVICES (SPD)

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Surge protective devices (SPD).

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified.

1. American National Standards Institute, Inc. (ANSI)/Institute of Electrical and Electronics Engineers (IEEE):

ANSI/IEEE C62.1;	Standard for Surge Arresters for Alternating Current Power Circuits.
ANSI/IEEE C62.11;	Standard for Metal-Oxide Surge Arrestors for AC Power Circuits.
ANSI/IEEE C62.41.1;	Guide on the Surges Environment in Low-Voltage (1000V and Less) AC Power Circuits.
ANSI/IEEE C62.41.2;	Recommended Practices on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits.
ANSI/IEEE C62.45;	Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits.

2. Underwriters Laboratory, Inc. (UL):

UL 50;	Cabinets and Boxes.
UL 1283	Electromagnetic Interference Filters.
UL 1449;	Surge Protective Devices, 3rd Edition.

3. National Electrical Manufacturers Association (NEMA):

NEMA LS1;	Low Voltage Surge Protective Devices.
NEMA PB1.1;	Instructions for Safety Instruction Operation and Maintenance of Panelboards Rated 600 Volts or less.

1.3 SYSTEM DESCRIPTION

A. Provide surge protective device (SPD) equipment having the electrical characteristics, ratings, and modifications as specified herein and as shown on the drawings. To maximize performance and reliability and to obtain the lowest possible let-through voltages, the ac surge protection shall be integrated into electrical distribution equipment such as switchboards and panelboards.

B. SPD units and all components shall be designed, manufactured, and tested in accordance with the latest applicable UL standard (ANSI/UL 1449 3rd Edition).

C. SPD units shall be furnished in two Types. Type 1 and Type 2 as outlined below:

1. Type 1: Permanently connected SPDs installed on the line or load side of main disconnect device(s), at main switchboard. This type closely relates to the devices previously referred to as secondary surge arrestors. These Type 1 SPDs should be specially suited to conduct the high energy impulses from lightning strikes.
2. Type 2: Permanently connected SPD installed on the load side of the service panel main disconnect device(s). This type most closely relates to devices that were previously classified as Transient Voltage Surge Suppression (TVSS). These Type 2 SPDs are specially suited for distribution boards and panelboard applications.

1.4 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Describe system operation, equipment and dimensions and indicate features of each component.
3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
4. Shop Drawings: Include elevations, cabinet dimensions, complete component listing and layout within cabinet, amperage ratings and capacities, system characteristics and wiring diagrams.
5. Submit Manufacturer's installation instructions.
6. Complete bill of material listing all components.
7. Warranty.

1.5 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following.

1. A detailed explanation of the operation of the system.
2. Instruments for routine maintenance.
3. Pictorial parts list and parts number.
4. Telephone numbers for authorized parts and service distributors.

1.6 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: SPD components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with the Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.8 WARRANTY

A. Units and components offered under this Section shall be covered by a 5 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Square D Surgelogic/EFI. (District Standard)

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 GENERAL

A. All Specification noted herein apply to the switchboard and panelboard units, unless otherwise noted.

B. The SPD system utilizes diversion modules to suppress and divert transient voltage and surge currents. The system is designed to provide protection for sensitive electronic devices against the effects of surges, transients and electrical line noise.

C. Environmental requirements:

1. Operating temperature: -40c to 60c.
2. Relative humidity: 0 - 95%.
3. Operating altitude: 0 - 12,000 feet.
4. Audible noise: Less than 35 dB.

D. Electrical requirements:

1. Unit operating voltage: The SPD system voltage shall be as indicated on the Drawings.
2. Maximum continuous operating voltage (MCOV): The MVOC shall not be less than 125% of the nominal system operating voltage.
3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.
4. Protection modes: The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

PROTECTION MODES TABLE				
Configuration	L-N	L-G	L-L	N-G
WYE	●	●	●	●
Delta	N/A	●	●	N/A

PROTECTION MODES TABLE				
Configuration	L-N	L-G	L-L	N-G
Single Split Phase	●	●	●	●
High Leg Delta	●	●	●	●

5. Nominal discharge current (I_n): All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n less than 20kA shall be rejected.

6. Voltage protection rating (VPR): The maximum ANSI/UL 1449 3rd Edition VPR for the device shall not exceed the following:

VOLTAGE PROTECTION RATING TABLE				
System Voltage	L-N	L-G	L-L	N-G
120/208	700V	700V	1200V	700V
277/480	1200V	1200V	2000V	1200V
346/600	1500V	1500V	3000V	1500V

E. SPD design:

1. The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

2. The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV.

3. Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50dB from 10kHz to 100MHz using the MIL-STD-220A insertion loss test method.

4. No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.

5. SPD shall provide the following integral monitoring options:

   a. Each unit shall have a green/red solid-state indicator light that reports the status of the protection on each phase:

      1) For WYE configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. WYE configured units shall also contain an additional green/red solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode.

      2) For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.

3) The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators shall indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights shall continue to indicate the status of the protection on all other phases and protection modes.

b. The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition.

c. The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.

d. Surge counter:

1) The SPD shall be equipped with an LCD display that indicates to the user how many surges have occurred at the location.

2) The surge counter shall trigger each time a surge event with a peak current magnitude of a minimum of 50 ± 20A occurs.

3) A reset pushbutton shall also be standard, allowing the surge counter to be zeroed. The reset button shall contain a mechanism to prevent accidental resetting of the counter via a single, short-duration button press. In order to prevent accidental resetting, the surge counter reset button shall be depressed for a minimum of 2 seconds in order to clear the surge count total.

4) The ongoing surge count shall be stored in non-volatile memory. If power to the SPD is completely interrupted, the ongoing count indicated on the surge counter's display prior to the interruption shall be stored in non-volatile memory and displayed after power is restored. The surge counter's memory shall not require a backup battery in order to achieve this functionality.

6. The unit shall contain thermally protected MOVs. These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.

7. All of the SPD's components and diagnostics shall be contained within one discrete assembly. SPDs or individual SPD modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.

8. Safety requirements:

a. The SPD shall minimize potential arc flash hazards by containing no user serviceable or replaceable parts and shall be maintenance free. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.

b. SPDs designed to interface with the electrical assembly via conductors shall require no user contact with the inside of the unit. Such units shall have any required conductors be factory installed.

2.3 SYSTEM APPLICATION

A. The SPD applications covered under this section include switchboards panelboard assemblies. All SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C, B, and A environments.

B. The minimum surge current capacity the device is capable of withstanding shall be as shown in the following table:

MINIMUM SURGE CURRENT CAPACITY TABLE			
Category	Application	Per Phase	Per Mode
C	Service Entrance Locations (Switchboards)	250kA	125kA
B	High Exposure Roof Top Locations (Switchboards and Panelboards)	160kA	80kA
A	Branch Locations (Panelboards)	120kA	60kA

C. All SPDs installed on the line side of the service entrance disconnect shall be Type 1 SPDs. All SPDs installed on the load side of the service entrance disconnect shall be Type 1 or Type 2 SPDs.

2.4 PANELBOARDS

A. The SPD application covered under this section includes lighting and outlet panelboards. The SPD units shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category A or B environments.

B. The SPD shall not limit the use of through-feed lugs, sub-feed lugs, and sub-feed breaker options.

C. SPDs shall be installed immediately following the load side of the main breaker. SPDs installed in main lug only panelboards shall be installed immediately following the incoming main lugs.

D. The panelboard shall be capable of re-energizing upon removal of the SPD.

E. The SPD shall be interfaced to the panelboard via a direct bus bar connection.

F. The SPD shall be included and mounted within the panelboard by the manufacturer of the panelboard.

G. The SPD shall be of the same manufacturer as the panelboard.

H. The complete panelboard including the SPD shall be UL67 listed.

2.5 SWITCHBOARDS

A. The SPD application covered under this section is for switchboard locations. Service entrance located SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C environments.

B. The SPD shall be of the same manufacturer as the switchboard.

C. The SPD shall be factory installed inside the switchboard at the assembly point by the original equipment manufacturer.

D. Locate the SPD on the load side of the main disconnect device, as close as possible to the phase conductors and the ground/neutral bar.

E. The SPD shall be connected through a disconnect (30A circuit breaker). The disconnect shall be located in immediate proximity to the SPD. Connection shall be made via bus, conductors, or other connections originating in the SPD and shall be kept as short as possible.

F. The SPD shall be integral to switchboard as a factory standardized design.

G. All monitoring and diagnostic features shall be visible from the front of the equipment.

2.6 ENCLOSURES

A. All enclosed equipment shall have NEMA 1 general purpose enclosures, unless otherwise noted. Provide enclosures suitable for locations as indicated on the drawings and as described below:

1. NEMA 1: Constructed of a polymer (units integrated within electrical assemblies), intended for indoor use to provide a degree of protection to personal access to hazardous parts and provide a degree of protection against the ingress of solid foreign objects (falling dirt).

2. NEMA 4: Constructed of steel, intended for either indoor or outdoor use, to provide a degree of protection from the following:

a. Against access to hazardous parts.

b. Of equipment inside the enclosure against ingress of solid foreign objects (dirt and windblown dust).

c. With respect to the harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water).

2.7 SOURCE QUALITY CONTROL

A. Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of NEMA and UL standards.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of SPD installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 INSTALLATION

A. Install SPD in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Set cabinets plumb and symmetrical with building lines in conformance with PB1.2. Furnish and install all construction channel bolts, angles, etc., required to mount the equipment furnished under this Section.

C. Unless otherwise indicated on the Power Single Line Diagram, provide SPDs on all service entrance switchboards, 120/208 volt distribution switchboards and 120/208 volt panelboards.

D. Conductors from the power source to the SPD shall be minimum #4 AWG copper in switchboards. Conductors shall be routed without sharp bends and straight and short as possible. The absolute maximum of 7'-0" long for units in switchboards and 1'-0" long for units in panelboards.

E. Conductors originating from direct bus bar connections shall be individually wrapped with electric tape in half-lapped increments for added protection of the un-protected conductors. Tie-wrap the conductors away from the bus bars without any sharp bends. All holes that the conductors pass through shall be grommets.

F. Cabinets shall be anchored and braced to withstand seismic forces as calculated per Section 260010: Basic Electrical Requirements.

3.3 FIELD QUALITY CONTROL

A. Prefunctional testing:

1. Visual and mechanical inspection:

a. Inspect for physical damage, defects, alignment and fit.

b. Compare nameplate information and connections to Contract Documents.

c. Check tightness of all control and power connections.

END OF SECTION – 26 43 13

SECTION 265100

LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Interior lighting fixtures.
2. Lamps and diodes.
3. Ballasts and LED drivers.
4. Diffusers and louvers.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 05: Miscellaneous. Fittings, brackets, backing supports, rods, etc. as required for support and bracing of lighting fixtures.
2. Division 09: Acoustical treatment. Slack fixture support wires.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Underwriters Laboratories, Inc. (UL):

UL 66;	Fixture Wire.
UL 924;	Emergency Lighting and Power Equipment.
UL 1574;	Track Lighting Systems.
UL 1598;	Luminaires.
UL 2108;	Low Voltage Lighting Systems.

2. Illumination Engineering Society of North America (IESNA):

IESNA LM-79-2008;	Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products.
IESNA LM-80-2008;	Approved Method for Measuring Lumen Maintenance of LED Light Sources.

3. Restriction of Hazardous Substances in LED (RoHS):

EU RoHS;	Directive 2002/95/EC Restriction of Hazardous Materials.

1.3 SYSTEM DESCRIPTION

A. Provide and install a fully functional and operating lighting fixture system as indicated, complete with lamps, wiring, control and securely attached to support system to meet all seismic code requirements.

B. Where catalog number and narrative or pictorial descriptions are provided, the written description shall take precedence and prevail.

1.4 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

3. Independent Testing Laboratories, Inc. or equal, photometric test report for each luminaire type and lamp combination listed on the fixture schedule. Test reports shall be based on Illuminating Engineering Society published test procedures and shall contain candlepower distribution curves in five lateral planes for fixtures with asymmetric distributions and fixture luminance data for vertical angles above 45 degrees from nadir.

4. Submit Manufacturer's installation instructions.

5. Complete bill of material listing all lighting fixtures, lamps and other components.

6. Warranty.

7. In addition to the requirements for Substitutions, under Section 260010: Basic Electrical Requirements, all requests for approval of non-specified products must be accompanied by the following:

a. A list of comparable buildings where the product is currently installed and can be observed. Buildings shall be within a 100 mile radius of Lighting Consultants office.

b. Furnish a working sample complete with housing, trim, 8’ cord and plug, and specified lamp.

1.5 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:

1. A detailed description and catalog cut of each lighting fixture type.

2. Instructions for routine maintenance.

3. Pictorial parts list and parts number.

4. Telephone numbers for authorized parts and service distributors.

1.6 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Lighting fixtures shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.8 WARRANTY

A. Units and components offered under this Section shall be covered by a 1 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

B. Ballast for fluorescent and high intensity discharge fixtures offered under this Section shall be covered by a 2 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. LEDs:
    a. Cree (LED)
    b. Philips (LED)
    c. Osram/Sylvania (LED)
    d. Xicato (LED)
2. LED Drivers:
    a. Addressable:
        1) Lutron Hi-lume A-series
    b. 0-10V Electronic:
        1) eldoLED SOLOdrive
        2) Osram/Sylvania Optotronic
        3) Philips Xitanium
3. Lighting fixtures: Refer to Fixture Schedule on Drawings.

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 GENERAL

A. Ferrous mounting hardware and accessories shall be finished using either a galvanic or phosphate primer/baked enamel process to prevent corrosion and discoloration of adjacent materials.

B. Fasteners shall be manufactured of galvanized steel.

C. Fixtures shall be free of light leaks and shall be designed to provide sufficient ventilation of lamps and ballasts, including vent holes where required.

D. All sheet metal Work shall be free from tool marks and dents and shall have accurate angles bent as sharp as compatible with the gauges of the required metal. All intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly. All surfaces shall be finished so as to eliminate all exposed sharp edges. All mitered corners or joints shall be accurately aligned with abutting intersecting members. Sheet metal

Work shall be properly fabricated so that planes will not deform (i.e. become concave or convex) due to normal expected ambient and operating conditions.

E. Wiring channels and lampholder mountings shall be rigid and accurately constructed.

2.3 LAMPS AND LEDS

A. Light emitting diodes (LED):

1. Refer to the Fixture Schedule for size and type of LED lamps required.
2. All diodes shall come from the same manufacturer and carry the same bin number.
3. All diodes shall be tested and tuned for the optimal Kelvin color point.
4. Color correlated temperature: 4000K
5. Minimum CRI (Color Rendering Index): 80+ U.O.N.
6. LED fixture components shall be free of all toxic materials to include lead, cadmium and mercury, and shall be RoHS compliant.
7. Groups of three or more diodes in a single housing shall be tested for even distribution.
8. Standard lumen output shall meet or exceed the State of California Title 24 Energy Code for high efficiency luminaries.
9. All LED fixtures shall have an IES formatted electronic photometric report.
10. Diodes shall have a minimum life of 50,000 hours and maintain at least 70% of initial lamp lumens throughout this period.

2.4 BALLASTS & DRIVERS

A. LED Drivers:

1. Addressable:
    a. Compatible with the specified network lighting control system.
    b. Continuous, flicker-free dimming from 100% to 1%.
    c. Operating Voltage: 120–277 V~ at 50/60 Hz
    d. Power Factor: > 0.90 for loads greater than 25 W
    e. Standby Power Consumption: < 1.0 W
    f. Total Harmonic Distortion (THD): < 20% for loads greater than 25 W
    g. Inrush Current: < 2 A
    h. Inrush Current Limiting Circuitry: eliminates circuit breaker tripping, switch arcing and relay failure.
    i. Open circuit protected
    j. Short circuit protected.
    k. Turn-on time: ≤ 1.5 seconds.
    l. PWM Dimming Frequency: 550 Hz
    m. RoHS Compliant.
    n. Drivers shall have a minimum life of 50,000 hours and maintain at least 70% of initial lamp lumens for that period.
    o. LEDs turn on to any dimmed level without going to full brightness.

p. Non-volatile memory restores all driver settings after power failure.

2. 0-10V:

a. 4-Wire, 0-10V analog control protocol

b. Continuous, flicker-free dimming from 100% to 1%.

c. Drivers to track evenly across multiple fixtures at all light levels, and shall have an input signal to output light level that allows smooth adjustment over the entire dimming range.

d. Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.

e. Driver must limit inrush current.

1) Meet or exceed $30mA^2s$ at 277VAC for up to 50 watts of load and 75A at 240us at 277VAC for 100 watts of load.

f. Withstand up to a 1,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A.

g. No visible change in light output with a variation of plus/minus 10 percent line voltage input.

h. Total Harmonic Distortion less than 20% percent and meet ANSI C82.11 maximum allowable THD requirements at full output. THD shall at no point in the dimming curve allow imbalance current to exceed full output THD.

i. Driver must support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance:

j. Adjustment of forward LED voltage, supporting 3V through 55V.

k. Adjustment of LED current from 200mA to 1.05A at the 100 percent control input point in increments of 1mA

l. Adjustment for operating hours to maintain constant lumens (within 5 percent) over the 50,000 hour design life of the system, and deliver up to 20 percent energy savings early in the life cycle.

m. Driver must be able to operate for a (+/- 10%)supply voltage of 120V through 277VAC at 60Hz.

n. Driver should be UL Recognized under the component program and shall be modular for simple field replacement. Drivers that are not UL Recognized or not suited for field replacement will not be considered.

o. Driver shall include ability to provide no light output when the analog control signal drops below 0.5 V , or the DALI/DMX digital signal calls for light to be extinguised and shall consume 0.5 watts or less in this standby. Control deadband between 0.5V and 0.65V shall be included to allow for voltage variation of incoming signal without causing noticeable variation in fixture to fixture output.

3. Unless otherwise noted on the fixture schedule, LED drivers shall be Integral to fixture housing, and provided with the luminaire specified on the fixture schedule. Driver quantity is not indicated on the fixture schedule; fixtures shall be provided with quantity of LED drivers as required.

4. Where indicated on the fixture schedule, provide remote mounted LED driver.

1) Remote drivers shall be mounted on a 4” square x 1.5” deep junction box, pre-wired and installation ready, to provide UL listed wiring compartment.

2) Locate remote drivers in accessible ceiling space, within 20’ of the light fixture.

3) Provide quantity as required for the light fixtures shown on the plans. Remote LED drivers shown on the plans may not indicate required quantity.

2.5 LENSES

A. Fresnel:

1. Lenses shall have uniform brightness throughout the entire visible area at angles from 45 to 90 degrees vertical, without bright spots or striations.

2. Lenses shall have opaque risers in colors as specified under the Fixture Schedule.

3. The same Manufacturer, unless otherwise specified, shall furnish all fixtures with fresnel lenses.

B. Glass:

1. Flat glass lenses shall be heat tempered borosilicate glass unless otherwise noted.

2. Glass finishes (i.e. sandblasted, etching, polishing) shall be performed as described in the fixture description.

C. Acrylic:

1. Lenses shall be injection molded crystal clear 100% virgin acrylic (except as indicated otherwise in the Fixture Schedule). For lenses with male pattern of pyramids or cones, specified minimum thickness refers to distance from flat surface to base of pyramids (cones) or thickness of undisturbed material. For lenses with female pattern, specified minimum thickness refers to overall thickness of material.

2. Lenses shall fully eliminate lamp images when viewed from all directions within 45 to 90 degree angles from vertical, where the ratio of lamp spacing to the distance from lamp underside to top of lens does not exceed 1.50. Within the viewing angle from 0 to 45 degrees the ratio of maximum brightness (under a lamp) to minimum brightness (between lamps) shall not exceed 3 to 1.

3. Finishes (i.e. sandblasting, etching, polishing) shall be performed as described in the Fixture Schedule.

4. Plastic electrical light diffusers must meet the requirements of Section 2-5209, CAC, Flame Spread Rating.

2.6 REFLECTOR CONES

A. Provide 45-degree lamp and lamp imaging cut-off unless otherwise specified in the Fixture Schedule. In fixtures where upper reflector is separated from cone, cut-off shall be 45-degrees unless otherwise noted.

B. Plastic materials shall to be used for reflector cones or aperture plate materials.

C. Fixture in which reflector cones are riveted or welded to the housing or where removal of the cone requires pressure to be applied to the finished surface of the reflector shall not be acceptable.

D. Cone flange shall be formed as an integral part of the cone and shall have identical color and finish as the cone, except when specified otherwise in the Fixture Schedule. The flange major surface shall be perpendicular to the cone axis. The width of the flange shall adequately cover the ceiling opening without light leaks. No fixture parts (housing, mounting frame, etc.) shall be visible between the ceiling surface and the edge of the cone flange. The same requirement shall be applicable to fixtures where the main reflector extends down to the bottom edge of the fixture without a separate cone. In such cases, the flange shall be formed as an integral part of the main reflector.

E. Reflector cones shall be manufactured of uniform gauge, not less than 0.032” thick, high purity aluminum, Alcoa 3002 alloy, free of spin marks or other defects or blemishes caused during manufacturing.

F. The finish on the inner surface of the reflector shall be as described in the Fixture Schedule and as produced by the Alzak process. The reflector shall have an anodic coating of not less than four mils thick. The reflector inner surface shall be free of water spotting and shall maintain a reflectivity ratio of not less than 83% on clear specular finishes. The reflectors shall have a low iridescence finish.

G. Reflector cone retention devices shall not deform the cone in any manner.

2.7 FIXTURES

A. Refer to the Fixture Schedule.

B. The finish of all fixtures and trim shall be submitted to and approved by the Architect prior to ordering.

C. All standard fixtures must bear UL label. Attaching of labels after delivery of fixtures is not acceptable.

D. All labels affixed to the fixture shall be in a location not visible from normal viewing angles.

2.8 ARCHITECTURAL COORDINATION

A. Consult Architectural Drawings for details of ceiling construction, finish, reflected ceiling plans and other applicable details and provide lighting fixtures suitable for the particular type of ceiling at each location.

B. Where fixtures are mounted in architectural coves, soffits, valances or cabinets and are given an overall length, the Contractor shall verify all lengths in the field prior to releasing fixture order.

C. Where fixtures are surface mounted or suspended to match the length of walls or other architectural elements, the Contractor shall verify all lengths in the field prior to releasing fixture order.

2.9 FIXTURE TRANSFORMERS

A. Low voltage transformers:

1. Low voltage transformers shall be core and coil construction, unless otherwise noted.

2. Primary voltage shall be as noted in Fixture Schedule, secondary voltage 12 VAC, unless otherwise noted.

3. Where transformers are integral to the fixture, they shall be accessible from below.

4. Sound rating shall be the lowest available. Replace excessively noisy transformers at no cost to the Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of lighting fixture installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 PREPARATION

A. Architectural Plans shall govern exact ceiling construction and mounting conditions for all fixtures. Contractor shall be responsible for coordination of fixture mounting and compatibility with ceiling construction.

B. Fixtures in areas where exposed or concealed pipe and ductwork prevents direct access to the structural ceiling, shall be provided with appropriate support system to suspend fixture below obstructions to avoid conflicts with same.

3.3 INSTALLATION

A. Install lighting fixtures in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

B. Contractor shall be responsible for all supports, hangers and hardware necessary for a complete installation.

C. Fixtures shall be plumb, level, square, in straight lines and without distortion. Remedy light leaks that may develop after installation of recessed or enclosed fixtures.

D. Turn over Project with all lamps in new and operating condition. Lamps that are burned less than 100 hours at Project closeout are considered new.

3.4 FIXTURE SUPPORTS

A. Physical supports:

1. Surface mounted fixtures solely supported by recessed boxes in a gypsum board ceiling shall have a 1 1/8" steel bar screwed or welded to the back of the box. This steel bar must be long enough to span two ceiling support channels and shall be attached to the channels by twisting wire around the bar and the support channel. For fixtures weighing over 50 pounds, provide fixture studs in recessed box.

2. Support surface mounted fixtures more than 18" wide at or near each corner or edge, in addition to support from outlet box.

3. Twisting wire around the bracket and two adjacent ceiling support channel runners on either side of fixture shall support recessed downlights manufactured with built-in brackets.

4. Where ceiling and/or wall construction or pipe and/or ductwork is such that mounting channels, strong-backs, trapezes, brackets, etc., are required to properly support fixtures, provide these supports under this Section, unless otherwise indicated.

5. Support outlet boxes as specified in Section 260533: Boxes. Provide all boxes with grounding pigtail.

B. Seismic supports:

1. Recessed fluorescent fixtures in suspended ceilings shall be supported by connecting two fixture support wires to the fixture at diagonal opposite corners for fixtures weighing 56 pounds or less. Connect four wires, one at each corner for fixtures weighing more than 56 pounds.

2. Surface mounted fixtures on suspended ceilings shall be attached to the main ceiling runner with at least two positive clamping devices and shall have a fixture support wire attached to each clamping device and to the structure above.

3. Recessed downlight fixtures in suspended ceilings shall be supported by connecting one fixture support wire to the fixture housing.

4. All suspended fixtures shall be able to swing 45 degrees from vertical in any direction without obstruction. Furnish suspended fluorescent fixtures with universal joint type hanger canopy and longitudinal sway adapter at each stem, to permit 45-degree swivel on 360-degree circle at canopy and 45 degree longitudinal movement at sway adapter. Submit Drawings of hanger assembly for review prior to ordering. If suspended fixture is not free to swing 45 degrees in any direction, without obstructions, provide fixture seismic restraint to prevent contact in conform to DSA IR 16-9.

5. Unless fixtures are cable hung, Contractor shall, provide for all suspended fixtures a safety wire or cable attached to the fixture and structure at each support capable of supporting four times the supported load.

6. All recessed fluorescent fixtures shall be furnished with earthquake clips where installed in tee bar ceiling.

3.5 IDENTIFICATION SYSTEM

A. All junction box coverplates for the lighting branch circuit system shall be clearly marked with a permanent black ink felt pen identifying the branch circuit (both panel designation and circuit number) contained in the box.

3.6 FIELD QUALITY CONTROL

A. Visual and mechanical inspection.

1. Inspect for physical damage, defects, alignment and fit.

2. Perform operational test of each lighting fixture after installed, circuited and energized.

3. Perform emergency operational test of all lighting fixtures connected to emergency circuiting by interrupting normal power source.

B. Contractor shall replace at no cost to the Owner all equipment which is found defective or do not operate within factory specified tolerances.

3.7 ADJUSTING

A. Field aiming: Where noted in the Fixture Schedule, the Contractor shall allow time in the bid and be responsible upon the installation of the light fixtures, for aiming and lamping fixtures as described in the fixture schedule. This aiming will occur at night under the direction of the Owner's Representative and the Architect or Engineer. The Contractor shall be responsible for providing the labor and materials for field aiming. This shall include, but not limited to, special rigging or scaffolding, adjusting fixtures in field, testing of various lamps with each fixture and/or testing of various lenses or louvers with fixtures, as directed by the Architect or Engineer.

3.8 CLEANING

A. Clean lighting fixtures prior to Project closeout in accordance with Manufacturer's recommended materials and methods.

END OF SECTION – 26 51 00

SECTION 283100

FIRE ALARM/LIFE SAFETY SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Life safety control panel (LSCP).
2. Initiating devices.
3. Notification devices.
4. Zone modules
5. Expansion panels
6. Remote annunciator panels.
7. Power supplies
8. Complete CSFM listed components
9. Fully operational
10. Pretesting and final testing.
11. DSA completion certification
12. Record Drawings.

B. Work furnish and installed under another Section, but connected under this Section:

1. Fire sprinkler alarm system flow switches, valve monitors and post indicating valves (P.I.V.).
2. Fire pump controller to monitor status.
3. Fan and fire/smoke damper control system for smoke management.

C. Work furnish and connected to life safety system under this Section, but installed and connected to HVAC system under another Section:

1. Duct mounted smoke detectors.
2. In-duct mounted smoke detectors for fire/smoke damper control. Except that wiring for damper power, control and monitoring shall be under this contract.

D. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 08: Roll-Down Doors, Door Hardware.
2. Division 23: HVAC System.
3. Division 21: Fire Sprinkler System.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. American National Standards Institute, Inc. (ANSI):

ANSI C62.41;	Guide for Surge Voltage in Low-Voltage AC Power Circuits.

2. National Fire Protection Association (NFPA):

NFPA 72;	National Fire Alarm Code with CSFM amendments
NFPA 101;	Life Safety Code.

3. California Building Code: 2013

CBC 905;	Smoke Control.

4. California Electrical Code: 2013

5. Underwriters Laboratories, Inc. (UL):

UL 38;	Manual Signaling Boxes Fire Alarm Systems.
UL 268;	Smoke Detectors for Fire Alarm Signaling Systems.
UL 268 A;	Smoke Detectors for Duct Application.
UL 464;	Audible Signal Appliances.
UL 497B;	Protectors for Data Communications and Fire Alarm Circuits.
UL 521;	Heat Detectors for Fire Protective Signaling Systems.
UL 864;	Control Units and Accessories for Fire Alarm Systems.
UL 1424;	Cables for Power-Limited Fire-Alarm Circuits.
UL 1480;	Speakers for Fire Alarm, Emergency and Commercial and Professional Use.
UL 1481;	Power Supplies for Fire-Protective Signaling Systems.
UL 1638	Visual Signaling Appliances Standard.
UL 1711;	Amplifiers for Fire Protective Signaling Systems.
UL 1971	Signal Devices for Hearing Impaired.

6. Factory Mutual System (FM) approval guide.

FM P7825	Approval Guide.

1.3 DEFINITIONS

A. Alarm signal: A signal that indicates a state of emergency requiring immediate notification of the fire department and building occupants.

B. Supervisory signal: A signal that indicates the impairment of a fire protection system, which may prevent its normal operation.

C. Trouble signal: A signal that indicates that a fault, such as an open circuit or ground, has occurred in the fire alarm system or in a separate subsystem monitored by the fire alarm system.

D. Initiating device: A system component that originates transmission of a change of state condition, which initiates an appropriate response via the fire alarm system.

E. Notification device circuit: A circuit to which notification devices are connected to visually and audibly indicate an alarm signal.

F. Signaling line circuit: A circuit to which any combination of circuit interfaces, control units or transmitters are connected and over which multiple system input signals or output signals are carried.

G. Class A wiring: A circuit that is monitored for integrity such that a single break, a single wire-to-wire short or a single loss of carrier condition will be indicated by a trouble signal on the FACP no matter where the break, short or loss of carrier condition occurs and will allow all functions of the affected circuit to remain operational. This would be Style 7 wiring for signaling line circuits.

H. Class B wiring: A circuit that is monitored for integrity such that a single break, a single wire-to-wire short or a single loss of carrier condition will be indicated by a trouble signal on the FACP no matter where the break, short or loss of carrier condition occurs, but which would prohibit devices beyond the fault, short or carrier loss from remaining operational. This would be Style 3 wiring for signaling line circuits, Style B for initiating device circuits and Style Y for notification device circuits.

1.4 SYSTEM DESCRIPTION

A. A new intelligent reporting, Style 7 networked, fully peer-to-peer, microprocessor-controlled fire detection and emergency voice alarm communication system shall be installed in accordance with the specifications and as indicated on the Drawings.

B. Each Signaling Line Circuit (SLC) and Notification Appliance Circuit (NAC): Limited to only 80 percent of its total capacity during initial installation.

C. Basic Performance:

1. Network Communications Circuit (NetSOLO) Serving Network Nodes: Wired using single twisted non-shielded 2-conductor cable or connected using approved fiber optic cable between nodes in Class A configuration.

2. Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Class B.

3. Initiation Device Circuits (IDC) Serving Non-addressable Devices Connected to Addressable Monitor Modules: Wired Class B.

4. Notification Appliance Circuits (NAC) Serving Strobes, and Speakers: Wired Class B.

5. On Class A Configurations: Single ground fault or open circuit on Signaling Line Circuit shall not cause system malfunction, loss of operating power, or ability to report alarm.

6. Transponders:

a. Operate in peer-to-peer fashion with other panels and transponders in system.

b. Each transponder shall store copy of audio evacuation messages and tones.

c. Systems that use centralized message storage and control at main fire alarm control panel shall not be acceptable.

7. Network Node Communications, Audio Evacuation Channels and Fire Phone Communications:

a. Communicated between panels and transponders on fiber optic cables.

9. Signaling Line Circuits (SLC):

a. Reside in remote transponders with associated audio zones.

b. SLC modules shall operate in peer-to-peer fashion with all other panels and

transponders in system.

c. On loss of INCC Command Center, each transponder shall continue to communicate with remainder of system, including all SLC functions and audio messages located in all transponders.

d. Systems that provide a "Degraded" mode of operation upon loss of INCC Command Center or short in riser shall not be acceptable.

10. Audio Amplifiers and Tone-Generating Equipment: Electrically supervised for normal and abnormal conditions.

11. Amplifiers: Located in transponder cabinets serving no more that 3 floors per transponder to enhance system survivability, reduce required riser wiring, simplify installation, and reduce power losses in length of speaker circuits.

12. Speaker NAC Circuits: Arranged such that there is a minimum of 1 speaker circuit per fire alarm zone.

13. Notification Appliance Circuits (NAC), Speaker Circuits, and Control Equipment: Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.

14. Speaker Circuits:

a. Electrically supervised for open and short circuit conditions.

b. If short circuit exists on speaker circuit, it shall not be possible to activate that circuit.

c. Arranged for 70 VRMS and shall be power limited in accordance with NEC

d. 20 percent spare capacity for future expansion or increased power output requirements.

15. Speaker Circuits and Control Equipment:

a. Arranged such that loss of any 1 speaker circuit will not cause loss of any other speaker circuit in system.

b. Systems utilizing "bulk" audio configurations shall not be acceptable.

16. 2-Way Telephone Communication Circuits:

a. Shall communicate digitally over the network between transponders.

b. Supervised for open and short circuit conditions.

c. Short circuit condition on 2-way telephone communications circuit shall result in trouble condition and not result in call-in condition.

17. Voice Communication:

a. Connect telephone circuits to speaker circuits to allow voice communication over speaker circuit from telephone handset.

b. Capable of remote phone-to-phone conversations and party-line communications as required.

D. Basic System Functional Operation: When fire alarm condition is detected and reported by 1 of the system alarm initiating devices, the following functions shall immediately occur:

1. System Alarm LEDs: Flash.

2. Local Piezo-Electric Signal in Control Panel: Sound at a pulse rate.

3. 80-Character LCD Display: Indicate all information associated with fire alarm condition,

including type of alarm point and its location within protected premises.

4. Historical Log: Record information associated with fire alarm control panel condition, along with time and date of occurrence. History Log shall have capacity for recording up to 4,100 events.
5. System output programs assigned via control-by-event equations to be activated by particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
    a. Close Fire Doors
    b. Shut down air handlers as required by code
    c. Notify the Central Station or Municipal Tie.
6. Strobes flash synchronized continuously.
7. Audio Portion of System: Sound alert tone followed by pre-recorded message determined by event and this scenario repeating or other message as approved by local authority until system is reset.

E. Fire Alarm System Functionality:

1. Provide complete, electrically supervised distributed, Class A networked analog/addressable fire alarm and control system, with analog initiating devices, integral multiple-channel voice evacuation, and fire fighter's phone system.
2. Fire Alarm System:
    a. Consist of multiple-voice channels with no additional hardware required for total of 4 channels.
    b. Incorporate multiprocessor-based control panels, including model E3 Series modules includes Intelligent Network INCC Command Center(s) (INCC), Intelligent Loop Interface (ILI-MB-E3 or ILI95-MB-E3), Intelligent Network Transponders (INX), communicating over peer-to-peer token ring network with standard capacity of up to 64 nodes expandable to 122.
3. Each ILI-MB-E3 or ILI95-MB-E3 Node: Incorporate 2 Signaling Line Circuits (SLC), with capacity to support in Velociti ® mode up to 159 analog addressable detectors and 159 addressable modules per ILI-MB-E3 SLC or support in Apollo mode up to 126 detectors and modules per ILI95-MB-E3 SLC.
4. Voice, Data, and Fire Fighter's Phone Riser: Transmit over single pair of wires or fiber optic cable.
5. Each Intelligent Network Transponder: Capable of providing 16 distributed voice messages, fire fighter phones connections, SLC loop for audio control devices, and integral network interface.
6. Each Network Node: Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
7. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
8. Network:
    a. Based on peer-to-peer token ring technology operating at 625 K baud, using Class A configuration.
    b. Capability of using twisted-pair wiring, pair of fiber optic Multi-mode cable strands up to 200 microns or Single-mode optimized for 9/125 microns, or any combination, to

maximize flexibility in system configuration.

9. Each Network Node:
    a. Capability of being programmed off-line using Windows-based software supplied by fire alarm system manufacturer. Capability of being downloaded by connecting laptop computer into any other node in system. Systems that require system software to be downloaded to each transponder at each transponder location shall not be acceptable.
    b. Capability of being grouped with any number of additional nodes to produce a "Region", allowing that group of nodes to act as 1, while retaining peer-to-peer functionality. Systems utilizing "Master/Slave" configurations shall not be acceptable.
    c. Capability of annunciating all events within its "Region" or annunciating all events from entire network, on front panel LCD or touch screen display without additional equipment.
10. Each SLC Network Node: Capability of having integral DACT (digital alarm communicator transmitter) that can report events in either its region, or entire network to single central station monitoring account.
11. Each Control Panel: Capability of storing its entire program, and allow installer to activate only devices that are installed during construction, without further downloading of system.
12. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.
13. Have the capacity for multiple pre-recorded messages (at least sixteen (16), but more if required by local AHJ) and address a list of subjects.
    a. Fire evacuation and relocation
    b. Intruder or hostile person sighted within or around the building grounds
    c. Directions to occupants to take cover within building
    d. Emergency weather conditions appropriate for local area
    e. All Clear

1.5 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:
    1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
    2. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
    3. Describe system operation, equipment and dimensions and indicate features of each component.
    4. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
    5. Shop Drawings shall include:
        a. Basic:
            1) Name of Owner and occupant.
            2) Address of the building.

3) Contractor’s name, address, telephone number and license number.

b. Symbols legend.

c. Equipment list showing quantity, make, model and CSFM listing number for each device.

d. Wire and cable schedule.

e. Scope of Work with overall system description.

f. Sequence of operation matrix with system inputs signals and output functions.

g. Code summary and Building type.

h. Assignment of Class and/or Style designation for device circuits.

i. Plot plan and floor plans of building with partitions, walls and room identification, showing locations of each device and control/monitoring equipment, communication equipment, conduit routing and size and cable/conductor type and quantity. Field devices shall all have a discrete identification designation located adjacent to each device on the Drawings.

j. Point-to-point wiring diagram in block or riser format showing all fire alarm components, device designations, conduit, wire types and sizes.

k. Provide 1/4" scale plan of equipment layout in main fire control room.

l. Include elevations of control panels, fireman’s fan and damper control panel, voice communications panel, graphic annunciator panel and remote annunciator panel.

m. Overall description of smoke control system based on Smoke Control Report, developed by others.

n. Smoke control operation matrix by individual initiating device for fan and damper control/monitoring as well as ancillary equipment controlled.

o. Elevation indicating mounting heights for manual pull stations, audible and visual devices and combination audible/visual devices.

p. Rated penetration details.

q. Typical wiring diagram details of field devices.

r. Detector mounting details at HVAC ducts.

s. Battery standby calculations showing total standby power needed to meet the specified system requirements.

t. Voltage drop calculations for system wiring circuits.

6. Furnish structural calculations for equipment anchorage as described in Section 260010: Basic Electrical Requirements.

7. Submit Manufacturer's installation instructions.

8. Complete bill of materials listing all components.

9. Provide California State Fire Marshal ‘CSFM’ listing sheet for each device.

10. Warranty.

B. Contractor shall submit approved Shop Drawings for review by State/Local Fire Marshal prior to the purchase and installation of equipment. Provide quantities of Drawing sets as required by jurisdiction. Drawings shall be wet stamped and signed by a registered professional Engineer.

C. Record Drawings:

1. Furnish Record Drawings as described in Section 260010: Basic Electrical Requirements, utilizing Shop Drawing submissions with updated field conditions. These Drawings shall include but not be limited to the following:
    a. Plot plans and building floor plans, showing point-to-point wiring location of and conduit routing to all devices.
    b. Block diagram/riser diagram showing the LSCP, system components and all conduit and wire type/sizes between each.
2. Drawings shall be incorporated into the Record Drawing submission.
3. Final acceptance will not be made until the Engineer has approved the Record Drawings.

1.6 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:
    1. A detailed explanation of the operation of the system.
    2. Instructions for routine maintenance.
    3. Pictorial parts list and part numbers.
    4. Schematic Drawings of wiring system, including all initiation and annunciation devices, control panel, annunciators, communication system, fan control system, printer/terminal, etc.
    5. Telephone numbers for the authorized parts and service distributors.

1.7 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Fire alarm/life safety system components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.9 WARRANTY

A. Units and components offered under this Section shall be covered by a *1* year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

B. The warranty package shall include, but not be limited to the following:
    1. Emergency maintenance service.
    2. Service by factory trained service representative of system Manufacturer.
    3. Replacement of any defective components.

1.10 SYSTEM START-UP

A. Upon completion of installation, a factory trained dealer service representative shall perform initial start-up of the fire alarm/life safety system. Sufficient time shall be allowed to properly check the system out and perform required minor adjustments before the Engineer's witnessed test shall begin.

1.11 MAINTENANCE

A. Extra Material:

1. Provide the following fire alarm system components as extra materials, matching the products installed and packaged for storing.

a. Manual pull station: Furnish a quantity equal to 10 percent of the number installed.

b. Detectors: Furnish a quantity equal to 10 percent, for each type, of the number installed.

c. Strobes and Speaker/strobes: Furnish a quantity equal to 10 percent of the number installed.

d. Speakers: Furnish a quantity equal to 10 percent of the number installed.

B. Maintenance Service:

1. For a period of one year following acceptance the equipment Supplier shall have a person(s) familiar with this Project attend four quarterly meetings with the Owner's Representative to review system performance, operation and any system problems. That person shall provide a written summary of the items discussed in each meeting and a schedule of when the system problems will be corrected. The report is due within 7 working days after each meeting.

2. During the eleventh month following system acceptance, on a weekend day, the equipment Supplier shall perform a complete test of the system, in a manner similar to the acceptance test. A written report shall be submitted to the Owner certifying that each initiating device has been tested. A copy of these test forms shall be submitted to the Engineer for review and acceptance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturer shall be provided per the districts standards.

1. Gamewell/FCI.

B. Substitutions: Substitutions will not be accepted.

2.2 FIRE ALARM AND DETECTION SYSTEM

A. Control panel:

1. The panel shall comply with applicable requirements of UL864 and shall provide power, annunciation, supervision and control for the complete fire alarm system. The panel shall be modular in construction, installed in a surface mounted steel cabinet with hinged door and cylinder lock, containing all modules necessary to operate as indicated herein.

2. Addressable devices shall be individually identified by the system and any quantity of addressable devices may be in alarm at any time up to the total number connected to the system.

3. The panel annunciator shall be a minimum of a 80 character alphanumeric display, which shall provide a user definable custom message associated with each detection device or zone.
4. Dynamic supervision of system electronics, wiring, initiating devices and software shall be provided by the control system. Failure of system hardware or wiring shall be indicated by type and location on the alphanumeric annunciator. Software and processor operation shall be monitored by a independent hardware watchdog, which will indicate their failure. The panel shall provide failsafe operation, i.e. all incoming alarms shall override all other modes of operation.
5. Provide a service mode to permit the arming and disarming of individual initiating or output devices as well as manually operating output devices. Status of these devices shall be displayed upon command from the control panel. The panel shall automatically return to the normal mode in the event the panel remains unattended in the service mode.
6. The panel shall be capable of measuring and adjusting the sensitivity of addressable detectors upon request. An alphanumeric display shall be provided to display custom messages and give readings of detector sensitivity detector by detector. Each device on an addressable initiating circuit shall be checked continuously to include the following:
    a. Sensitivity.
    b. Response.
    c. Opens.
    d. Shorts.
    e. Ground faults.
    f. Functionality.
    g. Status.
7. The panel shall monitor the addressable smoke detectors in such a manner that if the detectors become dirty and reach and maintain 80% of alarm threshold for five (5) consecutive hours, a trouble condition indicating exactly which device needs service shall be automatically annunciated. If the device becomes too insensitive for a period of 10 seconds, the trouble indication will read: "Input device response too low."
8. The panel shall report, by specific device number, any device removed from an addressable initiating circuit and all other devices shall continue to function.
9. The panel shall automatically indicate the total quantity of alarms and troubles that have occurred prior to reset at the control unit.
10. No alarm or trouble indication shall be resettable until it has been acknowledged. It shall not be possible to reset the system until all alarms have been acknowledged.
11. The panel shall be capable of:
    a. Counting the number of addressable devices within a designated area or "zone" which are in alarm.
    b. Counting "zones" which are in alarm.
    c. Counting the number of addressable devices which are in alarm on the system.
    d. Differentiating among types of addressable devices such as smoke detectors, manual stations, water-flow switches and heat detectors.
    e. Assigning priorities to types of devices, zones or groups of devices.

f. Cross-Zoning.

12. Each addressable device shall report its condition to the panel control unit every three (3) seconds in a manner such that failure of the connections to or internal electronics of the device will result in a trouble signal that identifies the specific device involved.

13. The panel shall also be capable of operating non-addressable Class A or B initiating circuits.

14. Alarm and trouble from non-addressable initiating circuits (zones) shall be annunciated and cause output functions in the same manner as addressable detection devices including a location message for each zone.

15. Panel output circuits shall be supervised and capable of providing 1.5 amp at 24 VDC.

16. Provision for programmable control relays in panel shall be included having dry contacts rated 120 VAC, 5 amp inductive.

17. Programmable remote relays shall be controlled in the same manner as panel mounted relays.

B. Initiation/notification modules:

1. All modules shall be plug-in, dynamically supervised and easily replaceable. Field wiring shall be connected to the panel with removable multi-conductor connectors to facilitate rapid removal and replacement of both the module and wiring for ease of serving the panel. The modules shall be system interconnected by a card edge connector.

2. Provide zone input addressable modules for monitoring non-addressable initiating circuits.

3. Provide programmable signal modules on output circuits for operation of DC audible devices.

4. Provide, as needed, programmable supplementary relay modules containing four independent relays fitted with form "C" contacts, rated at 120 VAC, 5 amps inductive.

C. Printer/terminal:

1. The control panel shall support one printer/terminal. This terminal shall be used for permanent records of the Control Panel status and detector chamber voltages and shall also be capable of system control as configured. The printer/terminal shall interface to the control panel via a 20ma supervised serial loop shielded cable.

2. The printer (and the terminal) shall be capable of listing, upon request, all functions indicated at panel digital annunciator.

D. Power supply: Emergency generator feed adequate to serve panel modules, initiating devices, annunciating devices, remote annunciators, door hold-open/closure devices, roll-down fire doors or shutters, fire/smoke dampers. All power connections whether AC or DC shall be separately fused within panel.

E. Uninterruptible power supply (batteries):

1. Provide an uninterruptible power source for all volatile system components including control panel, peripherals and remote annunciators. Power source shall consist of but not be limited to all necessary conduit, wire, outlets, transformers, panels and connections to each piece of equipment as required.

2. Uninterruptible power shall be required such that loss of power shall not cause the system operator to be required to restart the system or any part thereof upon return of power. The uninterruptible power supply shall be NFPA approved for applications and shall provide a 24 hour backup of the system; an then, at the end of that period, operate all alarm indicating devices used for evacuation for 30 minutes.

3. Provide a dual rate battery charger capable of recharging batteries to 80% capacity in 8 hours.

F. Remote station signal transmitter: Electrically supervise, capable of transmitting alarm and trouble signals over telephone lines to remote monitoring station receiver.

G. Auxiliary relays: Provide sufficient SPDT auxiliary relay contacts for each initiating device zone to provide accessory functions specified.

2.3 ADDRESSABLE INITIATING DEVICES

A. Manual pull stations: Shall conform to the applicable requirements of UL 38. Addressable manual stations shall be connected into addressable initiating circuits. Stations shall be dual action type. Stations shall be finished in red, with raised letter operating instructions of contrasting color. Control panel shall monitor the station by address and function. The use of a key or wrench shall be required to reset the station. Stations shall have a separate screw terminal for each conductor and be capable of field programming for its "address" location on a initiating circuit.

B. Heat detectors: Shall conform to the applicable requirements of UL 521. Addressable detectors shall be electronic designed for detection of fire by combination fixed temperature and rate-of-rise principle. Detectors shall be connected into addressable initiating circuits. All electronics shall be contained within detector head and shall plug-in to terminal base. Detector shall be field programmable and contain external indication that is readily visible. The detector shall be dynamically supervised and individually identified by LSCP, as well as sensitivity adjustable. Rating for fixed temperature portion shall be 135 degrees F. Detectors shall have screw terminals in base for making all wiring connection.

C. Smoke detectors: Shall conform to the applicable requirements of UL 268:

1. Photoelectric detectors: Addressable detectors shall be electronic designed for detection of abnormal smoke densities. Detectors shall consist of separate transmitter and receiver units. The transmitter unit shall emit an infrared beam to the receiver unit. When the signal at the receiver falls below a preset sensitivity, the detector shall initiate an alarm. The receiver shall contain an LED that is powered upon an alarm condition. Long-term changes to the received signal caused by environmental variations shall be automatically compensated. Detectors shall be connected into addressable initiating circuits. All electronics shall be contained within detector head and shall plug-in to terminal base. Detectors shall be field programmable and contain external indication that is readily visible. The detector shall be dynamically supervised and individually identified by LSCP, as well as sensitivity adjustable. Detectors shall have multiple sensitivity settings in order to meet UL listings for the different distances covered by the beam. Detectors shall have screw terminals in base for making all wiring connections.

2. Duct smoke detectors: Addressable detector shall have a duct housing, mounted exterior to the duct and with perforated sampling tubes. Activation of a detector shall cause shutdown of the associated air-handling unit via auxiliary contact base. Detectors shall be rated for the air velocity to be expected.

3. In-duct smoke detector: Addressable detector shall have external mounted box with relay output, remote test station with LED status indicator and keyed test switch and sensor head mounted within duct. Activation of detector shall cause associated fire/smoke damper to close via auxiliary relay base.

D. Interface modules: Addressable interface module shall be connected into addressable initiating circuits. This device shall be used for interfacing normally open or normally closed direct shorting contact devices to an addressable initiating circuit (i.e. waterflow, tamper switches, non-addressable initiating devices, etc.). Module shall be dynamically supervised and individually identified by LSCP.

E. Programmable relay modules: Addressable interface module containing a programmable control relay with contacts rated at 2.0 amps at 30VDC, 0.6 amps at 120 VAC.

2.4 NOTIFICATION DEVICES

A. Speakers, strobes and combination speaker strobes:

1. These units shall be mounted flush in all finished areas and surface mounted in unfinished equipment areas. White enamel grill for units mounted in finished (public) areas; red for units mounted in unfinished (mechanical) areas.

2. Maximum loading: The loading on both the strobe and audio circuits shall not exceed 75% of its rated capacity. Verify that strobe in-rush currents are safely within the maximum rated capacity of the circuit.

3. Speaker: Wall or ceiling mounted units shall include a blocking capacitor for line supervision and screw terminals for in and out wiring. The back of the speaker cone shall be covered to protect the cone from damage and dust. The speakers shall operate over a frequency range of 400 - 4000Hz and shall have field selectable power taps of 1/8 to 8 watts with sound output up to 92dBA at 10 feet measured per UL standard 1480 when set on the 8 watt tap. Speaker shall be rated for operation on a 70.7-volt audio system.

4. Strobe: Wall mounted units shall incorporate 15, 30, 75, 110 candela strobe lights that flash once per second with 24 VDC input with a maximum current draw of .088 amps.

5. Strobe/speaker: Wall mounted units with speaker Specifications listed above and shall incorporate 15, 30, 75, 110 candela strobe lights that flash once per second with 24 VDC input with a maximum current draw of .088 amps.

6. Remote power supplies for strobe circuits:

a. Provide quantity of remote power supplies required for system. Power supplies shall be mounted in hinged NEMA 1 enclosures, maximum 24" wide, with locking handle and the following items:

1) Back-up emergency batteries, sized per NFPA standards. Provide separate enclosure for batteries if required to prevent damage from corrosive gases.

2) Provide a automatic dual rate (high rate and float charge) battery charger capable of recharging batteries to 80% capacity in 8 hours. The charger output shall be supervised and fused.

3) Supervised programmable relays or network interface module to control strobe lights on a floor-by-floor basis.

b. Power supplies shall be connected to emergency power 120 VAC circuits.

c. If the power supply loses AC power, a system trouble shall occur.

d. Locks shall be keyed the same as all other life safety panels.

B. Bells: Shall be 6 inch10 inch surface mounted with matching mounting back box. Bells shall be of vibrating type, suitable for use in an electrically supervised circuit. Bells shall be the underdome type producing a sound output rating of at least 84 dBA87 dBA at 10 feet. Bells used in exterior locations shall be specifically listed or approved for outdoor use and provided with metal housing and protective grilles.

C. Fireman’s remote LCD annunciator: Shall have a two line by 40-character LCD display. Dedicated LED lamps shall light upon activation of any alarm, supervisory or trouble condition and a tone-alert shall sound. The backlit alphanumeric liquid crystal display (LED) shall indicate type of alarm, number of alarms, supervisory conditions and troubles in the system and a custom location designation. Annunciator shall include control switches for system acknowledgments, alarm silence and system reset. Information is transmitted to the annunciator over a single twisted, shielded pair cable. Annunciator shall be flush mounted in NEMA 13R enclosure for interior applications.

D. Remote graphic annunciator: Shall have a plan viewelevation of each building. A lamp indicated in its relative position in the building shall indicate each zone. Three individual lamps shall be provided for each zone and shall illuminate for an abnormal condition in that zone. Lamps shall be red for alarm condition; blue for supervisory condition and amber for trouble condition. Plan views shall be approximately to scale and in no case smaller than 12 inches15 inches in length or width. Annunciator shall have a door with piano hinge and two point cylinder lock or two cylinder locks. Lock shall be open using the same key as the control panel. A lamp test switch shall be provided. Annunciator shall be flush mounted.

E. Life safety command center annunciator:

1. Provide a surface mounted panel, sized as required to contain the following features:
    a. Graphic silk-screened representation of the buildings in vertical cross-section.
    b. LED indicating lights that shall illuminate the respective floor's LED indicator light for an occurrence in that building:
        1) System trouble. Illuminates on any component failure or abnormal condition for both the fire alarm and communication systems. (Yellow LED, only on floors with equipment.)
        2) Sprinkler Waterflow. (Blue LED)
        3) Smoke Detector. (Red LED)
        4) Duct Smoke Detector. (Red LED)
        5) Manual Pull Station (Yellow LED)
        6) Annunciation Devices Activated. (Green LED)
        7) Tamper Valve or PIV. (Blue LED)
        8) Fire Pump Running (Yellow LED)
        9) Fire Pump Trouble. (Yellow LED)
        10) Jockey Pump Running (basement floor only) (Yellow LED)
        11) Generator Running (Yellow LED)
        12) Generator Trouble (Red LED)
        13) Public Emergency Phone Activated. (Yellow LED)
    c. Sonalert Horn.
    d. Lamp test pushbutton.
    e. Horn silence pushbutton. This pushbutton shall be momentary type and shall allow a subsequent alarm to ring the horn again. On/off switch is not acceptable.
    f. Black silk-screened lettering describing the function of each device and light.
    g. Brush stainless steel faceplate with continuous piano hinge to access wiring compartment and 1/4 turn captive fasteners.
    h. Annunciator shall be UL and CSFM listed.
2. This annunciator shall annunciate alarm and trouble conditions it shall not contain any control capability over the fire alarm and communication system. All system horn silence and acknowledge shall be performed at the control equipment itself.
3. All control power shall be battery backed up and originate from the life safety control panel.

2.5 AUXILIARY EQUIPMENT CONTROL AND SUPERVISION

A. Under this Section, provide connections to the following equipment to activate control sequence of operation:

1. Fire sprinkler system components: Provide a pair of wires from a remote mounted addressable interface module (2'-6" maximum wire length) for each of the following devices:

a. Each waterflow switch to initiate a alarm signal.

b. Each valve monitor switch (tamper switch) to initiate a trouble signal.

c. Each P.I.V. to initiate a trouble signal.

d. Fire pump to initiate a trouble signal for fire pump "running", "loss of power," and "phase reversal."

2. Door hold-open/closure devices: Provide a pair of wires from a set of dry contacts in the LSCP or remote mounted programmable relays to each door hold-open/closure device for power to and release of doors.

3. Roll-down fire doors and shutters: Provide a pair of wires from a set of dry contacts in the LSCP or remote mounted programmable relays to each roll-down fire door or shutter for release of door.

4. Building energy management system (EMS) interface: Provide a pair of wires from a set of dry contacts in LSCP or remote mounted programmable relays to EMS system control panel. Contacts shall be normally closed and shall open upon any alarm condition.

B. Fire/smoke dampers: Provide the following at FLCP for manual override control and annunciation of each smoke management damper:

1. Three position (open-auto-closed), heavy-duty, industrial grade control switch for damper control as follows:

a. The "OPEN" and "CLOSED" modes shall override the normal operation of the HVAC control system.

b. The "AUTO" mode shall be used for normal damper operation when not in override mode.

2. LED indicator lights shall be provided adjacent to each control switch for status annunciation as listed below. Provide wiring and panel or remote mounted interface/relay modules for each damper controlled. "Open" and "Closed" indication shall be via connection to end switches furnished by Division 23.

a. Green = "OPEN"

b. Yellow = "CLOSED"

c. Red = "OVERRIDE" (at LSCP)

3. Provide graphic quality lettering on engraved nameplate to identify each switch and LED light.

2.6 LIFE SAFETY COMMUNICATIONS AND PUBLIC ADDRESS SYSTEM

A. System operation:

1. Provide a modular, fully supervised, zone selective voice communication system in the Life Safety Command Center Room. The page alarm system shall be utilized for automatic pre-recorded voice signaling and manual voice override paging.

2. Output zones shall be as follows:

a. One zone for each building.

b. All call (includes all zones).

3. All zone selector switches shall be toggle type with adjacent on/off LED light and clearly identified by floor, elevator or stairwell number.

4. Manual override via the hand-held microphone shall take priority over any and all alarm signals to assure communication of one-way voice instructions.

5. "Phone Patch" control shall be provided for the firefighter in control to allow voice instructions to be initiated from any remote fireman's telephone.

B. Communication amplifiers:

1. The unit shall be solid state complete with microphone and volume control.

2. The total harmonic distortion shall be less than 2% at 100% of rated output.

3. Amplification equipment shall be sized to provide sufficient power to drive one speaker per 1,000 square feet of building area on each floor with the speakers set on a wattage tap that allows 15dB above the ambient noise level in all areas of a normal 45dB office environment. Plus an additional 25 percent per amplifier. I.E. provide amplifiers rated for the maximum number of speakers possible in the building plus 25 percent spare capacity.

4. Provide output terminals mounted on a heavy-duty terminal strip for making all required connections.

5. Outputs shall be compatible with multi-tap speakers as required.

6. Electronic circuit protection shall be incorporated in the amplifier that provides automatic limiting against short circuits and overloads on its outputs. A thermostatic control shall protect the amplifier from operation at excessive temperatures and a circuit breaker for overcurrent protection shall be provided.

7. The front panel of the amplifier shall have a power indicator and a thermal overload indicator.

8. The amplifier shall operate from a 105 - 125 volt 60 Hz power source.

9. The unit shall be ruggedly constructed, temperature stable and be capable of operating in ambient temperatures ranging from -20 degrees C to +55 degrees C. The power transformers shall be heavy duty, fully enclosed and designed for continuous operation. The chassis shall be heavy-gauge steel with a perforated enclosure and both shall be finished in low luster black enamel.

10. Provide speaker zone supervision such that any zone in "trouble" shall be annunciated at the remote annunciator and the printer.

11. The amplifiers shall be mounted in the Life Safety Command Center Room.

12. Amplifiers shall be provided in 120 or 250-watt RMS increments at 70VRMS output voltage levels. Amplifiers shall be continuously supervised and be configured for single channel operation and redundancy for backup. All amplifiers shall have 60 to 15 KHz frequency response and be equipped with a battery saver feature to minimize supervisory current drain when operating on the 24VDC standby batteries.

13. Each speaker circuit shall be electrically supervised for opens and ground faults in the wiring and for short circuit faults on the speaker circuit wiring and shall be so arranged that a fault condition in any circuit or groups of circuits will not cause an alarm to be sounded. A short circuit on the speaker circuit wiring will automatically disconnect only the affected circuit thereby insuring the integrity of all other speaker circuits to receive an alarm signal and protect the system amplifiers, pre- amplifiers and taped voice or tone generators. The occurrence of any fault will light a trouble LED and sound the Sonalert but will not interfere with the proper operation of any circuit that does not have a fault condition. Initiating and

speaker circuits shall be wired using Class B supervised circuits (a break or ground fault in any conductor will be reported as a trouble condition).

14. Digital message repeater module (DRM) shall be provided for a pre-recorded general instruction message. The standard operating sequence shall be thirty seconds of alarm tone, followed by a 30 - 60 second digitized general instruction message. After the message is sent or has been interrupted by the hand-held microphone, before the tape message is completed or failure of the MRM, the alarm tone will again sound continuously until the system is reset or the tone silenced. The DRM will be supervised for EPROM memory and general status. Message shall be settable to be continuous repeatable or 1 - 3 times.

15. Redundant tone generators (RTM) shall be provided for alarm and auxiliary tone generation (slow whoop). RTM's shall be continuously supervised for operation and placement.

C. Remote switch bank and microphone panel:

1. Provide push-to-talk override microphone for life safety paging.

2. A bank of switches shall be provided within reach of the microphone for selective paging of each zone and a complete building page.

3. Provide a means for each toggle switch to accept an identification tag in the faceplate. Provide graphic quality lettering or Kroy lettering on each I.D. tag. Do not hand letter.

4. The microphone and switches shall be mounted in a panel on the wall in the Administration building.

2.7 VOICE COMMUNICATION BACK-UP POWER SUPPLY (BATTERIES)

A. Provide a back-up power source for all system components including but not limited to, amplifiers, digital message units and microphone circuits. Power source shall consist of but not be limited to all necessary conduit, batteries, wire, outlets, transformers, panels and connections to each piece of equipment as required.

B. Back-up power shall be required such that loss of utility power shall not cause the system operator to be required to restart the system or any part thereof upon return of power. The back-up power supply shall be NFPA approved for life safety applications and shall provide a 4-hour backup of the maximum load possible on the system as required by NFPA 72.

C. During power failure the amplifiers shall be automatically shut off to minimize drain on batteries but will turn on automatically during alarm or manual activation.

D. Provide a automatic dual rate (high rate and float charge) battery charger capable of recharging batteries to 80% capacity in 8 hours. The charger output shall be supervised and fused.

E. If the system loses AC power, a system trouble shall occur.

F. A solid-state power transfer circuit that shall switch to standby power automatically and instantaneously if normal power fails or falls below 15% of normal ("brown out" conditions). This electronic circuit shall allow the batteries to be effectively "floated" on the operating system to avoid upsetting the normal microprocessor scan and minimize resultant nuisance troubles and/or alarms.

2.8 LIFE SAFETY COMMAND CENTER

A. The life safety remote annunciator shall be the operations center for fire fighter's and shall consist of the following:

1. Public address system and microphone.

2. Firefighter's and public emergency telephone communication system and remote handset cabinet.

3. Fire alarm detection and control panel as well as graphic annunciator.

4. Controls and annunciation for all auxiliary equipment control.
5. Telephone for fire departments use with access to public telephone system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of fire alarm/life safety system installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 INSTALLATION

A. General:

1. Install fire alarm/life safety system in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.
2. The 120/208-volt, 3 wire, 60 cycles AC emergency power supply required to power the system. Connect to red colored circuit breaker(s) in panel board. Identify circuit as "Fire Alarm Circuit Control".

B. Wiring:

1. Refer to Section 260519: Building Wire and Cable.
2. Individual input and output device addressability as well as remote sensitivity measurement, supervision and power shall all be performed on the same pair of wires. Wiring shall be Class B.
3. Each Class B initiating circuit shall consist of a two (2)-wire circuit, allowing multiple T-taps and not requiring any end-of- line device for supervision. Each initiating circuit shall accommodate up to thirty (30) addressable programmable initiating devices. On the initial installation, only 21 devices are to be allowed per circuit to allow for future expansion.
4. Wiring for shielding certain conductors from others or routing in separate raceways, shall be as recommended by the Manufacturer's current requirements.
5. All cabling when concealed above accessible ceiling can be routed free air and supported every 48" in J-Hooks. J-hooks shall be sized for a maximum 40% fill and shall be color coded red, and not used for any other cable.
6. J-hooks shall be supported by independent 12 gauge steel wire or directly to building structure. Support to other disciplines support structure such as electrical conduit, mechanical ducting, ceiling wire, ATR, unistrut etc... will not be accepted and will require the contractor to install an independent support system.
7. All wiring shall be installed in a steel conduit when in exposed areas, and through walls and shall be of the size recommended by the equipment Supplier. Wire color-coding shall remain the same throughout the system.
8. No wiring other than that directly associated with life safety/fire alarm detection, alarms or auxiliary fire protection functions (no 120 VAC), shall be permitted in life safety/fire alarm support systems and pathways.
9. Make conduit and wiring connections to sprinkler flow switches, PIV's, sprinkler valve monitors, door hold-open/closure devices, smoke management fans, smoke dampers, fire pump controller, etc.
10. All wiring shall be checked and tested to ensure that there are no grounds, opens or shorts.
11. All life safety/fire alarm junction boxes shall be color-coded and marked per Section 260553: Electrical Identification.

12. Wire nut splices are not allowed.
13. Wires shall be numbered at each connection, termination and junction point. Wire numbering tags shall be Brady Perma-Code, Westline or equal wire makers. Each group of wires shall be tagged with its destination at each panel, terminal box or junction box.
14. All wire used on the life safety/fire alarm and communication system shall have a minimum insulation rating of 105 degrees C. Bell wire or thermostat wire is not acceptable.

3.3 FIELD QUALITY CONTROL

A. Refer to Specification Section 260800: Electrical Commissioning.

B. Manufacturer's field service: Contractor shall arrange and pay for the services of a factory-authorized service representative to supervise the initial start-up, pretesting and adjustment of the fire alarm/life safety system.

C. Independent testing: Contractor shall arrange and pay for the services of an independent Testing Agency to perform all quality control electrical testing, calibration and inspection required herein. Testing Agencies objectives shall be to:

1. Assure fire alarm/life safety system installation conforms to specified requirements and operates within specified tolerances.
2. Field test and inspect to ensure operation in accordance with Manufacturer's recommendations and Specifications.
3. Prepare final test report including results, observations, failures, adjustments and remedies.
4. Apply label on fire alarm/life safety system control panel upon satisfactory completion of tests and results.
5. Verify settings and make final adjustments.

D. At least three weeks prior to any testing, notify the Engineer so that arrangement can be made for witnessing test, if deemed necessary. All pretesting shall have been tested satisfactorily prior to the Engineer's witnessed test.

E. Prefunctional testing:

1. Provide Testing Agency with Contract Documents and Manufacturer instructions for installation and testing.
2. Visual and mechanical inspection:
    a. Inspect for physical damage, defects alignment and fit.
    b. Perform mechanical operational tests in accordance with Manufacturer's instructions.
    c. Compare nameplate information and connections to Contract Documents.
    d. Check tightness of all control and power connections.
    e. Check that all covers, barriers and doors are secure.
3. Electrical tests:
    a. The system shall be completely tested prior to final acceptance testing. All points shall be tested from point of initiation to the final point or points of annunciation. All circuits shall be tested for continuity and ability to transmit the required signal correctly to the LSCP. Any problem due to wrong wire type, wire twist, impedance, mismatches, noise filtering or shielding shall be completely corrected during pretesting and prior to any final acceptance tests.

b. Testing shall include each and every device in the system. Coordinate with other trades as necessary for testing.

1) Sprinkler flow switches: Record time delay from water flow to alarm and adjust as necessary for a 30-50 second delay.

2) Tamper switches: Verify "trouble "signal is received and alarmed on closing of each valve.

3) Smoke detectors and duct smoke detectors: Test with actual or approved artificial smoke. Verify that reset does not occur when devices are cleared of smoke. Verify supervisory circuit function. Perform pressure differential test on all duct-mounted smoke detectors.

4) Door release: Verify that proper alarm activates every held-open door, roll-down doors and shutters, to ensure doors close completely to the closed position.

5) Elevator recall: Verify that elevators recall to designated floor by testing elevator lobby detectors with smoke. This is necessary on the ground floor and one other only.

6) Firefighter's phone: Verify that each phone jack and supervisory circuit is fully operational and annunciates properly at the paging panel in the Life Safety Command Center Room.

7) Public emergency phone: Verify that each phone is operative and annunciates properly at the paging panel at the remote annunciator panels.

8) Voice communication systems: Verify that each building and/or floor can be selected.

9) Tone and prerecorded message generation: Activate by means of an alarm initiating device on each floor and verify that they are clearly audible in all occupied spaces including elevator lobbies, toilets, core areas, stairwells, mechanical rooms and garage. Adjust power taps at speakers to obtain proper +15 dBA level above ambient noise. Verify the override capability of the microphone paging system.

10) FFCP: Verify correct fan and damper control and status annunciation for each life safety fan and damper.

11) Central station notification: Verify that one set of conductors in the terminal cabinet becomes a short circuit on any "trouble" condition and that the other set becomes a short circuit on any "alarm" condition. Verify that the conductor groups are labeled properly.

12) Printer and remote annunciators: Verify that all alarm and trouble conditions print on the printer and annunciate at the remote annunciation panels.

13) Emergency generator power, fire pump and jockey pump status: Verify these annunciate their respective "Trouble" and "Running" conditions.

c. Test Report:

1) Provide a complete report listing every device, the date it was tested, the results and the date retested (if failure occurred during the previous test). The test report shall indicate that every device tested successfully.

2) Submit two typed copies of the test report on 8- 1/2" x 11" paper in a neatly bound folder to the Engineer for approval. Failure to comply with this will result in a delay of final testing and acceptance.

F. Functional performance testing:

1. Refer to Specification Section 260800: Electrical Commissioning for requirements of system wide functional performance testing.
2. After the approval of the test report, provide a schedule of final testing to be done in the presence of the Fire Marshal and Owner's Representative. The schedule must be received by the Engineer a minimum of 2 weeks prior to the Final Test Date and must list the dates and time slots in which the various systems can be tested.
3. Coordination of the Final Test dates with all parties (General Contractor, Mechanical Contractor, Electrical Contractor, Owner and others) shall be the sole responsibility of the Contractor. If a party is required to be present during any phase of testing to activate a device, ensure that the party or a qualified representative of the party is present throughout that phase of the testing.

G. In the event that the system fails to function properly during the testing as a result of inadequate pretesting or preparation. The Contractor shall bear all costs incurred by the necessity for retesting including test equipment, transportation, subsistence and the Engineer's hourly rate.

H. Contractor shall replace at no costs to the Owner all devices which are found defective or do not operate within factory specified tolerances.

I. Contractor shall submit the Testing Agency's final report to the Engineer for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies and remedies. Test report shall be included in the operation and maintenance manuals.

3.4 TRAINING

A. Refer to Specification Section 260800: Electrical Commissioning.

B. Factory authorized service representative shall conduct a 4 hour training seminar for Owner's Representatives upon completion and acceptance of system. Instructions shall include safe operation, maintenance and testing of equipment with both classroom training and hands-on instruction.

C. Contractor shall schedule training with a minimum of 7 days advance notice.

END OF SECTION – 26 61 13

SECTION 266516

INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Main controller/communicator panel.
2. Enclosures
3. Lock and Key
4. Power Supplies
5. Accessories required to provide a complete DACS
6. Passive infrared detector “PIR.”
7. Glass Break Detectors
8. Digital keypad arming/disarming stations.
9. Remote terminal cabinets.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1. Division 08: Door Hardware.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Underwriters Laboratories, Inc. (UL):

UL 13;	Power-Limited Circuit Cables.
UL 294;	Access Control System Units.
UL 603;	Power Supplies for Use with Burglar-Alarm Systems.
UL 639;	Intrusion-Detection Units.
UL 1076:	Proprietary Burglar Alarm Units and Systems.

2. Electronics Industries Alliance (EIA):

EIA:	Testing standards.

1.3 SYSTEM DESCRIPTION

A. General requirements:

1. Provide a complete security alarm monitoring/keypad access control system as described herein.
2. The system shall provide intrusion alarm notification via web IP address for motion detection within the building. Keypads shall arm and disarm the building system.

3. The system shall comprise all necessary supervision, processing, display and printout circuitry and/or devices.
4. The system shall comprise redundant circuitry to ensure that no single independent failure of any component or component group shall cause consequential failure of the system.

B. System overview: A functionally complete, integrated Digital Alarm Communicator System (DACS) per manufacturer's guidelines, codes and specification requirements.

1. The DACS shall include a Control Panel with built-in, supervised telephone line interface.
2. The DACS shall include recording and retention of event information in a dedicated event log.
3. The DACS shall incorporate an integral real-time clock, calendar, and a test timer.
4. The DACS shall incorporate battery charging capabilities with supervision of battery voltage and battery leads.
5. The DACS shall accommodate a time / event-based scheduling system.
6. The DACS shall be capable of supervision of peripheral devices and communications interfaces.
7. The DACS shall support the connection and reporting of intrusion, fire detection and access control devices to a remote Digital Alarm Communicator Receiver (DACR).
8. The DACS shall accommodate configuration and operation of separate, independent areas.
9. The DACS shall accommodate hard-wired or wireless point expansion via expansion point interface modules and RF receivers.
10. The DACS shall have electrically supervised detection loops and power supplies with battery(s) maintenance. This supervision shall be programmable for the purposes of reporting this information to the DACR.
11. The DACS shall be capable of monitoring and switching to active telephone lines when trying to establish communications with the DACR and transmitting a report.
12. The DACS shall be capable of sending (manually or automatically) test and status reports to remote DACRs.
13. The DACS shall be able to accommodate test, diagnostics, and configuration programming functions locally or remotely via a portable programmer or a computer running the Remote Programming Software (RPS).
14. The DACS shall annunciate alarm, trouble, service reminders, and other relevant system status messages in custom English text at the ACC.
15. Glassbreak sensors shall be installed at all exterior glass in all interior spaces indicated on the Drawings.
16. Flush mounted magnetic contact switches will be provided on all exterior doors to monitor and annunciate “open,” “closed,” ‘forced,” and “held” positions.
17. Both passive infrared detectors and door position switches shall transmit an alarm condition when the buildings are "armed" and system is violated.
18. Keypads shall be installed at each common building to provide individual zone control of a building. Keypads shall allow access to programmed zones via a 1 to 5 digit access code. They shall be capable of "disarming" or "arming" functions. A delay feature shall be built into the system to provide personnel sufficient time to disarm system upon entering a building prior to activation of an alarm sequence.

19. The monitoring and control panel shall include a programmable microprocessor and related circuitry capable of interpreting signals from the detection circuits and initiating appropriate alarms.

20. Activation of an intrusion alarm sensor shall cause a signal to be transmitted to a Central Station via telephone lines. A built-in dialer unit shall initiate signal transmission. In addition to alarm reporting, system shall report trouble, low battery and shunted zone indications.

1.4 SUBMITTALS

A. Items specified under this Section are Priority 1. Refer to Section 260010: Basic Electrical Requirements, for specific Priority 1 requirements.

B. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.

2. Describe system operation, equipment and dimensions and indicate features of each component.

3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.

4. Shop Drawings:

a. Plot plans and building floor plans, showing location of and conduit routing to all devices.

b. Point-to-point wiring diagram in block or riser formats showing all components, conduit and wire types and sizes with cable legend.

c. Include elevations of control panel and remote terminal cabinet(s).

5. Furnish structural calculations for equipment anchorage as described in Section 260010: Basic Electrical Requirements.

6. Submit Manufacturer's installation instructions.

7. Complete bill of materials listing all components.

8. Warranty.

1.5 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:

1. A detailed explanation of the operation of the system.

2. Instructions for routine maintenance.

3. Pictorial parts list and part numbers.

4. Schematic Drawings of wiring system, including all devices, control panel, terminal cabinets, etc.

5. Telephone numbers for the authorized parts and service distributors.

6. Final testing reports.

1.6 QUALITY ASSURANCE

A. All materials, equipment and parts comprising the units specified herein shall be new, unused and currently under production.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Security monitoring and control system components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipment shall be replaced and returned to Manufacturer at no cost to Owner.

B. Storage: Store in a clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal component damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.8 WARRANTY

A. Units and components offered under this Section shall be covered by a 1 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

1.9 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference at least seven calendar days prior to installing any equipment, devices or systems in the IDF Room. For projects with underground and/or roof mounted conduits, convene a separate pre-installation meeting

B. Attendance: Architect, Construction Manager, Contractor, Electrical Subcontractor, Low Voltage Subcontractor/s, District Low Voltage Systems Representative and Project Inspector.

C. Agenda: Review all low voltage systems related to the project. Subcontractors shall come prepared to discuss how the low voltage systems are being installed and run throughout the building(s).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Bosch Security Systems. (District Standard)

B. Substitutions: Under provisions of Section 260010: Basic Electrical Requirements.

2.2 INTRUSION CONTROL PANEL

A. Control Panel: Bosch B9512G control panel for large commercial applications.

1. Supports up to 599 points using a combination of hardwired or wireless points for installation flexibility, and up to 32 areas and 32 doors for up to 2,000 users

2. On-board Ethernet port for Conettix IP alarm communication and remote programming, compatible with modern IP networks including IPv6/IPv4, AutoIP, and Universal Plug and Play

3. Installer-friendly features including on-board USB for easy on-site RPS programming, plus plug-in PSTN and Cellular communication modules for simple installation and future proof upgrades

4. Email and text notifications as well as remote control of system using Android or iOS mobile devices with an additional Bosch D8103 & D101 enclosure, lock and key.
5. Enclosure to include sufficient 8-point expanders to support homerun cables to each device. Bosch D8128D Octopopit.
6. No popits allowed in this project.

2.3 POWER SUPPLY

A. 12 VDC, 5 amp uninterruptible power supply with multi-regulator and battery changer in vented locking 11”H x 15”W x 4”D cabinet. AlarmSaf PS5-M003-UL.

2.4 DETECTION DEVICES

A. Wall mounted passive infrared type. Bosch ISC-BPRQ2 with gimble mount B335-3. Mount 4” below suspended ceilings. Mount between 10’-0” to 14’-0” where ceiling height is over 10’-0”. In all cases, the motion sensor should not be obstructed. Two motions sensors are to be installed in each classroom for optimum coverage. Additional motion sensors are to be installed to cover all exterior doors and hallways.

B. A glass break detector must be install to cover any exterior window in the project. Wall mounted DS1103i Flush‑mount Glassbreak Detector. The maximum detection range is 25 ft. (7.6 m) from the farthest corner for glass sizes 12" by 12" (0.3 m by 0.3 m) and larger. This detector can also be ceiling mounted if a nearby wall is not within its range.

C. Takex pool beams are to be used around the perimeter of the pool decks.

D. For pools with a maximum distance of 165' between the beams Tekex PB-IN-50HF. For pools with a maximum distance of 330' between the beams Tekex PB-IN-100HF

2.5 EXTERIOR BELL

A. Amesco ABB-1014 to be installed outside the exterior door closest to the buildings IDF. Location to be approved by the District’s Low Voltage Systems Representative.

2.6 KEYPADS

A. Wall mounted alarm set/disable keypad with illuminated 16-character vacuum fluorescent display and sounder. Off-white case Bosch D1255. Unless otherwise specified, a minimum of 4 keypads are to be installed throughout the building to enable flexibility in program zoning. Specific locations are to be confirmed during design.

2.7 CABLE

A. #22/4 Conductor cable. West Penn 25241.

B. #18/4 Conductor cable. West Penn 25244.

C. IDEAL #89-610 Barrier Strips for consolidation of power wires at the panel end.

D. Berk-Tek 11074739 data cable grey in color. Install 2 cables from the Intrusion panel to the IDF rack located in the same room and terminate each end onto grey Leviton CAT 6 61110-RG6 jacks. At the rack end secure jacks on ports 47 and 48 of the designated patch panel. At the intrusion panel end secure the jacks onto a (2) port Leviton SMB.

2.8 LABELS

A. The contractor shall provide tags, straps, and adhesive labels. These tags, straps, and adhesive labels must be of high quality that will endure heat, water, and time.

B. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.

C. Shall be pre-printed using a mechanical means of printing.

D. Where used for cable marking, provide vinyl substrate with a white printing area and a clear “tail” that self laminates the printed area when wrapped around the cable. The cable marking should be immediately visible and be within two inches from the termination point.

E. Where insert type labels are used, provide clear plastic cover over label.

F. Labeling P-touch font size 4MM bold, black on White, 3/8” labeling tape on all patch cords, cables ends, panels and devices.

G. Labels shall be numbered consecutively and separate for each type of use. Refer to Work Station Details and Floor Plan Device Numbering Example for additional information

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of the security system installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 COORDINATION

A. Coordinate all installation requirements for door contacts with other trades prior to ordering of doors and frames.

B. Install contacts, boxes, conduits and connections to doors and frames for complete operating installation. All connections shall be concealed.

3.3 INSTALLATION REQUIREMENTS

A. Alarm circuits shall be terminated on screw terminals. Terminal blocks shall be Allen-Bradley with 600 volt screw terminals for #22 to #10 conductors, mounted to type M22 channel or approved equal. Submittal shall show internal elevation of terminal cabinets with equipment laid out.

B. All cables shall be run through fanning strip to terminals on terminal blocks.

C. All cables entering terminal cabinet shall be identified with Brady or E-Z code wire markers. Upon completion of installation, six (6) copies of one-line "as-built" wiring diagram shall be furnished to the Owner.

D. Each cable run on wiring diagram shall be identified with exact wire marker code (numerical or alphabetical) as appears in terminal cabinets.

E. Station locations shall be identified by architectural room numbers and in all ways one-line wiring diagram shall relate as closely as possible to architectural Drawings.

F. No splices shall occur in underground pullboxes. System wiring shall be continuous, without splices, from terminal cabinet to terminal cabinet and control panel to devices. All interior junction boxes shall be accessible and locations shall be recorded or "As-Built" Drawings.

G. Door contacts shall be located 6" from hinge side of door and both the switch and magnet shall be epoxy in place.

H. After all equipment is installed and operational, Contractor shall set angle settings, sensitivity settings, etc., of each detector to ensure optimum performance and minimal false alarms. Mask out areas, of each detector, to remove sources of false alarms (windows, heaters, air diffusers, etc.), from detection zones.

3.4 WIRING

A. Wiring from devices in building to terminal block at the same building shall be West Penn #241 or approved equal.

B. Wiring from each building terminal block to the control panel shall be West Penn #244 or approved equal.

C. Wiring from each keypad to the control panel shall be West Penn #244 or approved equal.

D. Low voltage AC Power wiring shall not run close to or parallel to fluorescent lighting fixtures. If necessary, run conduit perpendicular to the lighting conduit with as much separation as possible.

E. All wiring shall be installed in conduit in walls or hard ceilings or open wiring installed concealed above suspended ceilings. Open wiring shall be supported on rings not to exceed 24-inches on center. Separation of a minimum of 4" is required between low voltage systems throughout the cable run.

F. Each device cables shall be homeruns from the device to the panel located in the IDF. No daisy chaining of power or alarm circuit wiring is permitted.

G. End-of-line resistors shall be installed at the device end, not at the panel end.

H. All devices shall be labeled and each end of the device. All cables are to be labeled with a p-touch labeler on both ends. Labeling samples must be provided and approved by the District's Low Voltage Systems Representative before the system is labeled.

I. All point assignments shall be coordinated and approved by the District's Low Voltage Systems Representative prior to termination of device cabling at panel end. Refer to District's Point Assignment and Point Index Templates.

J. No popits are allowed on this project.

3.5 FIELD QUALITY CONTROL

A. Refer to Specification Section 260080: Electrical Commissioning.

B. Manufacturer's field service: Contractor shall arrange and pay for the services of a factory-authorized service representative to supervise the initial start-up, pretesting and adjustment of the security system.

C. Pretesting objectives shall be to:

1. Assure security system installation conforms to specified requirements and operates within specified tolerances.

2. Field test and inspect to ensure operation in accordance with Manufacturer's recommendations and Specifications.

3. Prepare final test report including results, observations, failures, adjustments and remedies.

4. Apply label on security system control panel upon satisfactory completion of tests and results.

5. Verify settings and make final adjustments.

D. At least three weeks prior to any testing, notify the Engineer so that arrangement can be made for witnessing test, if deemed necessary. All pretesting shall have been tested satisfactorily prior to the Engineer's witnessed test.

E. Prefunctional testing:

1. Visual and mechanical inspection:

a. Inspect for physical damage, defects alignment and fit.

b. Perform mechanical operational tests in accordance with Manufacturer's instructions.

c. Compare nameplate information and connections to Contract Documents.

d. Check tightness of all control and power connections.

e. Check that all covers, barriers and doors are secure.

2. Electrical tests:

a. The system shall be completely tested prior to final acceptance testing. All points shall be tested from point of initiation to the final point or points of annunciation. All circuits shall be tested for continuity and ability to transmit the required signal correctly to the controller. Any problem due to wrong wire type, wire twist, impedance, mismatches, noise filtering or shielding shall be completely corrected during pretesting and prior to any final acceptance tests.

b. Testing shall include each and every device in the system. Coordinate with other trades as necessary for testing.

1) Door contact switches: Verify alarm signal received and annunciated at control panel.

2) Detection devices: Adjust device sensitivity as required for coverage and location. Verify alarm signal received and annunciated at control panel.

3) Keypads: Ensure that keypads function properly to “arm” and “disarm” the system.

4) Card Reader: Ensure that card reader provides feedback from illuminated LED display, green if successful, red if not successful, with audible beep.

5) Remote station monitoring: Verify that the alarm condition is transmitted via telephone lines to remote monitoring station from auto-dialer/modem device within the control panel.

c. Test report:

1) Provide a complete report listing every device, the date it was tested, the results and the date retested (if failure occurred during the previous test). The test report shall indicate that every device tested successfully.

2) Submit two typed copies of the test report in a neatly bound folder for review and approval. Failure to comply with this will result in a delay of final testing and acceptance.

F. In the event that the system fails to function properly during the testing, as a result of inadequate pretesting or preparation, the Contractor shall bear all costs incurred by the necessity for retesting including test equipment, transportation, subsistence and the Engineer's hourly rate.

G. Contractor shall replace at no costs to the Owner all devices which are found defective or do not operate within factory specified tolerances.

H. Contractor shall submit the Testing Agency's final report for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observation, deficiencies and remedies. Test report shall be included in the operation and maintenance manuals.

3.6 TRAINING

A. Factory authorized service representative shall conduct a 2 hour training seminar for Owner's Representatives upon completion and acceptance of system. Instructions shall include safe operation, maintenance and testing of equipment with both classroom training and hands-on instruction.

B. Contractor shall schedule training with a minimum of 7 days advance notice.

3.7 AS BUILT DOCUMENTATION

A. The Contractor will be provided drawings in electronic format (DWG, AutoCAD release 14 or later) on which as-built construction information can be added.

B. Upon completion of the project, the Contractor is to prepare as-built documentation showing actual site conditions and installation as constructed.

C. The Contractor shall annotate the base drawings and return a hard copy and electronic form (AutoCAD release 14 or later).

D. The Contractor shall provide and install a C-size framed floor plan with outlet and device locations for all low voltage systems. The floor plan shall be framed and installed in the new MDF/IDF Room. The drawing should be a plan of the building with a symbols legend showing where all the devices are and the labeling for each device only. Remove all general notes and details not applicable to the low voltage systems.

END OF SECTION – 26 65 16

SECTION 267319

ASSISTIVE LISTENING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Work included: Labor, materials and equipment necessary to complete the installation required for the item specified under this Division, including but not limited to:

1. Transmitter.
2. Receivers.
3. Antenna and cabling.

B. Related Work: Consult all other Sections, determine the extent and character of related Work and properly coordinate Work specified herein with that specified elsewhere to produce a complete installation.

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:

1. Electronic Industries Association (EIA):

EIA REC 127-49;	Power Supplies.
EIA RS 160-51	Sound Systems.
EIA SE 101-A--49;	Amplifiers for Sound Equipment.
EIA SE 103-49;	Speakers for Sound Equipment.

2. Underwriters Laboratories, Inc. (UL):

UL 50;	Enclosures for Electrical Equipment.

1.3 SYSTEM DESCRIPTION

A. Assistive listening system for multipurpose rooms, including wireless FM base station transmitter, antenna wiring, personal receivers and miscellaneous accessories required for a complete system.

B. Digital audio processing and direct digital synthesis for superior FM transmission, sound clarity and channel flexibility; wide-band and narrow-band compatible; bass cut adjustment; line, microphone and speaker level inputs; lightweight and comfortable receivers; easy to install and operate.

C. Include suitcase for housing portable system components.

D. Transmitter shall be rack-mountable base station with input from house sound system, microphone or speaker. Must have terminal block speaker level input, flexible connection options (XLR microphone/line input), VFD display, level control, customized output, overload warning light, RF fault indicator, frequency agility and lock out feature to prevent transmitter settings from being changed.

E. Personal receivers shall be body-worn and furnished with pouch and belt clips. Receiver models shall be narrow-band, 72 to 76 MHz frequency with 6-channels.

F. Range shall be 700,000 square feet of unobstructed coverage with standard antenna or higher as required to cover the entire floor area per UBC.

1.4 SUBMITTALS

A. Submit in accordance with the requirements of Section 260010: Basic Electrical Requirements, the following items:

1. Data/catalog cuts for each product and component specified herein, listing all physical and electrical characteristics and ratings indicating compliance with all listed standards.
2. Describe system operation, equipment, dimensions and indicate features of each component.
3. Clearly mark on each data sheet the specific item(s) being submitted and the proposed application.
4. Total number of personal receivers and accessories including pouch with belt clip to be provided (minimum of 1% of the total number of seats for Auditorium and Gymnasium).
5. Proposed antenna location and mounting detail.
6. Local frequency usage, from frequency scanning survey with proposed frequency for this Project.
7. Submit Manufacturer's installation instructions.
8. Complete Bill of Materials listing all components.
9. Warranty.

1.5 OPERATION AND MAINTENANCE MANUAL

A. Supply operation and maintenance manuals in accordance with the requirements of Section 260010: Basic Electrical Requirements, to include the following:

1. A detailed explanation of the operation of the system.
2. Instructions for routine maintenance.
3. Pictorial parts list and part numbers.
4. Schematic wiring diagrams.
5. Telephone numbers for the authorized parts and service distributor.
6. Final testing reports.

1.6 QUALITY ASSURANCE

A. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

B. Only products and applications listed in this Section may be used on the Project unless otherwise submitted.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery: Assistive listening system components shall not be delivered to the Project site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable. Equipment damaged during shipping shall be replaced and returned to Manufacturer at no cost to Owner. Components shall be properly packaged in factory-fabricated containers.

B. Storage: Store in clean, dry, ventilated space free from temperature extremes. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris and traffic. Provide heat where required to prevent condensation.

C. Handling: Handle in accordance with Manufacturer's written instructions. Be careful to prevent internal components damage, breakage, denting and scoring. Damaged units shall not be installed. Replace damaged units and return equipment to Manufacturer.

1.8 WARRANTY

A. Units and components offered under this Section shall be covered by a 1 year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products furnished by the following Manufacturers shall be acceptable if in compliance with all features specified herein and indicated on the Drawings.

1. Gentner.
2. Williams Sound, Corp.
3. Comtek.

B. Substitutions: Under provisions of Section 16010: Basic Electrical Requirements.

2.2 TRANSMITTER

A. The transmitter shall operate in the Auditory Assistance Band as approved by the FCC. The transmitted field strength shall not exceed 80mV per meter at three meters and transmit to an area of more than 700,000 square feet. The operating frequency shall be digitally selectable by rear panel thumb wheel switches to any of 37 frequencies in the approved band.

B. Transmitter shall have XLR balanced and RCA unbalanced input jacks selectable as balanced mic, balanced and unbalanced line, and unbalanced speaker audio signals. Front panel control to adjust the audio input level with and LED audio level display. Switchable high-pass filter providing a 6dB/octave roll off at 180Hz. Included is an audio processing chain that consists of wide-band AGC, multi-band compression, Aphex Aural Exciter, and peak limiting. Also, front panel control to regulate the overall amount of audio processing and switchable 1kHz test tone to aid setup and receiver tuning.

C. Transmitter shall be powered by an external AC line to 12VDC power adapter. The front panel shall have a power switch with LED and an LED to indicate proper RF carrier operation. Included shall be a ¼" stereo monitor jack with volume control. Transmitter shall be rack mountable in a standard 1 RU rack space.

D. Transmitter shall be supplied with remote mounted flex antenna and 50 feet of RG174 coaxial type cable.

E. Technical specifications:

1. Audio inputs:
    a. Mic: 600Ω balanced, 10mV
    b. Line: 600Ω balanced, 1V
    c. Line: 10Ω unbalanced, 1V
    d. Speaker: unbalanced
2. Automatic gain control range: 40dB
3. Manual input level control: 20dB
4. Signal to noise ratio: 60dB

5. Transmission type: FM modulation
6. Max. deviation: ±25kHz, 50kHz total
7. Max. radiated power: 8000uV/m at 30M ≤100mW
8. RF level adjust: ¼, ½ and full power
9. Frequency control: Digitally synthesized, crystal controlled
10. Frequency stability: 0.005% from 0-50ºC
11. Selectable frequencies: 37 channels between 72-76MHz
12. Power requirements: 9-15VDC at 500mA

2.3 RECEIVER

A. The receiver shall operate in the Auditory Assistance Band as approved by the FCC. It shall be digitally tunable to one of 37 frequencies within that band by concealed rotary switches.

B. The receiver shall be housed in a high-strength, plastic case with integral pocket clip. The on/off/volume control shall be properly marked and the only control that is exposed. There shall be a standard 1/8" mono headphone jack for audio output. The jack shall be recessed to provide stress protection for the headphone plug.

C. The receiver shall operate on two standard AA batteries, and contain built-in recharging contacts for operation with rechargeable batteries and a suitable drop-in recharger.

D. Technical Specifications:

1. Type: FM, medium bandwidth (60kHz)
2. Audio frequency range: 100Hz-10kHz
3. Audio output level: 140mW into 32Ω
4. Signal-to-noise ratio: >55dB
5. Distortion: <2%
6. RF frequency range: 37 channels, 72-76MHz
7. Sensitivity: 0.8uV typical, 1mV max for 12dB SINAD
8. Controls: On/off/volume, channel selector (hidden)
9. Earphone jack: Standard 3.5mm mono
10. Power requirements: 2 x AA batteries
11. Battery life: 40 hours with alkaline types

E. Provide a total of six (6) receivers for this project.

2.4 ANTENNA CABLE EXTENDER

A. Coaxial cable:

1. Cable <200': RG58A/U, Belden #8219 with 4dB loss over 100ft. or Belden #9311 with 3dB loss over 100ft.
2. Cable <500': VHF/UHF, Belden #9913 with 1dB loss over 100ft.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Contractor shall thoroughly examine Project site conditions for acceptance of the assistive listening system installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 INSTALLATION

A. General:

1. Install system in accordance with Manufacturer's written instructions, as indicated on the Drawings and as specified herein.

2. Carefully match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

B. Transmitter: Install transmitter in sound rack or on top of sound rack. Coordinate exact location with sound system Sub-contractor.

C. Antenna and ground plane: Install antenna and ground plane on the ceiling in accordance with Manufacturer's written instructions and as indicated on the Drawings.

D. Wiring:

1. Refer to Section 260519: Building Wire and Cable.

2. Route wiring continuously between devices without splices.

3. Size wiring to conform to the equipment Manufacturer's requirements.

4. All wiring shall be installed in a continuous steel conduit system and shall be of the size recommended by the equipment Supplier.

5. Make splices, taps and terminations on numbered terminal strips in junction, pull and outlet boxes, terminal cabinets and equipment enclosures. Identification of conductors and cables: use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams.

E. Receivers: Deliver the receivers to the Owner after system has been installed and tested.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's field service: Contractor shall arrange and pay for the services of a factory-authorized service representative to supervise the initial start-up, pretesting and adjustment of the system. Testing Agencies objectives shall be to:

1. Assure assistive listening system installation conforms to specified requirements and operates within specified tolerances.

2. Field test and inspect to ensure operation in accordance with Manufacturer's recommendations and Specifications.

3. Verify settings and make final adjustments. Settings and adjustments shall be performed on the transmitters and all the receivers.

B. Prefunctional testing:

1. Visual and mechanical inspection:

a. Inspect for physical damage, defects alignment and fit.

b. Perform mechanical operational tests in accordance with Manufacturer's instructions.

c. Compare nameplate information and connections to Contract Documents.

d. Check tightness of all connections.

e. Check that all covers, barriers and doors are secure.

2. Electrical tests:

    a. Perform complete testing to determine conformance with the requirements of the Contract Documents.

    b. Operational test: Perform an operational test to verify conformance of system performance and conditions to Contract Document within Manufacturer's tolerances.

C. In the event that the system fails to function properly during the testing as a result of inadequate pretesting or preparation, the Contractor shall bear all costs incurred by the necessity for retesting including test equipment, transportation, subsistence and Engineer's hourly rate.

D. Contractor shall replace at no cost to the Owner all devices which are found defective or do not operate within factory specified tolerances.

E. Contractor shall submit the testing final report to the Engineer for review prior to Project closeout and final acceptance by the Owner. Test report shall indicate test dates, devices tested, results, observations, deficiencies and remedies. Include a copy of the test report in the Owner’s operation and maintenance manuals.

3.4 CLEANING

A. Upon completion of Project prior to final acceptance the Contractor shall thoroughly clean the system components per Manufacturer's approved methods and materials. Remove all paint splatters spots, dirt and debris.

3.5 TRAINING

A. Factory authorized service representative shall conduct a 4 hour training seminar for Owner's representative upon completion and acceptance of system. Instructions shall include safe operation, maintenance and testing of equipment.

B. Contractor shall schedule training with a minimum of 7 days advance notice.

END OF SECTION – 26 73 19

SECTION 270500

COMMON WORK RESULTS FOR COOMUNICATIONS

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. Division 00 General Conditions and Division 01 General Requirements apply to the work of this Section.

B. The Contractor shall have a Project Manager with a RCDD on staff and submit a copy of their current credentials.

1.2 WORK INCLUDED

A. This section describes the scope of work, standards, products and execution to provide new and complete Voice and Data Backbone Cabling and routing on the Yerba Buena High School Campus of the East Side Union High School District. This project includes the following types of cabling: single and multi-mode fiber (data backbones), Category 6 copper, and Category 3 copper (voice and speaker backbones). This is a cabling-only project, and does not include specifications for PBX, handsets, desktop PCs, or servers used for the generation of communication signals on the installed wiring.

1. Installation of Outside Plant single and multimode Fiber Optic Backbone cabling from the new Building IDF to the Main Distribution Frame (MDF) of the campus.

2. Installation of Outside Plant Category 3 voice backbone cable from the new Building IDF to the Main Distribution Frame (MDF) of the campus.

3. Installation of Inside Plant Category 6 horizontal distribution cable from the new Building IDF to wall and ceiling mounted outlets.

4. Routing, suspension, and mounting of cabling.

5. Termination of all cables in Telecommunications Spaces and other specified locations.

6. Testing, labeling, and documentation of all cable and hardware installed under this contract.

7. Preparation and submission of testing reports, as-built drawings and cabling documentation.

8. Sealing of OSP entrance conduits and all penetrations after cabling is installed.

B. It is the intent of the Drawings and Specifications to provide a cabling system ready for use. Any item not specifically drawn or called for in the Specifications, but normally required for a complete system, is considered to be part of the Contract.

1.3 RELATED WORK INCLUDED IN OTHER SECTIONS

A. Sections of Division 26 00 00 Electrical General Requirements.

B. Sections of Division 27 00 00 Communications.

C. Sections of Division 28 00 00 Intrusion, Surveillance, Fire Alarm

1.4 SUBMITTALS

A. The Contractor shall provide submittals within 30 working days of Notice to Proceed. The Contractor shall not deliver materials to the site until submittals are approved.

B. Product Data:

1. Provide manufacturer's catalog information showing dimensions, colors, and configurations.
2. Submittals shall include all items called for in PART 2 – PRODUCTS of this document and the manufacturers cut sheets for the following:
    a. All single mode fiber optic cable
    b. All multimode fiber optic cable
    c. All balanced twisted pair cable
    d. All connectors and required tooling
    e. All termination system components
    f. All grounding and surge suppression system components
    g. All test equipment to be used
3. Identify each submittal item by reference to Specification Section paragraph in which item is specified or Drawing and Detail number.
4. Organize submittals in the same sequence as they appear in Specification Sections, articles, or paragraphs.

1.5 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference at least seven calendar days prior to installing any EMS, electrical outlets, A/C equipment, devices or systems in the IDF Room. For projects with underground and/or roof mounted conduits, convene a separate pre-installation meeting. EMS equipment to be mounted above 7 feet in height in the IDF.

B. Attendance: Architect, Construction Manager, Contractor, Electrical Subcontractor Low Voltage Subcontractor/s, District Low Voltage Systems Representative and Project Inspector.

C. Agenda: Review all low voltage systems related to the project. Subcontractors shall come prepared to discuss how the low voltage systems are being installed and how they will run throughout the building(s)

PART 2 – PRODUCTS

2.1 GENERAL

A. The Voice and Data Cabling System is defined as all required equipment and cabling, including hardware, termination blocks, cross-connects, patch panels, patch cords, copper and fiber cabling.

B. The Contractor shall supply the products as detailed in this specification. If not specified, the Contractor can select products of suitable quality and workmanship. For any products selected by the Contractor, the Contractor is required to submit product documentation including manufacturer's original literature, product specifications and testing reports as previously described.

C. Equal Product may be considered for substitution for those products specified; however, any equivalent product(s) must be approved by the District Low Voltage Systems Representative and must show demonstrated and documented equivalence to the product(s) specified.

D. All material furnished shall be new and unused. All materials used shall bear the Underwriter's Laboratory, Inc. label - provided that a standard has been established for the material in question. All products and materials are to be clean, free of defects, and free of damage and corrosion.

E. The Contractor must provide a Leviton / Berk-Tek limited lifetime product and performance warranty upon completion of project.

2.2 OUTSIDE PLANT COPPER BACKBONE CABLE

A. All voice grade cable placed in the outside environment shall be solid, unshielded twisted pair, PE-89, and 24 AWG Outside Plant Cable (OSP). Twenty five pair cable shall be Superior Essex 09-097-92 for speakers. Fifty pair cable shall be Superior Essex 09-100-92 for analog lines.

B. The copper twisted pair shall have a mutual capacitance at 1kHz of 83 nF/mile and meet ANSI/ICEA S-84-608 2007.

C. The cable shall be resistant to mechanical damage, lightning, and damage from wildlife. The cable shall have a dual shield design with fully flooded shield interfaces.

2.3 BUILDING ENTRANCE PROTECTORS

A. All OSP balanced twisted pair cable pairs shall be provided with protection at each building with an entrance cable protector panel. Circa Telecom 1880ECA1-50G regardless of the number of pairs required.

B. The protector panel shall be equipped with a ground lug that will accept a 6 AWG copper bonding conductor.

C. Each protector panel shall be fully loaded with 5-pin plug-in protector modules

4b1fs-240.

2.4 110-TYPE WIRING BLOCK KIT

A. The wiring block kit shall support Category 3 applications and facilitate cross connection and interconnection using cross connect wire. Leviton 41MB2-3FT. Each kit shall be provided with a vertical cord manager, Leviton 41880-300.

B. The wiring block shall be fire retardant, molded plastic consisting of horizontal index strips for terminating 25 pairs of conductors each. The index strips shall be marked with five colors on the high teeth, separating the tip and ring of each pair, to establish pair location. The wiring block shall accommodate 22 through 26-AWG conductors.

C. The wiring block kit shall include multiple 100 pair blocks, mounting frame, horizontal cord manager and label holder.

D. Provide C5 clips for ISP feeder terminations only. No station cabling is to be terminated directly onto 110 frames unless otherwise specified by District Low Voltage Systems Representative.

E. Every 110 frame is to be fully loaded with C5 Clips

2.5 RISER RATED BACKBONE CABLE

A. ISP copper backbone cable shall be solid, twisted pair Category 3, CMP, 24 AWG Berk-Tek 10032112 50 pair. This cable is to tie the 110 field to the equipment racks.

B. The copper twisted pairs shall have a mutual capacitance at 1 kHz of 15.7 nF/1000 ft.

2.6 HYBRID FIBER OPTIC BACKBONE CABLE

A. The fiber optic backbone cable shall be a 12 SM/12MM 62.5 micron outside plant rated composite cable in a loose tube construction with inner and outer jackets and corrugated steel armor Berk-Tek OPAD12B024-012CB3510/25012AB0403. This is a long lead item. The contractor shall allow time for approval and ordering of the cable.

B. The Singlemode fiber shall be ISO/IEC 11801 OS2, dispersion un-shifted fiber which meets the ITUT G.652d requirements.

C. The 62.5/125 micron multimode fiber shall have a maximum attenuation of 3.4 dB/km at 850 nm, and 1.0 dB/km at 1300 nm. This fiber shall be ISO/IEC 11801 OM1.

D. Provide Leviton 36" 12 strand break out kits 49887-12L.

2.7 FIBER OPTIC PANELS AND MODULES

A. Low Profile 2U combination panel shelfs, Leviton OPT-X-5R2UH-S06 with 4 metal blank plates at each end Leviton 5F100-BLK. The panel shelf shall be available in a 2U height fully enclosed shelf, with integrated front cable management trough included. The shelf shall be equipped with hinged front doors for easy access, front cable management trough, top cover panel, standard water-tight cable entry conduit connectors for OSP cable, and blank labels for identifying fiber terminations.

B. Fiber modules shall be loaded with fiber optic adapter panels. Leviton 5F100-12P for multimode, and 5F100-12Z for Singlemode. Modules must be from the same manufacturer as the fiber shelf.

C. LC Fiber Optic connectors shall utilize a pre-radiused zirconia ferrule and anaerobic adhesive for fiber alignment. Leviton 49990-MDL for multimode, and 49990-SDL for Singlemode.

D. All the fiber strands must be installed in the panels straight through.

2.8 UTP STATION CABLE

A. UTP Station cable shall consist of 4-pair Category 6, 23 AWG thermoplastic insulated conductors. All station cabling in plenum rated areas must have a minimum cable sheath rating of CMP. (All systems consist of CAT6 cabling). Type "A" stations receive 4 cables per outlet, type "B" stations receive 2 cables per outlet, type "C" receive 1 cable for a wall phone location and type "D" receive two cables per wireless outlet location.

1. This cable must meet parameters of the Cat 6 Cable TIA/EIA-568B and CAT 6 Permanent Link TIA/EIA-568B Commercial Building Telecommunications Wiring Standard.

a. Input Impedance – 100 Ohms +/- 15% at 1-100 MHz

b. ACR at 250 MHz shall be a minimum of 8.7 dB/100m.

c. PS NEXT at 250 MHz shall be a minimum of 39.3 dB/100m.

d. Insertion loss at 250 MHz shall be a maximum 32.6 dB/100m.

2. Data station cable jacket shall be blue, Berk-Tek 11074694.

3. Wireless cable jacket shall be green, Berk-Tek 11074895.

2.9 COMMUNICATIONS OUTLET TERMINATIONS

A. T568B eight position, 8-conductor RJ45 jacks with 110 style rear termination. These terminations shall meet or exceed the requirements of the Cat 6 Cable TIA/EIA-568B and CAT 6 Permanent Link TIA/EIA-568B Commercial Building Telecommunications Wiring Standard.

1. Four Pair data station cables in surface wall boxes shall be terminated on blue jacks, Leviton 61110-RL6. Provide a minimum of four type "B" and one type "C" outlet in each class room.

2. Four pair cables for wireless outlets in ceiling mounted boxes shall be terminated on green jacks, Leviton 61110-RV6. Provide a minimum of one type “D” outlet in each class room.

3. Four pair cables for camera outlets shall be terminated on yellow jacks, Leviton 61110-RY6. (refer to camera section)

4. Four pair cables for intrusion panel IP connectivity shall be terminated on gray jacks, Leviton 61110-RG6. (refer to intrusion section)

5. Four pair cables for speakers shall be terminated on purple jacks, Leviton 61110-RP6. (refer to paging section)

B. Universal faceplates that will accept the jack of the connectivity solutions shall be used throughout this project. Material shall be stainless steel. Leviton 43080-1S2 2 ports and 1S4 4 ports.

C. Wall phone faceplates to be provided under this scope shall accept the jacks used on this project Leviton 4108W-1SP. The wall plate must have 8” clearance from center to all sides in order to correctly support the wall phone. Wall phone plate must be installed at ADA height adjacent to classroom entryway.

D. Wireless face plates shall be Leviton Quick Port 2 Port Face Plate 41080-2IP. Refer to Type “D” Wireless location detail.

2.10 COPPER PATCH PANELS

A. High density unshielded twisted pair termination panels with space for 48 8P8C modules. Panels shall mount in a standard 19 inch equipment rack with universal hole spacing and allow for independent installation and removal of jack modules. Rear cable management bar shall be included with each patch panel. Cable termination modules shall be included as needed to complete the installation. All unused ports shall be covered with black blank modules. Provide 20% additional patch panels for future growth for all systems.

1. Modular jack panels shall be 48 ports in a 2RU space. Leviton 49255-H48 for CAT6 cabling.

2. 2RU space 48 port patch panel Leviton 69586-U48 with 110 termination on the rear of panel shall be used for ISP rack to 110 frame backbone ties.

2.11 WIRE MANAGEMENT

A. Horizontal and Vertical cable managers shall be capable of managing cables on the front and rear of a standard 19 inch equipment rack. Horizontal managers shall have pass through holes that incorporate integral bend radius control and fingers with rounded edges. Hinged covers shall allow access to the cable pathway without having to remove the cover from the wire manager. Install horizontal wire managers above and below each patch panel.

1. Horizontal cable manager 2U high, Chatsworth 30530-719.

2. Vertical cable managers shall be Chatsworth 30095-703.

2.12 TELECOMMUNICATIONS GROUNDING AND BONDING

A. All grounding and bonding conductors shall be copper and may be insulated.

When conductors are insulated, the sheath shall be green or marked with a distinctive green color, and shall be listed for the application. The minimum bonding conductor size shall be 6 AWG.

B. The Telecommunications Ground Busbar (TGB) shall be dedicated and pre-drilled copper busbar provided with holes for use with standard sized lugs. This busbar shall have

minimum dimensions of .25 inch thick, 4 inches wide, and be variable in length. The busbar shall be connected to a dedicated ground rod to be installed at each IDF/MDF.

C. Two-hole compression ground lugs shall be Chatsworth 40162-901, 40162-904, 40162-909, and 40162-911, or equal, based on the size of the copper conductor to be terminated.

D. All low voltage systems in this project are to be grounded and bonded.

2.13 LABELS

A. The contractor shall provide tags, straps, and adhesive labels. These tags, straps, and adhesive labels must be of high quality that will endure heat, water, and time.

B. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.

C. Shall be pre-printed using a mechanical means of printing.

D. Where used for cable marking, provide vinyl substrate with a white printing area and a clear “tail” that self-laminates the printed area when wrapped around the cable. The cable marking should be immediately visible and be within two inches from the termination point.

E. Where insert type labels are used, provide clear plastic cover over label.

F. Copper patch panel labeling shall be completed with adhesive labeling kit specifically designed for the panel, Leviton 49257-QHD.

G. Labeling P-touch font size 4MM bold, black on White, 3/8” labeling tape on all work stations, panels and devices. Contractor must provide labeling samples for approval before labeling of the systems is performed.

H. A round Avery label green in color Product Number: 5463 and a station label utilizing the same font size as on work station face plate must be installed on ceiling grid below each wireless cable location for identification. See type “D” Wireless Location Detail.

I. Devices shall be numbered consecutively and separate for each type of workstation/system. Refer to Work Station Details and Floor Plan Device Numbering Example for additional information.

2.14 EQUIPMENT AND LADDER RACK SYSTEM

A. UL listed Chatsworth 19”W x 84”H x 15” D 45 RMU Aluminum 2 post rack P.N. 55053-703

B. Ladder rack to wall support, Chatsworth Wall Angle Support Kit P.N. 11421-712

C. Rack to runway support Chatsworth mounting plate P.N. 10595-712

D. Ladder rack support system, Chatsworth Universal Cable Runway P.N. 10250-712

E. Straight through ladder rack splice, Chatsworth Butt-Splice Kit P.N. 11301-701

F. Ladder rack junction splice, Chatsworth Junction Splice Kit P.N. 11302-702

G. Ladder rack protective end caps, Chatsworth Protective Rubber End Caps P.N. 10642-001

H. Wall support for cable runway Chatsworth Triangular Support Bracket P.N. 11312-712

I. Provide two single sided equipment shelves for each rack installed, Chatsworth P.N. 40074-700.

J. Equipment rack bonding material Chatsworth Green Ground Jumper P.N. 40159-009 and Chatsworth Green Cable Runway Ground Strap Kit P.N. 40164-001. Remove paint under each ground lug

2.15 POWER DISTRIBUTION

A. Rack mounted power distribution unit shall be a 19 inch wide 20 amp 125V horizontal unit with eight 5-20R receptacles and a standard 10 foot power cord with 5-20P straight blade plug, Geist RCURN082-102D20ST5-OD to be installed in the MDF/IDF.

B. Add two dedicated 20 Amp 5-20R, four-plex power receptacles per rack. The receptacles are to be supported 6" above the ladder rack where as not to impede with the vertical manager pathways.

C. Add one dedicated 20 Amp 5-20R , four-plex power receptacle for the intrusion panel and one convenience outlet at standard height location to be determined. All electrical work in the IDF must be approved by the District's Low Voltage Systems Representative prior to installation.

D. An electrical sub-panel is to be installed in the IDF that houses only the circuits for that room. Location of this sub-panel is to be confirmed with the District's Low Voltage System Representative before installation.

2.16 OTHER EQUIPMENT

A. Plywood Backboard: The Contractor shall provide fire-rated, A/C grade, void free, ¾"x4'x8' plywood. To reduce warping, fire rated plywood should be kiln dried to a maximum moisture content of 15%. Plywood shall be securely fastened to the wall. Plywood shall be painted with two coats of white paint. The Contractor shall not paint over the fire rating stamp. The plywood is to be mounted vertically and is to cover all walls of the IDF.

B. Service loop mounts: The Contractor shall provide service loop mounts for management of the fiber and copper service loops at both ends. Leviton Storage Rings for OSP backbone cabling shall be provided. The Contractor shall provide a service loop equal to the maximum length allowable so as to not exceed a total of 50 feet of exposed cable from building entrance to termination. One Leviton Storage Ring 48900-OFR must be provided for each OSP cable.

C. Fabric Innerduct: The Contractor shall install 3 cell fabric innerduct in all sections of conduit, Maxcell or equal. Installation must follow manufacturer's installation requirements, using recommended installation tools. Fabric Innerduct size shall match manufacturer recommended maximum size per conduit ID.

D. Patch Cords: The Contractor shall provide Leviton bootless / snagless patch cords for both station and IDF equipment end. Patch cord counts to support cable total drop count build out of all low voltage systems terminated on patch panels. Lengths and colors are as follows:

1. 8' Blue patch cord Cat 6 bootless / snagless
2. 7' Blue patch cord Cat 6 bootless / snagless
3. 6' Green patch cord Cat 6 bootless / snagless
4. 6' Yellow patch cord Cat 6 bootless / snagless
5. 6' Grey patch cord Cat 6 bootless / snagless
6. 6' Purple patch cord Cat 6 bootless / snagless

7. 6’ Orange patch cord Cat 6 bootless/snagless

E. Fiber Patch Cords : The contractor shall provide (4) duplex each SM & MM fiber patch cords, not to exceed 15 meters each and will not introduce a loss greater than 1.0 dB, including connectors. The contractor shall confirm actual length and connector types with the District Low Voltage Systems Representative.

F. Cross-connects: Each IDF and MDF receives one CPI 11435-719 Cable Reel with four reels of Superior Essex cross-connect wire. One 1k roll of white/blue 02-001-13 for analog, one 1k roll of yellow/blue 02-002-13 for speakers, one 1k roll of red/blue 02-053-13 and one two pair red/blue, red/orange 02-221-13.

G. New IDFs are to be 8’X10’with an open ceiling of at least 10ft in height. New MDFs are to be 16’x 12’ with an open ceiling of at least 10ft. in height.

PART 3 – EXECUTION

3.1 GENERAL

A. Manufacturer’s recommended installation practices shall be followed.

3.2 DAMAGES

A. The Contractor shall be liable for any and all damages to portions of the existing Campus caused it, its employees or subcontractors, including, but not limited to:

1. Damage to any portion of the Campus caused by the movement of tools, materials, or equipment.

2. Damage to any component of the existing telecommunications spaces accessed by the Contractor.

3. Damage to the existing electrical, telecommunications, mechanical and/or life safety or other systems caused by inappropriate operation or connections made by the Contractor or other actions of Contractor.

3.3 OUTSIDE PLANT CABLE INSTALLATION

A. Use pulling compound when necessary. Pulling compounds must be water-base lubricant that will not deteriorate cable or conduit.

B. All cable/cabling shall be kept 30 inches away from any heat source; i.e. steam valves, etc.

C. Cables shall be pulled free of sharp bends, kinks, twists, or impact damage to the sheath. Cables shall not be pulled across sharp edges. All conduits and sleeve with rough edges will be provided with bushings on both ends. Cables shall not be forced or jammed between metal parts, assemblies, etc.

D. All outside plant cables will be terminated within 50 feet of the building entrance point. This is a maximum cable measurement and includes lengths for service loops, routing, backboard and patch panel mounting. If the cables cannot be terminated within the 50 foot length, the cables shall be extended in rigid conduit to within a 50 foot distance from the point of termination.

E. Cable mountings and service loops on backboards will be installed efficiently to minimize the backboard space consumed. All cables will be routed at right angles, in accordance with the bend radius specifications for the type of cable being routed. Copper cables will be tie wrapped every 4 feet. Fiber cables shall use Velcro wraps.

F. No splices of any type are permitted on any OSP or ISP Low Voltage System cabling.

3.4 COPPER BACKBONE TERMINATIONS

A. All OSP copper shall be terminated on building entrance protector panels.

B. The building Entrance blocks shall be fully populated with protection fuses.

C. The OSP copper cable shall be exposed for no more than 50 feet from the point of entry in each building to where it is terminated on the protector panels as defined in Article 800-2 of the National Electrical Code. Each OSP cable must have a least a 20ft. service loop at each end provided that it does not exceed the 50 ft maximum entrance distance.

D. The Building Entrance protection blocks shall be grounded with a 6 AWG copper bonding conductor between the protector ground lug and the grounding bus bar.

F. From the protector blocks, the Contractor shall provide ISP feeder to match OSP feeder count to new, wall mount 110 style blocks. All pairs shall be extended from the protector blocks to the 110 blocks.

G. From the 110 blocks, the Contractor shall provide ISP feeder ties to separate patch panels mounted onto equipment rack in same IDF. Location is to be confirmed with the District's Low Voltage System Representative before installation.

3.5 FIBER OPTIC BACKBONE TERMINATIONS

A. Fiber will directly terminate on the rack mount fiber shelves without additional splicing. Sufficient cable slack to allow for movement and relocation will be required. Each OSP cable must have a least a 20ft. service loop at each end provided that it does not exceed the 50 ft. maximum entrance distance.

B. Field terminated LC connectors are required for all fiber strands in the telecommunications closets. All optical fiber strands shall be terminated. Connectors will be color-coded to distinguish core size.

3.6 HORIZONTAL CABLE

A. Place UTP cable so as to maintain the minimum cable bend radius limits specified by the manufacturer.

B. J-hooks shall be used in drop tile ceiling environments for cable pathways spaced at 60"or less. Directional or level changes require closer spacing. Erico J-hook cable ceiling supports are to be installed and allow for 25% future growth and must not exceed the manufactures recommended cable fill ratios. On 90 degree vertical transitions greater than 3 ft. wall support in the form of a ladder rack section and waterfall type cable/conduit adapters will be required to support the additional weight and to minimize long term kinks and stress on the cable.

C. Cable tray shall be used in all open ceiling environments. Legrand Itray, cable tray system is to be installed. Tray size to allow for 25% future expansion and not exceed manufacturer's recommended cable fill ratio. All cables installed in, entering or exiting from the tray must be installed in neat bundles by color and dressed aesthetically pleasing to the eye.

D. To avoid damaging horizontal cable conductors during installation, do not exceed a 25 pound force pulling tension.

E. Place copper cables transitioning between overhead pathways and cabinets in a neat and orderly manner. All exposed cabling is to be level both horizontally and vertically. All bends must be sweeping 90 degrees not exceeding the cable manufactures recommended long term storage bend radius.

F. Directly terminate twisted pair cable on patch panels and outlets in standard 568B color code order.

G. Cable runs of low voltages cabling systems shall maintain a minimum of 4" clearance throughout entire length of runs. Bundling of different systems cables is not permitted.

3.7 LABELING

A. Outside Plant

1. The Contractor is required to provide labels for all cables at any vaults, pull box, or access panel crossing. The Contractor shall provide cable labels twelve inches from the end of the cable as it enters the building, on service loop mounts, and three inches from the end of the cable at the point of termination. Fiber optic cable orange laminate tag (3.5" x 2") HellermannTyton # CT2003X2. Copper cable yellow laminate tag (3.5" x 2") HellermannTyton # CT2012X2. Cable Orange Laminate Write-On Tag (4" x 1.5") HellermannTyton # WC1503X2. The Contractor shall provide adhesive labels on all termination hardware such as fiber distribution shelf, protector, and 110 blocks.

2. All cables will be labeled according to the guidelines shown below as adapted from the EIA/TIA 606-A standard.

3. Fiber and copper backbone cable labeling shall follow the convention to include:

a. Campus

b. The origination point (Building Room ID)

c. The destination point (Building Room ID)

d. The type of cable

e. The strand or pair count.

B. Horizontal Distribution

1. The Contractor is required to provide labels at all termination hardware such as patch panels, patch cords, faceplate outlets and devices.

a. Provide station location number and room number label at all patch panels. Coordinate with District Low Voltage Systems Representative prior to labeling systems. The Contractor shall provide 1/8 inch thick engraved plastic labels for new cabinets or racks installed. The engraving shall be white on black background.

3.8 TESTING

A. The Contractor's staff selected to provide the testing of this installation shall be certified by the manufacturer of the test equipment utilized, trained in all aspects of telecommunications acceptance testing procedures of the products described herein and shall have a minimum of five years experience in telecommunications acceptance testing.

B. The contractor shall notify the district prior to start of testing and provide the date that testing will start for the district to be present when the testing is started

B. Field test instruments shall have a current calibration certificate on hand during testing and the latest software and firmware installed.

C. All cables and termination hardware shall be 100% tested to verify cabling system performance under installed conditions. All pairs/strands of each installed cable shall be verified prior to system acceptance.

D. Balanced Twisted Pair Cable Testing

1. CAT 6 test results must include the following tests and provided in electronic format upon completion of each site: Wire Map, Length; Propagation Delay;

Delay Skew; Attenuation; NEXT, NEXT @ Remote; Power Sum NEXT, PSNEXT @ Remote; ELFEXT, ELFEXT @ Remote; Power Sum ELFEXT; Attenuation-to-Crosstalk Ratio (ACR), ACR @ Remote; Characteristic; Impedance; DC Loop Resistance; Return Loss (RL), RL @ Remote.

2. Each test page must be properly identified with School site, Building and Station location, Example: "**ST BLD K W001A"**. All test results must be submitted in sequential order. All tests are to be "Permanent Link" type.

2. All pairs shall be tested with a copper test tool that conforms to the specifications of a certified Level II-E test set as described in TIA/EIA 568-B.2.

3. Copper backbone cabling and ISP ties shall be tested for conformance to the specifications of EIA/TIA Category 3 for multi-pair cable. Test shall include opens, shorts, polarity reversals, transposition, TDR for length, DC resistance, and tip/ring per pair. All test results must be submitted in sequential order.

4. If the project is reusing existing copper backbone cable. The contractor is to test all pairs as mentioned above at the beginning of the project and repair any bad pairs as part of the project. Before and after test results will be required upon projects completion utilizing the same testing format.

E. Optical Fiber Cable Testing

1. The Contractor shall conduct on reel test of all optical fiber cable prior to the installation.

2. Optical fiber testing shall be performed on all terminated fiber in the completed end-to-end system. Testing shall consist of an end-to-end OLTS and OTDR test performed per TIA/EIA-526-7. These tests also include continuity checking and optical length measurement of each fiber.

3. Paired duplex fibers in multi-fiber cables shall be tested to verify polarity in accordance with sub clause 10.3 of ANSI/TIA/EIA 568-B.1. The polarity of the paired duplex fibers shall be verified using an OLTS.

4. All singlemode fiber optic cabling shall be tested at both 1310 and 1550 nm per TIA/EIA 526-7 Methods "A.1" (OLTS) and "B" (OTDR). All multimode fiber optic cabling shall be tested at 850 and 1300 nm.

5. Each fiber shall be tested in both directions.

6. Link test results from the OLTS and OTDR shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation may be generated. All test results must be submitted in sequential order.

7. If the project is reusing existing fiber cable, the Contractor is to test all strands in the manner mentioned above at the beginning of the project and repair any bad connectors as part of the project. Before and after OTDR and OLTS test results will be required upon project's completion.

3.9 TEST RECORDS

A. General

1. All cables will be tested and the results in electronic format and on CD-ROM, with the resulting file capable of being formatted with one test result per 8.5 inch by 11 inch page.

2. Test results saved within the field test instrument shall be transferred to a Windows based database utility that allows for the maintenance, inspection, and archiving of the test records. The test records shall be uploaded to the PC unaltered, i.e. “as saved in the field test instrument”. The file format CSV does not provide adequate protection of these records and shall not be used.

3. The database for the complete project shall be stored, emailed and delivered on CD-ROM prior to punch walk and/or to the acceptance of the project. This CD-ROM shall include the software tools required to view, inspect, and print any selection of the test reports in the native format of the tester. All test results must be submitted in sequential order.

3.10 AS BUILT DOCUMENTATION

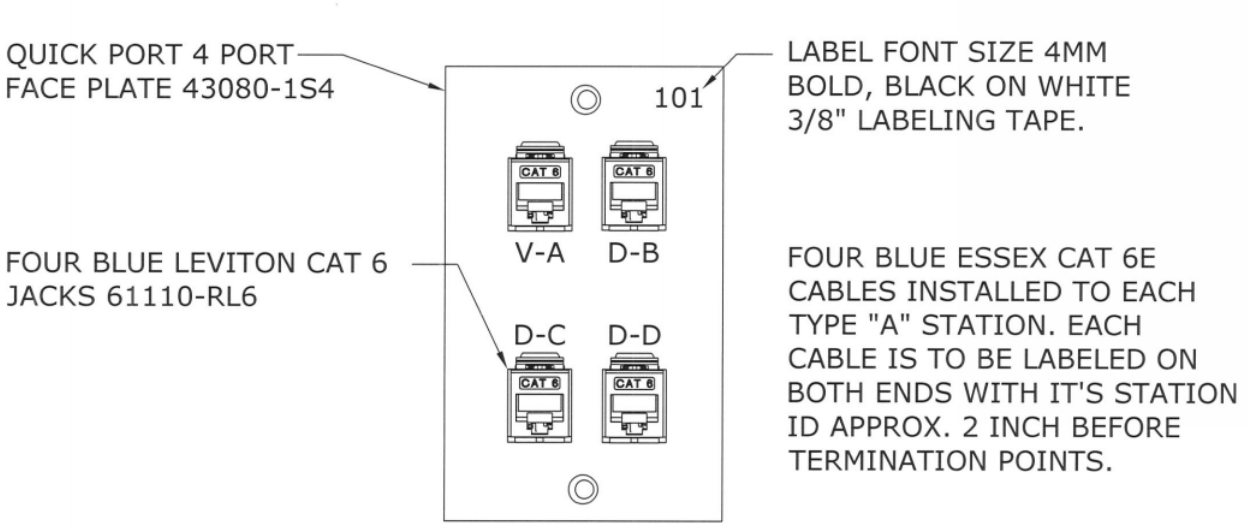
A. The Contractor will be provided drawings in electronic format (DWG, AutoCAD release 14 or later) on which as-built construction information can be added.

B. Upon completion of the project, the Contractor is to prepare as-built documentation showing actual site conditions and installation as constructed.

C. The Contractor shall annotate the base drawings and return a hard copy and electronic form (AutoCAD release 14 or later).

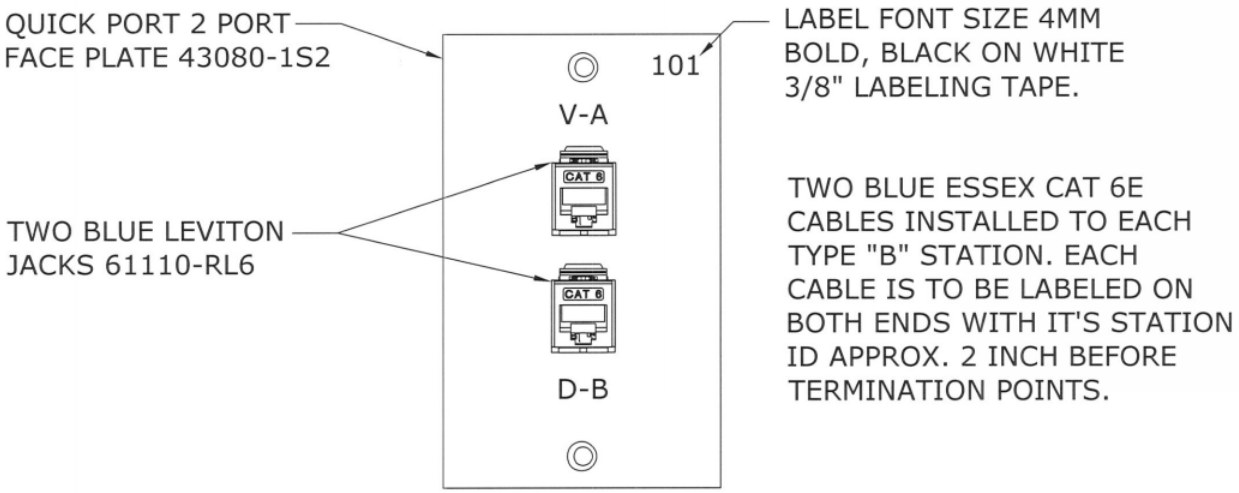
D. The Contractor shall provide and install a C-size framed (not laminated) floor plan with outlet and device locations for all low voltage systems. The floor plan shall be framed and installed in the new MDF/IDF Room. The drawing should be a plan of the building with a symbols legend showing where all the devices are and the labeling for each device only. Remove all general notes and details not applicable to the low voltage systems.

3.11 DISTRICT STANDARD DETAILS



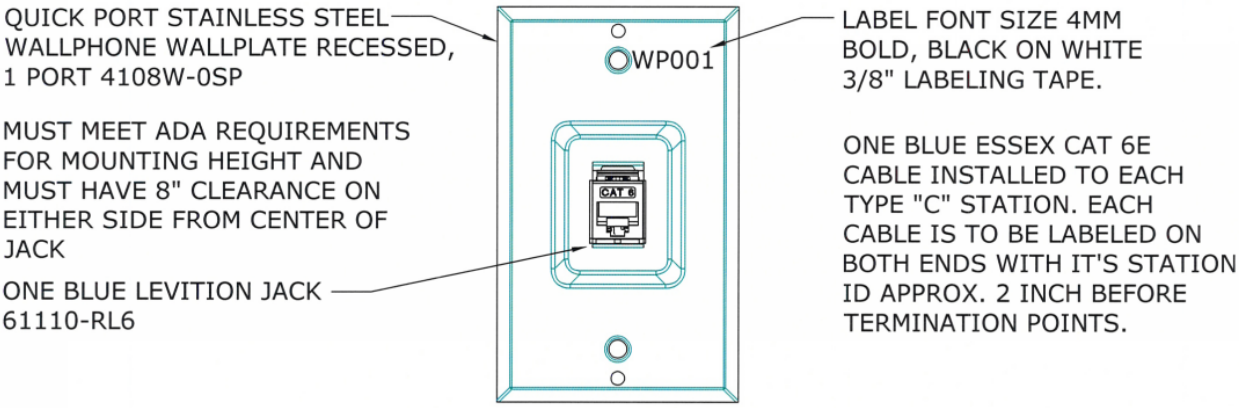
TYPE "A" WORK STATION DETAIL

ESUHSD GUIDELINE STANDARDS 040112



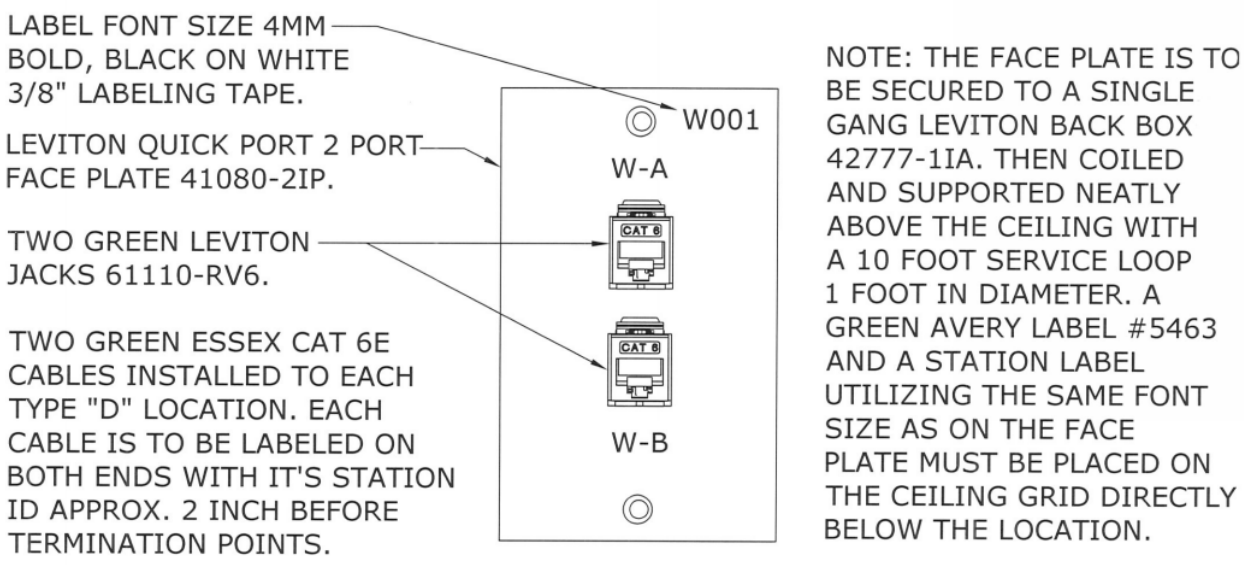
TYPE "B" WORK STATION DETAIL

ESUHSD IT GUIDELINE STANDARDS 040112



TYPE "C" WALL PHONE LOCATION DETAIL

ESUHSD IT GUIDELINE STANDARDS 040112



TYPE "D" WIRELESS LOCATION DETAIL

ESUHSD IT GUIDELINE STANDARDS 040112

END OF SECTION

SECTION 260060

PUBLIC ADDRESS MASS NOTIFICATION SYSTEM

PART 1 – GENERAL

1.1 GENERAL REQUIREMENTS

A. Division 00 General Conditions and Division 01 General Requirements apply to the work of this Section.

1.2 WORK INCLUDED

A. This Section specifies the requirements necessary to furnish and install:

1. Indoor speakers
2. Exterior speakers
3. Connection to new or existing Telecor equipment
4. Wireless clocks

1.3 RELATED WORK

A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for basic communications materials and methods:

1. Sections of Division 26 00 00, Electrical General Requirements
2. Sections of Division 27 00 00 Communications

B. In the event of conflict regarding requirements for communications materials and methods between this Section and any other section, the provisions of this Section shall govern.

1.4 SUBMITTALS

A. Manufacturer’s literature describing the product

B. Wiring diagrams clearly showing the interconnections of all major components

C. Maintenance manuals and parts lists. Manuals shall include schematic drawings and service instructions.

D. Floor plan drawings showing device locations, conduit routings, and number of conductors

1.5 EXISTING SYSTEM FUNCTIONAL DESCRIPTION

A. The existing campus public address system shall be extended to the new / modernized building.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference at least seven calendar days prior to installing any equipment, devices or systems in the IDF Room. For projects with underground and/or roof mounted conduits, convene a separate pre-installation meeting

B. Attendance: Architect, Construction Manager, Contractor, Electrical Subcontractor, Low Voltage Subcontractor/s, District Low Voltage Systems Representative and Project Inspector.

C. Agenda: Review all low voltage systems related to the project. Subcontractors shall come prepared to discuss how the low voltage systems are being installed and run throughout the building/s.

PART 2 – PRODUCTS

2.1 INTERIOR SPEAKERS

A. Interior speakers shall be eighth inch diameter paper cone type with T25 25V line matching transformer. Frequency range to be 30 to 15,000 Hz. Telecor STB-11 or equal. Drop ceiling support shall be Telecor CC1, or equal. Interior wall mounted speakers shall be mounted in Atlas Sound VP-161A-APF backbox/baffle assembly. Atlas Sound

2.2 EXTERIOR SPEAKERS

A. Exterior speaker assembly shall be Atlas APF-15TUC series loudspeaker with T-11 transformer in an Atlas SE161-R6 backbox and VP161-APF cover, or equal. Housing shall include a baffle and be painted to match surrounding surfaces.

2.3 CABLING

A. Cable serving interior speakers shall be home run 23 AWG Category 6 CMP, Berk-Tek LANmark 1000 Cat6 white in color 11074738

B. Cables are to be terminated at the IDF onto purple Leviton Cat 6 jacks

61110-RP6 and secured to a 48 port Leviton Multimedia panel 49255-H48 with a 49257-QHD. Ports utilized will depend on speaker counts. A 50 pair ISP cable is to terminate from a 48 port Leviton 69586-U48 patch panel to the 110 frame in the same IDF. Ports utilized will depend on speaker counts.

2.4 TELECOR EQUIPMENT

A. Provide and install a Telecor XL system and Tel-250 amplifier with supporting heavy duty CPI rack shelves. The headend is to include enough points on the system to support a 1:1 speaker to points ratio for the campus. An additional 25 inputs and 100 outputs will also be required for growth.

B. Provide and install from the Telecor XL unit 25 pair tails to C5PPLs located in the designated equipment rack TBD in the MDF. The 25 pair tail counts are to support the build out in 2.4A.

C. Provide and install a custom length CAT 6 purple in color patch cord for each speaker from the terminated purple jacks to the C5PPLs.

D. Each patch cord must be labeled at each end with a wraparound Brady type label approximately 2” from the male plug. Each label is to match the speaker location label. Neatly route all patch cords through existing vertical and horizontal management. All patch cords installed must have sufficient slack as to not exceed its bend radius minimum and not too long as to take up unnecessary space in the cable management spaces.

E. Provide all programming, bell schedules, Primex syncing module and syncing of clock system for the entire campus Telecor system.

F. Provide and install 2 MCC300 consoles including associated cabling to 2 workstations TBD.

G. The contractor will be responsible for connecting and programming the XL system to the ESUHSD network for remote accessibility at the Ed Center. When adding to an existing system the Contractor shall program all new speakers to Telecor Equipment as directed by the district representative.

H. When adding to an existing system install TELECOR IOP-4 CARD with 50 FT. 25 pair CAT 3 Tail terminated into 110 frame. Contractor shall program one port of the new card(s) for each speaker installed. The bell schedule will be provided by the district IT Representative.

2.5 CLOCKS

A. Install new wired Primex Traditional Series Clocks 14306 12.5” (31.75cm) Black in color. Clocks shall be synchronized to existing campus clock system. Electrical outlet must be installed to support the 120VAC clock.

2.6 LABELS

A. The Contractor shall provide tags, straps, and adhesive labels. These tags, straps, and adhesive labels must be of high quality that will endure heat, water, and time.

B. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.

C. Shall be pre-printed using a mechanical means of printing.

D. Where used for cable marking, provide vinyl substrate with a white printing area and a clear “tail” that self laminates the printed area when wrapped around the cable. The cable marking should be immediately visible and be within two inches from the termination point.

F. Copper patch panel labeling shall be completed with adhesive labeling kit specifically

G. Labeling P-touch font size 4MM bold, black on White, 3/8” labeling tape on all work stations, panels and devices. Contractor must provide labeling samples for approval by the District’s Low Voltage Systems Representative before labeling of the systems is performed.

H. Labels shall be numbered consecutively and separate for each type of use. Refer to Work Station Details and Floor Plan Device Numbering Example for additional information

PART 3 – EXECUTION

3.1 GENERAL COMMUNICATION CABLING METHODS

A. Install cable after interior of building has been physically protected from the weather and work likely to damage conductors has been completed. .

B. Before installing cabling, ensure cable pathways are thoroughly cleaned. Inspect conduit and wireway installed by others.

B. Cabling systems shall be separated by color and segregated along the paths.

D. Pull tape with preprinted foot markers is usually provided when conduit and innerduct are installed; if not, provide pull tape in each empty communications conduit containing a bend or over 10 feet in length.

E. All wiring shall be installed in conduit in concealed areas and in surface nonmetallic raceway in exposed locations.

F. Provide pigtails of adequate length for neat, trained, and bundled connections.

G. Provide protection for exposed cables where subject to damage.

H. Provide abrasion protection for cable or wire bundles that pass through holes or across edges of sheet metal.

I. All equipment except portable equipment shall be secured firmly in place. This shall include loudspeakers, amplifiers, cables, etc. Fastening and supports shall be adequate to support their loads with a safety factor of at least three (3). All switches, connectors, outlets, etc., shall be clearly, logically and permanently marked during installation.

3.2 TESTING

A. The Contractor shall perform an operational check to assure that the system complies with all requirements of these specifications. Operation tests shall be made in the presence of the Engineer and Owner's representative who shall be notified of the test date a minimum of ten (10) days prior to that date.

B. The Contractor, if requested to do so by the Owner, shall be prepared to show by "proof of performance" test that the equipment furnished is equal or superior to the equipment specifications. This proof shall be shown by actual tests and not be printed sales literature. To this end, the Contractor shall provide qualified audio technicians and such test equipment as required to perform this function. The following test equipment shall be considered minimum for the above stated purpose. Sound level meter, 1/3 and 1/10 octave-band wave analyzer, sine and square-wave generator, impedance (CRL) bridge, audio oscilloscope, distortion analyzer, graphic level recorder, calibrated microphone, real-time spectrum analyzer, beat-frequency oscillator, random-noise generator, etc. Instruments, as manufactured by General Radio, Tektronix, Hewlett-Packard and Bruel & Kjaer, are considered acceptable for measurements. Non-professional test equipment or "home-built kit" type gear shall not be acceptable under these specifications.

3.3 AS BUILT DOCUMENTATION

A. The Contractor will be provided drawings in electronic format (DWG, AutoCAD release 14 or later) on which as-built construction information can be added.

B. Upon completion of the project, the Contractor is to prepare as-built documentation showing actual site conditions and installation as constructed.

C. The Contractor shall annotate the base drawings and return a hard copy and electronic form (AutoCAD release 14 or later).

D. The Contractor shall provide and install a C-size framed floor plan with outlet and device locations for all low voltage systems. The floor plan shall be framed and installed in the new MDF/IDF Room. The drawing should be a plan of the building with a symbols legend showing where all the devices are and the labeling for each device only. Remove all general notes and details not applicable to the low voltage systems.

END OF SECTION

SECTION 281600

INTRUSION DETECTION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Division 00 General Conditions and Division 01 General Requirements apply to the work of this Section.

1.2 DESCRIPTION OF WORK

A. Installation of new turn-key Intrusion Detection System.

B. Projects where the ESUHSD is renovating or adding on to a building, the intrusion alarm contractor shall include all cost to de-commission the existing system before any new contraction can start. The District shall be advised in writing the date as to when the existing system will be de-commissioned. The Contractor scope of work shall not degrade any function or operation of the remaining site intrusion alarm system. All de-commissioned devices shall be turned over to the ESUHSD. Should the remaining site intrusion alarm system malfunction, be turned off or be degraded due to the construction activities, the Contractor shall provide twenty four hour security watch at its own expense until the system is back online and fully functioning.

1.3 RELATED WORK

A. This Section shall be used in conjunction with the following other specifications and related Contract Documents to establish the total requirements for basic communications materials and methods:

1. Section 26 05 00, Electrical General Requirements.

2. Sections of Division 27 00 00 Communications.

1.4 SUBMITTALS

A. Manufacturer’s literature describing the product

B. Wiring diagrams clearly showing the interconnections of all major components

1.5 SYSTEM FUNCTIONAL DESCRIPTION

A. The Intrusion Alarm System shall provide intrusion alarm notification via web IP address for motion detection within the building. Keypads shall arm and disarm the building system.

1.6 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference at least seven calendar days prior to installing any equipment, devices or systems in the IDF Room. For projects with underground and/or roof mounted conduits, convene a separate pre-installation meeting

B. Attendance: Architect, Construction Manager, Contractor, Electrical Subcontractor, Low Voltage Subcontractor/s, District Low Voltage Systems Representative and Project Inspector.

C. Agenda: Review all low voltage systems related to the project. Subcontractors shall come prepared to discuss how the low voltage systems are being installed and run throughout the building(s).

PART 2 – PRODUCTS

2.1 GENERAL

A. Equipment shall bear U.L. label.

B. All materials that make-up a complete system shall be U.L. listed.

2.2 INTRUSION CONTROL PANEL

A. Control Panels

1. Bosch B9512G control panel for large commercial applications. Supports up to 599 points using a combination of hardwired or wireless points for installation flexibility, and up to 32 areas and 32 doors for up to 2,000 users. On-board Ethernet port for Conettix IP alarm communication and remote programming,compatible with modern IP networks including IPv6/IPv4, AutoIP, and Universal Plug and Play. Installer-friendly features including on-board USB for easy on-site RPS programming, plus plug-in PSTN and Cellular communication modules for simple installation and future proof upgrades. Email and text notifications as well as remote control of system using Android or iOS mobile devices with an additional Bosch D8103 & D101 enclosure, lock and key.

B. Enclosure to include sufficient 8-point expanders to support homerun cables to each device. Bosch D8128D Octopopit.

C. No popits allowed in this project.

2.3 POWER SUPPLY

A. 12 VDC, 5 amp uninterruptible power supply with multi-regulator and battery changer in vented locking 11”H x 15”W x 4”D cabinet. AlarmSaf PS5-M003-UL.

2.6 DETECTION DEVICES

A. Wall mounted passive infrared type. Bosch ISC-BPRQ2 with gimble mount B335-3. Mount 4” below suspended ceilings. Mount between 10’-0” to 14’-0” where ceiling height is over 10’-0”. In all cases, the motion sensor should not be obstructed. Two motions sensors are to be installed in each classroom for optimum coverage. Additional motion sensors are to be installed to cover all exterior doors and hallways.

B. A glass break detector must be install to cover any exterior window in the project. Wall mounted DS1103i Flush-mount Glassbreak Detector. The maximum detection range is 25 ft. (7.6 m) from the farthest corner for glass sizes 12" by 12" (0.3 m by 0.3 m) and larger. This detector can also be ceiling mounted if a nearby wall is not within its range.

C. Takex pool beams are to be used around the perimeter of the pool decks.

For pools with a maximum distance of 165' between the beams Tekex PB-IN-50HF. For pools with a maximum distance of 330' between the beams Tekex PB-IN-100HF

2.7 EXTERIOR BELL

A. Amesco ABB-1014 to be installed outside the exterior door closest to the buildings IDF. Location to be approved by the District’s Low Voltage Systems Representative.

2.8 KEYPADS

A. Wall mounted alarm set/disable keypad with illuminated 16-character vacuum fluorescent display and sounder. Off-white case Bosch D1255. Unless otherwise specified, a minimum of 4 keypads are to be installed throughout the building to enable flexibility in program zoning. Specific locations are to be confirmed during design.

2.9 CABLE

A. #22/4 Conductor cable. West Penn 25241.

B. #18/4 Conductor cable. West Penn 25244.

C. IDEAL #89-610 Barrier Strips for consolidation of power wires at the panel end.

D. Berk-Tek 11074739 data cable grey in color. Install 2 cables from the Intrusion panel to the IDF rack located in the same room and terminate each end onto grey Leviton CAT 6 61110-RG6 jacks. At the rack end secure jacks on ports 47 and 48 of the designated patch panel. At the intrusion panel end secure the jacks onto a (2) port Leviton SMB.

2.10 LABELS

A. The contractor shall provide tags, straps, and adhesive labels. These tags, straps, and adhesive labels must be of high quality that will endure heat, water, and time.

B. Shall meet the legibility, defacement, exposure, and adhesion requirements of UL 969.

C. Shall be pre-printed using a mechanical means of printing.

D. Where used for cable marking, provide vinyl substrate with a white printing area and a clear “tail” that self laminates the printed area when wrapped around the cable. The cable marking should be immediately visible and be within two inches from the termination point.

E. Where insert type labels are used, provide clear plastic cover over label.

F. Labeling P-touch font size 4MM bold, black on White, 3/8” labeling tape on all patch cords, cables ends, panels and devices.

G. Labels shall be numbered consecutively and separate for each type of use. Refer to Work Station Details and Floor Plan Device Numbering Example for additional information

PART 3 – EXECUTION

3.1 GENERAL

A. All wiring shall be installed in conduit in walls or hard ceilings or open wiring installed concealed above suspended ceilings. Open wiring shall be supported on rings not to exceed 24-inches on center. Separation of a minimum of 4” is required between low voltage systems throughout the cable run.

B. Each device cables shall be homeruns from the device to the panel located in the IDF. No daisy chaining of power or alarm circuit wiring is permitted.

C. End-of-line resistors shall be installed at the device end, not at the panel end.

D. All devices shall be labeled and each end of the device. All cables are to be labeled with a p-touch labeler on both ends. Labeling samples must be provided and approved by the District’s Low Voltage Systems Representative before the system is labeled.

E All point assignments shall be coordinated and approved by the District’s Low Voltage Systems Representative prior to termination of device cabling at panel end. Refer to District’s Point Assignment and Point Index Templates.

D. No popits are allowed in this project

3.2 PROGRAMMING AND TESTING

A. The Contractor shall perform an operational check to assure that the system complies with all requirements of these specifications.

B. The contractor shall program the system to report alarms to the overall campus system as directed by the owner.

3.3 AS BUILT DOCUMENTATION

A. The Contractor will be provided drawings in electronic format (DWG, AutoCAD release 14 or later) on which as-built construction information can be added.

B. Upon completion of the project, the Contractor is to prepare as-built documentation showing actual site conditions and installation as constructed.

C. The Contractor shall annotate the base drawings and return a hard copy and electronic form (AutoCAD release 14 or later).

D. The Contractor shall provide and install a C-size framed floor plan with outlet and device locations for all low voltage systems. The floor plan shall be framed and installed in the new MDF/IDF Room. The drawing should be a plan of the building with a symbols legend showing where all the devices are and the labeling for each device only. Remove all general notes and details not applicable to the low voltage systems.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1- GENERAL

1.1 DESCRIPTION

A. Furnish labor, material and equipment required for the removal of surface debris, removal of trees, shrubs and other plant life, where indicated on the Drawings; remove temporary structures, miscellaneous debris in and around structures to be demolished; remove appurtenances and abandoned utilities; remove brush, trash, salvage and debris resulting from clearing; remove paved asphalt concrete areas. Include stripping and stockpiling of topsoil, and dust control.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies: Perform Work, including disposal of debris, in accordance with rules and regulations of State and local agencies having jurisdiction. Comply with Section 01 41 00 and 01 41 01.

1.3 SUBMITTALS

A. Conform to the requirements of Section 01 32 19 for submittal procedures.

B. Product Data: Provide data for Products specified.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 SURROUNDING SITE CONDITION SURVEY

A. Prior to commencing the Work, Contractor, and District's Representative shall tour the Project site together to examine and record damage to existing adjacent buildings, streets, sidewalks, and all other improvements. This record shall serve as a basis for determination of subsequent damage due to Contractor's operations and shall be signed by all parties making the tour. Any cracks, sags, or damage to the adjacent buildings and improvements not noted in the original survey, but subsequently discovered, shall be reported to the District's Representative.

1.5 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The Drawings show existing above and below grade structures, drainage lines, storm drains, sewers, water, gas, electrical, hot water, steam, condensate and other utilities that are known to the District in their approximate location. The Contractor shall exercise care in avoiding damage to these facilities. The Contractor will be held responsible for the repair if damaged. The District or District's Representative does not guarantee that all utilities or obstructions are shown or that the locations indicated are accurate.

B. Locate and surface mark (various colors specified by USA) all known existing underground structures and utilities before proceeding with construction operations that may damage them. Stake and flag utility valve boxes and other surface structures. Prior to commencing excavation and trenching, coordinate with Underground Service Alert (USA North/1-800-227-2600 or 811) for field verification and marking of utilities within limits of Project site. Provide USA notification permit number to District's Representative prior to starting site Work. Existing underground structures and utilities shall be kept in service unless approval to interrupt or shutdown service is obtained from District's Representative. If damaged, the utility shall be repaired with no adjustment of Contract Sum or Contract Time.

C. Contractor shall uncover, prior to any earthwork for new construction, all existing piping where crossings, interferences, close proximity (5 feet or less) or connections are shown on the Drawings, from 1 foot below proposed construction limit to the existing ground surface. Any variation in the actual elevations and the indicated elevations shall be brought to the District's Representative's attention. If the Contractor does not expose all existing utilities, Contractor shall not be entitled to additional compensation for Work necessary to avoid interferences.

D. If interferences occur at locations other than the general locations shown on the Drawings, and such utilities are damaged before their locations have been established, or create an interference, the Contractor shall notify the District's Representative and a method for repairing the damage or correcting the interference shall be supplied by the District's Representative. Payment for additional Work due to interferences not shown on the Drawings shall be in accordance with the General Conditions.

E. Care shall be exercised to prevent damage to adjacent facilities including walks, streets, curbs, and gutters from settlement, lateral movement, undermining, and washout and other hazards; where equipment will pass over these obstructions suitable planking shall be placed. Damaged facilities, due to the Contractor operations, shall be removed and replaced at the Contractor's expense.

F. If any other structures or utilities are encountered, request District's Representative to provide direction on how to proceed with the Work.

G. If any structure or utility is damaged, take immediate action to ensure the safety of persons and property. Correct damage immediately. Contractor shall bear all costs of correction, replacement, repair, restoration, including related damages additional testing, inspection, and compensation for District’s Representatives services and expenses. Compensation to the District shall be made by deductive Change Order.

H. No Work is to be performed on energized electrical equipment unless scheduled with the District's Representative. The District reserves the right to specify specific conditions for all Work involving energized high-voltage electrical equipment.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Herbicide: Surflan, Chipco, Ronstar G, or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: Verify existing conditions at the site and include all work evident by site inspection whether or not shown on the Drawings.

3.2 PREPARATION AND COORDINATION

A. Notify District's Representative before starting Work and comply with District requirements.

B. Do not close or obstruct roadways, sidewalks or hydrants without District's Representative's approval.

C. Tree Protection: Tree and plant protection shall be in accordance with Section 01 56 39 Tree & Plant Protection. Trees identified by the District's Representative for relocation shall be removed and turned over to the District, at a location identified by the District's Representative.

3.3 SITE CLEARING

A. Conduct clearing with minimum interference to public and private access. Maintain egress and access from adjacent structures at all times.

B. Clear the site within the limits shown and remove all pavement, trees, shrubs, remaining brush, stumps and waste material that would interfere with construction operation, except as specifically indicated otherwise on the Drawings, or identified by the District's Representative.

C. Apply an approved herbicide to remaining roots over 1 1/2 inches in diameter.

D. In areas not to be further excavated, fill depressions resulting from site clearing. Place and compact satisfactory soil materials in accordance with the Geotechnical Report.

E. Clear undergrowth and deadwood without disturbing subsoil.

F. Pollution and Dust:

1. Comply with Section 01 35 00.

2. Conduct operations so as to prevent windblown dust and dirt from interfering with adjacent property's normal operations.

3. Wet down dirt areas by spraying as required to prevent dust from becoming airborne.

G. Assume liability for all claims related to windblown dust and dirt.

H. No burning on District property.

3.4 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Section 01 35 00 and 01 41 01, including, but not limited to:

1. Separate packaging materials by type and place in locations designated by the Contractor.

2. Place unused scrap material in locations designated by the Contractor.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rough Grading of site, Excavating, backfilling and grading, as required to obtain contours and elevations indicated on the Drawings.

2. Subgrade preparation for pavement areas.

B. Related Sections:

1. Section 31 10 00 Site Clearing.

2. Section 31 23 33 Trenching and Backfilling.

3. Section 31 25 13 Erosion Controls

1.2 REFERENCES

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 1997.

B. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2000a.

C. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.

D. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2000.

E. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 1994.

F. ASTM D 2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregates; 1995.

G. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 1996.

H. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 1996.

I. Geotechnical Investigation for site is available in accordance with Information Available to Bidders: Geologic Hazards Evaluation and Geotechnical Engineering Study, Yerba Buena High School, Building 100, 1855 Lucretia Avenue, San Jose, California, prepared by Earth Systems Pacific, dated March 11, 2015.

1.3 DEFINITIONS

A. Excavation: Earth excavation includes excavation of pavement and other obstructions visible on the ground surface; underground structures, utilities and other items to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.

B. Subgrade: Previously undisturbed material prepared, and compacted to required density and elevation to support a structure, or pavement system.

C. Subbase: Compacted layer of approved material used between the subgrade and the pavement.

D. Earth Excavation: Materials not otherwise defined as rock excavation including removal and disposal of pavements, visible on grade obstructions, underground structures, utilities and other items indicated to be removed.

E. Unauthorized Excavation: Includes removal and disposal of material beyond subgrade elevations, and dimensions indicated without prior approval of the District’s Representative.

F. Standard Specifications: Refers to the Standard Specifications, State of California, California State Transportation Agency, Department of Transportation (Caltrans), latest edition. In case of conflict between the Standard Specifications and these Specifications, the strictest Specifications shall govern. Provisions for measurement and payment specified within the Standard Specifications shall be disregarded and the provisions of this Agreement shall govern.

G. Relative Compaction: Ratio, expressed as a percentage of field dry density as compacted to a maximum dry density of representative sample of the same material determined by ASTM D1557.

1.4 SUBMITTALS

A. Conform to the requirements of Section 01 32 19 for submittal procedures.

B. Product Data: Provide data on Products specified.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

F. Deliver samples of import backfill materials to District's Representative in quantities sufficient for testing. Deliver at least 15 days prior to use.

G. Submit a Confined Space Emergency Plan in accordance with Section 01 41 00 Regulatory Requirements prior to any personnel entering trenches or excavations greater than 5 feet in depth.

1.5 QUALITY ASSURANCE

A. Testing and Inspection Service: District will engage soil testing and inspection service, for quality assurance testing during earthwork operations.

1.6 DELIVERY, STORAGE AND HANDLING

A. Stockpile satisfactory excavated materials in approved location, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

1. Do not store soil within drip line of trees indicated to remain.

1.7 PROJECT CONDITIONS

A. Subsurface Conditions: Contractor responsibility to determine the exact nature and extent of subgrade conditions.

B. Subgrade and geotechnical information provided by the District shall not relieve the Contractor of responsibility for being familiar with the character and extent of subsurface conditions that may be encountered during performance of the Work.

C. Do not use explosives.

D. The Contractor shall assess and evaluate all site conditions and layout the work before any earthwork shall begin.

1.8 MAINTENANCE

A. Repair settlement at excavated areas for a period of one year following final acceptance at no additional cost to District. Remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment; restore appearance, quality, and condition of surface and finish to match adjacent work, and eliminate evidence of restoration.

1.9 WARRANTY

A. The Contractor shall warrant the Work against settlement for a period of one year after the date of final acceptance, and shall repair damage caused by settlement within that time. For the purpose of this Specification, settlement will be deemed to have occurred if on paved surfaces, depressions greater than 3/8 inch occur relative to paved surfaces outside the excavation area.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fill Materials: Use only suitable fill except where sand is required. Do not use water saturated soil material or contaminated material.

1. On-site soils are considered suitable for use in engineered fill material, provided that they are at a workable moisture content and free of significant concentrations of organic materials, rubble or debris. The on-site clay soils located at an approximate depth of ten feet below existing site grades are not considered suitable for use in fill construction beneath at-grade structures, exterior slab-on-grade concrete or pavements.

2. If imported material is required for fill and backfill, the imported material must be granular soil, free of organic matter, which does not exhibit excessive shrinkage or swelling behavior when subjected to changes in water content. Imported fill shall contain no environmental contaminants or construction debris. The material shall conform to the following:
   a. Have 100 percent pass through a 3 inch sieve, 95 to 100 percent pass through a 1 inch sieve.
   b. Be thoroughly compacted without excessive voids.
   c. Have a maximum Plasticity Index of 15.
   d. Have an Expansion Index less than 20.

PART 3 EXECUTION

3.1 PREPARATION

A. Excavate by hand within drip-line of trees to remain. Do not damage trees or roots, prevent dehydration of exposed roots. Refer to Section 01 56 39 Tree & Plant Protection for additional requirements.

B. Surfaces to receive fill and soils to be compacted shall be free of standing water, and shall not be saturated with water.

C. In asphalt concrete paved areas, neatly saw cut pavement 12 inches beyond the limits of excavations. If edge of pavement is located within 30 inches of limit of excavation, remove pavement to existing edge.

D. Complete clearing and stripping as indicated on Drawings and in accordance with Section 31 10 00 Site Clearing.

E. Remove existing utility lines that traverse the site as indicated on Drawings and in accordance with Section 31 10 00 Site Clearing.

F. Scarify and compact the upper 12 inches of the exposed subgrade-to-receive fill to 90 percent relative compaction.

3.2 EXCAVATION

A. Additional Excavation: When excavation has reached required subgrade elevation shown on Drawings, notify District's Representative who will inspect conditions. When unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and place excavated material as directed by the District's Representative.

B. Stability of Excavations: Comply OSHA regulations for slope requirements. Provide shoring and bracing where required slope cannot be maintained.

C. Excavation for Pavements: Cut surface under pavements to comply with pavement section shown on Contract Documents.

D. Coordinate excavation, preparation and backfill with Work of related Sections for Project Site utilities, drainage and irrigation systems.

E. Replace the excavated material or any approved supplementary import material in lifts not to exceed 6 inches in compacted thickness and compact each lift to a minimum 90 percent relative compaction.

F. The upper 12-inches of fill within building pads and concrete flatwork areas shall be per the project geotechnical report.

G. Perform footing excavations after fill placement is complete.

3.4 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification as indicated below.

B. Percentage of Maximum Density Requirements: Compact soil to no less than the following percentages of maximum density in accordance with ASTM D 1557.

1. Building Slabs: Compact top 12 inches of subgrade and each layer of backfill or fill material at 90 percent relative compaction.

2. Lawn or Unpaved Areas: Compact top 12 inches of subgrade to 85% relative density, and each preceding layer of backfill or fill material at 90 percent density.

3. Vehicular pavements: Compact top 12 inches of subgrade and each layer of backfill or fill material at 90 percent relative compaction. The upper 6 inches of pavement subgrade soils shall be compacted to at least 95 percent relative compaction.

C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

1. Remove and replace or scarify and air dry soil material that is too wet to permit compaction to specified density.

2. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

3.5 BACKFILL AND FILL

A. Place approved soil material in layers to required subgrade elevations, for each area classification listed below. Do not use water saturated soil material or contaminated material.

1. In excavations, use approved excavated or borrow material.

2. Under planted areas, use topsoil from site stockpile as specified in Section 31 10 00 Site Clearing.

3. Under walks and pavements, use subbase material, approved excavated or borrow material, or combination of both.

4. Under steps, use approved subbase material.

5. Under building slabs, use approved drainage fill material.

B. Backfill excavation as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

2. Inspection, testing, approval, and recording locations of underground utilities.

3. Removal of concrete formwork, shoring and bracing: Prevent settling due to removal of materials from below structures.

4. Backfilling of voids with satisfactory materials.

5. Removal of trash and debris from excavation.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Place backfill and fill materials in uniform lifts not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches loose depth for material compacted by hand-operated tampers. Prevent wedging action of backfill against structures and displacement of piping and conduit.

3.6 GRADING

A. Provide smooth finished surfaces within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated on Drawings, or between such points and existing grades.

B. Grade areas outside of building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, within the following tolerances above or below required finish grade.

1. Lawn and Unpaved Areas to Receive Topsoil: 0.10 foot

2. Pavements and Walks: Line, grade and cross-section, 0.10 foot

3. Structures: 0.10 foot.

C. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

D. Grade fill under building slabs smooth and even, free of voids, to required elevation. Provide final grades with a tolerance of plus or minus 1/4 inch in 10 feet.

3.7 FIELD QUALITY CONTROL

A. See Section 01 40 00 Quality Requirements, for general requirements for field

inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D6938.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), or AASHTO T 180.

D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no additional cost to the District.

3.8 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Transport approved clean excess excavated material to designated soil storage areas on District's property and within four miles of Project Site and stockpile soil. Keep enough soil to place 12 inches in planting areas, soil to be clean of debris including gravel.

D. Comply with the applicable provisions of Section 01 74 00 - Cleaning.

C. Remove excess excavated material, trash, debris and waste materials and dispose of it off the District's property.

D. Except for stripped topsoil or other material indicated to remain District property, cleared materials shall become the Contractor’s property and shall be removed from the Project site.

3.9 PROTECTION

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

C. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

D. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.10 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Section 01 74 00 – Cleaning, including, but not limited to:

1. Separate packaging materials by type and place in locations designated by the Contractor.

2. Place unused scrap material in locations designated by the Contractor.

END OF SECTION

SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes trenching, backfilling and compacting for utilities.

B. Related sections
   1. Section 01 40 00 Quality Requirements.
   2. Section 31 20 00 Earth Moving.
   3. Section 31 25 13 Erosion Controls.

1.2 REFERENCES

A. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3); 2000.

B. Manual of Warning Signs, Lights and Devices for Use in Performance of Work Upon Highways, issued by the California State Department of Transportation.

C. Office of Safety and Health Act (OSHA) Construction Safety Orders.

D. California Code of Regulations Title 8: Construction Safety Orders.

1.3 DEFINITIONS

A. Finish Grade Elevations: Indicated on Drawings.

B. State Standard Specifications: Standard Specifications, State of California, California State Transportation Agency, Department of Transportation (Caltrans), latest edition, excluding Sections pertaining to measurement and payment items.

C. Relative Compaction: Ratio, expressed as a percentage of field dry density as compacted to a maximum dry density of representative sample of the same material determined by American Society for Testing and Materials (ASTM) Test Method D1557 (c).

1.4 SUBMITTALS

A. Conform to the requirements of Section 01 32 19 for submittal procedures.

B. Product Data: Provide data for Products specified.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

F. Submit name of imported materials source.

G. Deliver samples of backfill and fill materials to District's Representative in quantities sufficient for testing. Deliver at least 15 days prior to use.

1.5 WARRANTY

A. The Contractor shall warrant against settlement for a period of one year after the date of final acceptance, and shall repair damage caused by settlement within that time. For the purpose of this Specification, settlement will be deemed to have occurred if on paved surfaces, the depression falls 3/8-inches below the average of the sides of the uncut portion.

PART 2 PRODUCTS

2.1 BEDDING AND BACKFILL MATERIALS

A. Bedding: In accordance with City of San Jose Department of Public Works Standard Specifications, latest edition.

B. Backfill: In accordance with City of San Jose Department of Public Works Standard Specifications, latest edition.

2.2 SOURCE QUALITY CONTROL

A. See Section 01 40 00 Quality Requirements for general requirements for testing and analysis of soil material.

B. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 PREPARATION

A. Preparation of Work
   1. Underpin adjacent structures, which may be damaged by excavation Work, including utilities.

2. Maintain trench crossings for vehicular and pedestrian traffic at street crossing, driveways and fire hydrants.

3.2 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. See Section 31 20 00 Earth Moving for additional requirements.

3.3 TRENCHING

A. Work Included

1. Perform operations necessary to excavate earth, regardless of character and subsurface conditions, from the trench or adjacent thereto, and to place trench stabilization, pipe bedding, pipe cover, trench water removal, trench backfill and base, as shown on the Drawings, as well as providing traffic control and regulation through construction areas.

2. The Contractor shall do excavation of whatever substance is encountered to the lines and grades shown on the Drawings. Materials suitable for use as backfill shall be piled in an orderly manner a sufficient distance from the edge of the trench to avoid overloading and to prevent sliding into the trench.

3. The Contractor shall do such grading or Work as is necessary to prevent surface water from entering the excavation.

4. Demolish and remove existing pavement, curb and gutter, and other Project Site facilities as shown on the Drawings allow Project operations. Existing asphalt concrete pavement to be removed shall be saw cut in longitudinal neat straight lines while maintaining the cuts vertical for the full depth of the asphalt concrete pavement. Portions of existing concrete curbs, gutters and sidewalks to be removed to permit new construction shall be cut using a concrete saw to provide neat straight lines with vertical cuts.

5. Maximum allowable open trench is 600 L.F. at any one time. Trenches outside the enclosure of the temporary construction fence are to be covered or otherwise protected at the end of each work day.

6. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

7. Do not interfere with 45 degree bearing splay of building foundations.

8. Cut trenches wide enough to allow inspection of installed utilities.

9. Hand trim excavations. Remove loose matter.

10. Remove large stones and other hard matter which could damage piping or impede consistent backfilling or compaction.

11. Remove lumped subsoil, boulders and rock up to 1/3 cu. yd. in size.

12. Remove excavated material that is unsuitable for re-use from Project Site.

13. Stockpile excavated material to be re-used in area designated on Project Site in accordance with Section 31 20 00 Earth Moving.

14. Remove excess excavated material from Project Site in accordance with provisions in Section 31 20 00 Earth Moving.

B. Width of Trench: Except where otherwise specifically permitted by District's Representative, sides of trenches shall be vertical, shored, as required, and shall be of uniform width from top to bottom. Trenches shall be of a width as shown on the Drawings.

3.5 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

D. Buried pipe shall have at least 36 inches of cover and 12 inches of clearance from other utilities.

3.5 PIPE BEDDING

A. Bedding Excavation: Excavate trenches below grade of pipe bottom to the depth indicated on drawings.

B. Stabilization of Trench Bottom: When trench is unstable due to wet or spongy foundation, stabilize trench bottom with gravel or crushed rock. The District's Representative will determine suitability of trench bottom and amount of gravel or crushed rock needed to stabilize soft foundation. Remove and replace soft material with gravel or crushed rock when directed by District's Representative.

C. Placement of Bedding Material: Place sufficient bedding material in trench bottom up to grade of bottom of pipe. Relative compaction of tamped material shall be not less than 90 percent relative compaction. Place and compact additional bedding material to provide uniform bearing under the full length of the pipe to a minimum width of 60 percent of its external diameter.

3.6 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Place sand backfill to not less than 4” above top of pipe.

C. Place warning tape and tracer wire for all utilities.

D. Fill up to subgrade elevations unless otherwise indicated.

E. Employ a placement method that does not disturb or damage other Work.

F. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

G. Maintain optimum moisture content of fill materials to attain required compaction density.

H. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

I. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

J. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise on the Drawings. Make gradual grade changes. Blend slope into level areas.

K. Reshape and re-compact fills subjected to vehicular traffic.

L. Compaction: Native backfill shall be compacted by machine in uniform layers not exceeding 0.67 foot. Backfill shall be compacted to a relative compaction of not less than 90 percent to within 1 foot of subgrade. The upper 1 foot of subgrade shall be compacted to 95 percent; 85 percent compaction will be acceptable in undeveloped areas.

3.7 TOLERANCES

A. Top Surface of General Backfilling: Plus or minus 0.10 foot from required elevations.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 0.10 foot from required elevations.

3.8 FIELD QUALITY CONTROL

A. See Section 01 40 00 Quality Requirements for general requirements for field inspection and testing.

B. The District will make soils tests when advised by the Contractor that in the Contractor’s opinion sufficient densities have been achieved. If the first tests in any areas fails, the Contractor shall pay for further testing in that area until specified densities are obtained.

The District's Representative shall determine the number and location of tests required. Contractor shall provide a backhoe and operator upon request at no additional cost to the District.

C. Lights, flags, and other warning and safety devices for street and highway work shall conform to the requirements set forth in the current Manual of Warning Signs, Lights and Devices for Use in Performance of Work Upon Highways, issued by the California State Department of Transportation.

D. Preparation, excavation and trenching shall comply with California Code of Regulations Title 8: Construction Safety Orders.

3.9 CLEANING

A. Leave unused materials in a neat, compact stockpile during progress of work.

B. Remove unused stockpiled materials. Leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

3.10 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. The Contractor shall remove and dispose of all excess excavated material to a suitable site. The proper and legal disposal shall be the responsibility of the Contractor.

3.11 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Section 01 74 00 - Cleaning including, but not limited to:

1. Separate packaging materials by type and place in locations designated by the Contractor.

2. Place unused scrap material in locations designated by the Contractor.

END OF SECTION

SECTION 31 25 13

EROSION CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Work included: The work included in this Section includes all labor, materials, and equipment necessary to place temporary and permanent erosion and sediment control measures as detailed on the Drawings and specified herein.

1.2 RELATED SECTIONS

A. Section 31 20 00 Earth Moving

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 for definitions, acronyms, and abbreviations.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.

C. Referenced Standards:

1. Caltrans Standard Specifications.

1.4 QUALITY ASSURANCE AND CONTROL

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

1.5 ENVIRONMENTAL REQUIREMENTS

A. Protect adjacent properties and water resources from erosion and sediment damage throughout life of contract.

1.6 SUBMITTALS

A. Product Data: Submit:

1. Materials list of items proposed to be provided under this Section.

2. Specifications and other data needed to prove compliance with the specified requirements.

3. Monthly Inspection Report and Certification Form for Erosion and Sediment Controls. Please note that inspections must be done monthly at least two (2) weeks apart and after a Two-Year rainfall (4 to 6 inches of rain). Keep reports on file at the job trailer. Do not mail to sate or city offices. A copy of the report form is attached in the SWPP Plan.

PART 2 PRODUCTS

2.1 FOR EROSION AND SEDIMENT CONTROL

A. The primary erosion and sediment control measures implemented during the Mass Grading/Site Preparation phase of the project shall be inspected, maintained, and repaired in accordance with the Storm Water Pollution Prevention Plan for this project. Secondary measures such as Inlet Protection, dust control, erosion control blanket, temporary and permanent seeding shall be installed/applied as necessary. See Civil Plans for placement of BMP's and the Erosion Control Details for further information.

B. Inlet Protection as shown on the above mentioned detail sheet.

PART 3 EXECUTION

3.1 PREPARATION

A. Review Site Improvement Plans and the Storm Water Pollution Prevention Plan along with the approved "Notice of Intent" issued by the California Regional Water quality Control Board (RWQCB).

B. Deficiencies or changes on Site Improvement Plans or Storm Water Pollution Prevention Plan as it is applied to current conditions shall be brought to the attention of the Project Civil Engineer for remedial action.

3.2 EROSION CONTROL AND STORM WATER POLLUTION PREVENTION PLAN IMPLEMENTATION

A. Place erosion control and storm water pollution prevention measures in accordance with the approved Contract Documents as construction proceeds and the appropriate phase is in progress for each measure.

B. Permanent erosion control measures shall be incorporated into the Project at the earliest practical time to minimize the need for temporary controls.

3.3 PERMANENT AND TEMPORARY SEEDING MEASURES

A. Permanently seed and mulch cut slopes as excavation proceeds to extent considered desirable and practical.

B. Slopes that erode easily or that will not be graded for a period of fourteen (14) days or more shall be temporarily seeded as work progresses with temporary seeding.

3.4 REMOVAL OF EROSION AND SEDIMENT CONTROL MEASURES

A. When site is ninety-five percent (95%) re-vegetated and stabilized with grasses, remove temporary sediment risers. Remove accumulated sediment and regrade area to original contours. Seed and protect with permanent grass seed mixture.

B. Remove drainage structure inlet protection.

C. Remove silt fence and temporary check dams. Seed and protect any disturbed areas with permanent grass seed mixture.

END OF SECTION

SECTION 32 12 16

ASPHALT PAVING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section Includes:

1. Asphaltic concrete paving, wearing, binder and base course.

2. Surface sealer.

3. Paving fabrics.

4. Aggregate subbase course.

1.2 RELATED SECTIONS

A. Section 31 25 13 Erosion Controls

B. Section 31 20 00 Earth Moving

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 for definitions, acronyms, and abbreviations.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.

C. Referenced Standards:

1. CalTrans Standard Specifications.

2. American Association of State Highway and Transportation Officials:

3. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot- Mix Types.

4. AI MS-19 - Basic Asphalt Emulsion Manual.

5. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.

6. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.

1.4 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Asphalt Pavement Mix (Base Course):

1. Basis of Measurement: By cubic yard.

2. Basis of Payment: Includes preparing base, primer, tack coating surfaces, placing, compacting and rolling, testing. Includes mix design, supplying to site, testing.

B. Asphalt Pavement Mix (Wearing Course):

1. Basis of Measurement: By cubic yard.

2. Basis of Payment: Includes primer, tack coating surfaces, placing, compacting and rolling, testing. Includes mix design, supplying to site, testing.

1.5 PERFORMANCE REQUIREMENTS

A. Paving: Designed for main street arteries.

1.6 SUBMITTALS

A. Product Data: Submit product information and mix design.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with California Department of Transportation Public Work's standards.

B. Mixing Plant: Conform to California Department of Transportation Public Work's standards.

C. Obtain materials from same source throughout.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Asphalt Cement: In accordance with Section 39 of California Department of Transportation Public Work's standards.

B. Aggregate for Base Course Mix: In accordance with California Department of Transportation Public Work's standards.

C. Aggregate for Wearing Course Mix: In accordance with California Department of Transportation Public Work's standards.

D. Tack Coat: In accordance with California Department of Transportation Public Work's standards.

2.2 ASPHALT PAVING MIX

A. Use dry material to avoid foaming. Mix uniformly.

B. Base Course: In accordance with California Department of Transportation Public Work's standards.

C. Wearing Course: In accordance with California Department of Transportation Public Work's standards.

2.3 SOURCE QUALITY CONTROL AND TESTS

A. Submit proposed mix design of each class of mix for review prior to beginning of Work.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify compacted subgrade subbase is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

C. Verify gutter drainage grilles and frames, manhole frames, and are installed in correct position and elevation.

3.2 SUBBASE

A. Prepare subbase in accordance with California Department of Transportation Public Work's standards.

3.3 PREPARATION – PRIMER

A. Apply primer in accordance with California Department of Transportation Public Work's standards.

3.4 PREPARATION - TACK COAT

A. Apply tack coat in accordance with California Department of Transportation Public Work's standards.

3.5 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with California Department of Transportation Public Work's standards.

B. Place asphalt within twenty-four (24) hours of applying primer or tack coat.

C. Place asphalt wearing course as indicated on the Plans.

D. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

E. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.6 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

A. Place wearing course within twenty-four (24) hours of placing and compacting binder course. When binder course is placed more than twenty-four (24) hours before placing wearing course, clean surface and apply tack coat before placing wearing course.

B. Compact each course by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

C. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

3.7 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from Indicated Elevation: Within 1/4 inch.

3.8 PROTECTION OF FINISHED WORK

A. Immediately after placement, protect pavement from mechanical injury for forty-eight (48) hours or until surface temperature is less than 140 degrees F.

END OF SECTION

SECTION 32 13 13

SITE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes site concrete, including but not limited to pavements, walls, retaining walls, stairs, curbs, gutters, mow bands, and other minor site concrete.

B. Provide all labor, materials, equipment, and services to complete the work as indicated on the drawings, and in accordance with these specifications. Work includes but is not limited to the following:

Concrete formwork

Concrete reinforcement

Cast-in-place concrete items:

a. Concrete paving, sidewalks, ramps, pads, curbs, gutters, mow bands, walls, truncated domes, etc.
b. Miscellaneous concrete.
c. All imbeds including anchor bolts, tiedowns, hold downs with bolts, straps, and sleeves.

C. Related Sections

Section 01 32 19 Submittals

Section 05 12 00 Structural Steel

Section 32 84 00 Planting Irrigation

1.2 REFERENCES

A. Caltrans Standard Specifications - Standard Specifications, State of California, California State Transportation Agency, Department of Transportation (Caltrans), latest edition.

B. ASTM - American Society for Testing and Materials

C. ACI - American Concrete Institute, Manual of Concrete Practice.

D. CBC – California Building Code

1.3 DEFINITIONS

A. Percent Compaction: ASTM D1557, percentage as shown on the Drawings of the maximum in-place dry density of the same material.

1.4 SUBMITTALS

A. Conform to the requirements of Division 1, Section 01 32 19 for submittal requirements.

B. Shop Drawings Reinforcement: Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete structures.

C. Concrete Design Mixes:

The preparation of design mixes will be the responsibility of the Contractor. Mix designs may be prepared by the supplier and shall be certified by a Civil Engineer registered in California. Mix designs will be designed by the supplier and approved by the District's Representative.

Written reports will be submitted to the District Representative of each proposed mix for review. Do not begin concrete production until mixes have been reviewed by the District's Representative.

Adjustment of Concrete Mixes:

Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results and other circumstances warrant; at no additional cost to the District and as accepted by the District's Representative. Provide submittals as in A above. Submit adjustment designs a minimum of 48 hours ahead of schedule for concrete production.

D. Product Data: Manufacturers' current catalog cuts and specifications for the following:

Expansion joint filler, sealant, backer rod and bond breaker, including manufacturer's standard color chart for sealant

Air-entrainment.

Curing Compound.

Fly Ash or Slag

MDO plywood made for forming

Water stops

Tactile warning surfacing

E. Certificates:

Reinforcing Steel: Certificate of compliance

Concrete Mix Design: Ticket for each batch delivered showing the following:

a. Mix identification.
b. Weight of cement, aggregate, water, and admixtures, aggregate sizes/proportion, and air entrainment.

1.5 QUALITY ASSURANCE

A. Comply with American Society for Testing Materials (ASTM) A-615 "Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," and "Manual of Standard Practice for Detailing Reinforced Concrete Structures," publication American Concrete Institute (ACI) 315-65 of the American Concrete Institute.

B. Comply with all pertinent recommendations contained in ACI, "Recommended Practice of Concrete Formwork, ACI-347", and the 2013 California Building Code (CBC).

C. Construct forms to sizes, shapes, lines and dimensions indicated on Drawings, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in Work. Use selected materials to obtain required finish. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Provide complete forms of such strength and construction as to prevent any spread, shifting, or settling when concrete is deposited, and tight enough to avoid any leakage or washing out of cement mortar.

E. Provide at least one person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly trained and experienced in placing the types of concrete specified and who shall direct all Work performed under this Section. For finishing of exposed surfaces of the concrete, use only thoroughly trained and experienced journeymen concrete finishers.

F. Conform to Section 90 of the Caltrans Standard Specifications.

G. The Contractor shall contact District’s Representative of any discrepancies between field conditions and plans prior to proceeding with Work. The written dimension on Drawings shall supersede the graphic presentation. Dimensions are from back of curb, center line, base lines or as noted on the plans. All field adjustments must be approved by District’s Representative prior to installation.

H. All walks and curbs shall be established in the field for review and approval prior to concrete pours. The Contractor shall layout the area or form work for review by District’s Representative. If approval is not obtained, the Contractor is responsible for removal of any unauthorized field adjustments.

I. Transitions of curves to other curves, and curves to straight line tangents, shall be smooth and continuous.

J. Place expansion joint and score joints as shown on plan. Adjustments in the field shall be made only with the approval of District’s Representative.

K. Where new concrete paving is placed adjacent to curbs or existing concrete paving, a construction joint (cold joint) shall be provided between the new concrete paving and curbs or existing concrete paving.

L. Sleeving shall be coordinated with concrete work. Refer to irrigation plan for sleeving location.

M. The Contractor shall be responsible for repairing, at no additional cost to District, any disturbed existing landscape designated to remain which resulted from construction of this project.

N. Some materials may require a several week order lead time. Contractor is responsible for determining any and all ordering lead times, and providing required materials at the project site in a timely manner. No unapproved substitutions will be allowed. Contact District's Representative immediately if a specified material is not available.

O. Mock-up: Refer to specification Section 01 32 19 for submittal requirements.

One 4 foot square mock up for all poured in place finishes, including concrete paving and vertical walls, as shown on the drawings. Mock-ups shall also include finish, jointing, thickness, and edging.

Mock-ups shall be reviewed and approved by the District's Representative prior to commencing full work. Approved mock-up shall serve as a standard of quality for judging the acceptance of paving on the Project and may remain as part of the work.

P. Lines and Levels: To be established by a licensed Surveyor or registered Civil Engineer.

Q. Mix Standards: Conform to the ACI Manual and the Portland Cement Association's "Design and Control of Concrete Mixes".

R. Design of Concrete Mix: Employ approved commercial testing laboratory to design concrete mixes as follows:

Item	Minimum Cement Content	28-Day Minimum Strength	Water to Max. Slump	Aggregate Size	Gal/Bag Cement Ratio Max.
Slabs on Grade, Curbs, Exterior Walkways	517 lb/cu. yd	3,000 PSI	3 in.	¾ in	5.5
Walls and Footings	564 lb/cu yd.	4,000 PSI	2-1/2 in.	¾ in	6.0

S. Fly Ash:

Source Control: The following sources of ash are not to be used:

a. Ash from a peaking plant instead of a base loaded plant.
b. Ash from plants burning different coals or blends of coal.
c. Ash from plants burning other fuels (wood chips, tires, trash) blended with coal.
d. Ash from plants using oil as a supplementary fuel.
e. Ash from plants using precipitator additives, such as ammonia.
f. Ash from start-up or shut-down phases of operation.
g. Ash from plants not operating at a "steady state."
h. Ash that is handled and stored using a wet system.

Fly ash used in concrete should be as consistent and uniform as possible. Fly ash to be used in concrete should be monitored by a quality assurance/quality control (QA/QC) program that complies with the recommended procedures in ASTM C311.(6) These procedures establish standards for methods of sampling and frequency of performing tests for fineness, loss on ignition (LOI), specific gravity, and pozzolanic activity such that the consistency of a fly ash source can be certified.

1.6 QUALIFICATION OF INSTALLER

A. Installer shall be thoroughly trained and experienced in the skills required, and shall be completely familiar with the products and their installation as specified on the Drawings and in this Section. Installer shall be present at all times during progress of Work of this Section and shall direct all Work performed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivered Mixes: Coordinate delivery so that mixes may be immediately poured upon arrival at site.

B. Components and Accessories:

Fittings and Reinforcements: Protect from rust, soil and oil contamination at all times. Store on pallets above ground.

Templates: Protect from damage. Test accuracy prior to each use.

1.8 SEQUENCING AND SCHEDULING

A. Coordination: Coordinate all items of other trades to be furnished and set in place. Coordinate proper installation of all accessories embedded in the concrete and for the provision of holes, openings, etc., necessary to the execution of the work of the trades in ample time that progress of the work is not delayed.

1.9 JOB CONDITIONS

A. Cold-Weather Placement: comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

B. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.

C. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor’s option.

Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.

Fog spray form, reinforcing steel, and subgrade just before placing concrete. Keep subgade moisture uniform without puddles or dry areas.

1.10 COORDINATION

A. Secure all pipe sleeves, anchors and bolts, including those for angle frames, inserts, ties and other materials in connection with concrete construction, in position before concrete is placed.

B. Obtain information and instructions from other Trades and suppliers in ample time to schedule and coordinate the installation of items furnished by them to be embedded in concrete so provisions for their work can be made without delaying the project.

1.11 FORM CONSTRUCTION TOLERANCES

A. Set form to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of Work so that forms can remain in place for twenty-four hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

C. Top of forms not more than one-eighth inch in ten feet vertical elevation.

D. Vertical face on longitudinal axis not more than one-fourth inch in ten feet horizontal width.

E. Circular or curved formwork shall be continuous, complete radii as indicated on Drawings. No straight segments in circular/curved formwork shall be accepted.

1.12 TESTS AND OBSERVATIONS

A. The following tests shall be made by District's testing laboratory or by a certified Special Inspector as determined by the District. Special inspections for Concrete Construction shall be in accordance with Section 1704.4 and Table 1704.4 of the 2010 CBC and as noted below:

Periodic Inspection of reinforcing steel and placement.

Cement: Mill analysis and test reports by supplier certifying cement conforms to Specifications is acceptable in lieu of tests at the discretion of District's Representative.

Provide free access to Work and cooperate with testing laboratory.

Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.

Concrete Inspections:

a. Continuous Placement Inspection: Inspect for proper installation procedures.
b. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.

Strength Test Samples:

c. Sampling Procedures: ASTM C172.
d. Cylinder Molding and Curing Procedures: ASTM C31, cylinder specimens.

Concrete cylinders: Make and cure in accordance with ASTM C31.

e. Record shall be made of the time cylinders were made and of locations of concrete from which the cylinders were taken.

f. Three identical cylinders shall be taken from each pour of 25 cubic yards or part thereof, being placed each day.
g. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
h. Make one additional cylinder during cold weather concreting, and field cure.

Field Testing:

i. Slump Test Method: ASTM C143.
j. Air Content Test Method: ASTM C173.
k. Temperature Test Method: ASTM C1064.
l. Measure slump and temperature for each compressive strength concrete sample.
m. Measure air content in air entrained concrete for each compressive strength concrete sample.

Cylinder Compressive Strength Testing:

n. Test Method: ASTM C39.
o. Test Acceptance: In accordance with ACI 318.
p. Test one cylinder at 7 days.
q. Test two cylinders at 28 days.

Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

Should tests show that concrete is below specified strength; the Contractor shall remove all such concrete. Full cost of removal of inferior concrete, its replacement with concrete of proper specified strength and testing shall be borne by the Contractor.

1.13 CODES AND STANDARDS

A. ACI 301 "Structural Concrete for Building"

B. ACE 305 “Recommended Practice for Hot Weather Concreting”

C. ACI 306 “Recommended Practice for Cold Weather Concreting”.

D. ACI 308 “Curing Concrete”

E. ACI 309 “Recommended Practice for Consolidation of Concrete”

F. ACI 318 "Building Code Requirements for Reinforced Concrete".

G. ACI 347 “Recommended Practice for Concrete Formwork”.

H. ACI 605 “Recommended Practice for Hot Weather Concreting”.

I. ACI 614 "Recommended Practice for Measuring, Mixing, and Placing Concrete".

J. ASTM C31 “Practices for Making and Curing Concrete Test Specimens in the Field”.

K. ASTM C33-86 "Specifications for Concrete Aggregate".

L. ASTM C94-89 "Specifications for Ready Mixed Concrete".

M. ASTM C143 “Test Method for Slump Portland Cement Concrete”.

N. ASTM C150 “Portland Cement”.

O. ASTM C309 “Specifications for Liquid Membrane-forming Compounds for Curing Concrete”.

P. Western Concrete Reinforce Steel Institute (WCRSI) "Manual of Standard Practice".

Q. Where provisions of pertinent codes and standards conflict with this Specification, the more stringent provisions shall govern.

R. California Building Code (CBC), latest edition.

S. Section 90 of the Caltrans Standard Specifications.

PART 2 - PRODUCTS

2.1 CONCRETE REINFORCEMENT

A. Reinforcing Bars: Deformed Billet Steel Bars, ASTM A-615, Grade 40 or 60, containing a minimum of 70% total recycled content, clean and free from rust, scale, or coating that will reduce bond.

B. Smooth Dowels for Joints: ASTM A615, Grade 40 smooth, billet-steel bars, shop painted with iron-oxide zinc-chromate primer.

C. Welded Wire Mesh: ASTM A-185 plain type and uncoated finish.

2.2 CONCRETE

A. Concrete Mix:

Ready-mixed concrete in accordance with ASTM C-94 and with aggregates comply with ASTM C-33 and Portland Cement ASTM C-150, Type II.

All mixes shall conform to applicable building code requirements listed herein or on the Drawings. All mix designs shall be submitted to the District’s Representative for approval before being used. Mix design shall show proportions of cement, fine and coarse aggregate, and water and graduation of combined aggregates. Calcium chloride shall not be added at any mix.

Concrete shall be Class B per Caltrans Standards.

Cement: All cement shall be Portland cement Type II, and shall be the product of one manufacturer. The temperature of cement delivered to the plant shall not exceed 150 degrees Fahrenheit.

Aggregates

a. Coarse aggregate shall have a minimum cleanliness value of 75.
b. Fine aggregate shall have a minimum of sand equivalent of 75.
c. Any suitable individual grading of coarse aggregates may be used.

Water: All water shall be clean and free from deleterious matter.

Admixture: No admixture of any type shall be used without prior approval of the District’s Representative.

Concrete shall be as specified: Class B

d. 28-Day Minimum Strength: Refer to Table in Paragraph 1.5(R) above
e. Concrete slump: Refer to Table in Paragraph 1.5(R) above
f. Air Content: No air entrainment

B. Fly Ash: Pozzolanic admixtures, conforming to ASTM C618, Class C, with weight loss of ignition limited to not exceed 3 percent shall be used in mix designs to replace Portland Cement up to 15% by weight, unless noted otherwise on drawings.

Reference: ACI 211.4R-93.

C. Aggregate Base for Pavement:

1. Description: Class II aggregate base shall be 3/4 inch maximum and free from organic matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base.

2. Grading Requirements:

Percent Passing	Sieve Size
100	1 in.
90-100	3/4 in.
35-60	#4
10-30	#30
2-9	#200

3. Quality Requirements:

a. Sand Equivalent: 25 min

C. Water: Clean, potable (domestic) free from injurious amounts of salts, oils, acids, alkalis, organic materials or other deleterious matter. Available from source determined by District's Representative.

D. Air Entrainment: ASTM C260.

E. Admixtures: Admixtures containing chlorides are not permitted. All admixtures shall be mixed in accordance with manufacture's written recommendations.

2.3 ACCESSORIES

A. Tie Wires: Black annealed, ASTM A-82, minimum 16 gauge.

B. Chains, Bolsters, Bar supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.

C. Stirrup Steel: ASTM A-82.

D. Snap Ties: Snap-off metal of fixed length capable of leaving no metal within one and one-half (1 1/2) inches of surface nor causing fractures, spall or other defects larger than one (1) inch in diameter.

E. Expansion Joint Materials:

Premolded Joint Filler: ASTM D1751, non-extruding and bituminous type resilient filler, compatible with sealant, and having a "guide strip" removable depth gauge.

Joint Sealant: ASTM C290, non-snag sealant "Dynatred" by Pecora Corporation, [214] 278-8158 or "Sonolastic Sealant Two-Part" by Sonneborn, [415] 889-9899, or equal.

a. Color shall be selected by the District's Representative from the manufacturer's full color selection.

Bond Breaker: Pressure-sensitive tape as recommended by sealant manufacturer to suit application.

F. Forms:

Steel or wood of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal.

Use forms that are straight and free of distortions and defects.

Use flexible spring forms or laminated boards to form radius bends as required.

G. Form Release Agent: Colorless non-staining, free from oils. Chemical agent shall not impair bonding of paint or other proposed coatings.

H. Form-Facing Materials:

All Surfaces: of sufficient strength to hold concrete properly in place and prevent leakage of water from forms.

Exposed Surfaces: Matte finish, coated, medium density overlay plywood made for forming. No wood-textured finish will be permitted on exposed concrete unless specified as such.

I. Curing Compound: ASTM C309, Type I-D, Class A.

J. Integral Color: As indicated on Drawings.

2.4 DETECTABLE WARNING SURFACE

B. Detectable warning surfaces shall be ADA compliant.

C. Detectable warning surface shall be ADA Solutions Cast-In-Place Replaceable Tactile, or approved equal.

1. Color: Truncated dome color to be yellow FS 33538 of Federal Standard 595C for the conditions on this project (CBC 11B-705.1.1.3).

2. Size: All truncated dome panels shall be 36" wide. The length shall be according to the Civil drawings.

3. Warranty: The manufacturer guarantees a five-year manufacturer warranty.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify that subgrade preparation for concrete paving has been completed prior to commencement of work.

Surface Drainage:

Report in writing conflicts discovered on the site or prior work, which would prevent positive drainage. Correct prior to performing concrete work.

Do not permit finished paving surfaces to vary more than 1/4 in. measured with a 10 ft. metal straightedge, except at grade changes. No "birdbaths" or other surface irregularities will be permitted. Properly correct irregularities.

3.2 PREPARATION

A. Templates: Use templates for all anchor plates, bolts, inserts and other items embedded in concrete. Accurately secure so that they will not be displaced during placing of concrete.

B. Piping and Conduit: Do not embed piping, other than electrical conduit, in structural concrete. Locate conduit to maintain strength of structures at maximum. Verify size, length and location of electrical conduit.

C. Exposed Tree Roots: protect per Section 01 56 39 Tree and Plant Protection

D. Aggregate Base Course: Compact base course to thicknesses and relative compaction shown on Drawings.

3.3 CONCRETE REINFORCEMENT PLACEMENT

A. Fabricate reinforcement in accordance with ACI-315, providing a minimum concrete cover of three inches or as specified in UBC, latest edition.

B. Place all reinforcement in the exact position shown on the Drawings and secure in position during the placing and compacting of concrete. Wire bars together with No.16 gauge wire with ties at all intersections except where spacing is less than twelve inches in each direction, in which case tie alternate intersections.

C. Place all sleeves, inserts, anchors and embedded items required for adjoining work or for its support prior to concreting. Fill voids in embedded items temporarily with readily removable material to prevent entry of concrete.

D. Give all contractors and subcontractors whose work is related to concrete or supported by it, ample notice and opportunity to introduce and/or furnish embedded items before concrete placement.

E. Verify that concrete reinforcement may be installed in strict accordance with all pertinent codes and regulations, the Shop Drawings and the original design.

F. Verify score joints in sidewalk slabs are constructed at 5-foot maximum intervals.

G. Bending:

Fabricate all reinforcement in strict accordance with the reviewed Shop Drawings.

Do not use bars with kinks or bends not indicated on the Drawings or on the reviewed Shop Drawings.

Do not bend or straighten steel in a manner that will injure the material.

Bend all bars cold.

Make all bends for other bars, including hooks, around a pin having diameter not less than six times the minimum thickness of the bar for number 8 and smaller and eight times the thickness for number 9 and larger.

H. Before the start of concrete placement, accurately place all concrete reinforcement, positively securing and supporting by concrete blocks, metal chairs or spacer, or by metal hangers.

I. Clearance:

Preserve clear space between bars of not less than one time the normal diameter of round bars.

In no case let the clear distance be less than 1 inch or less than 1-1/3 times the maximum size of aggregate.

Provide the following minimum concrete covering of reinforcement:

Concrete below ground deposited against forms: 3 inches.

Concrete deposited against earth: 3 inches.

Concrete elsewhere: as indicated on Drawings.

J. Splicing:

Horizontal bars:

Place bars in horizontal members with minimum laps at splices sufficient to develop the strength of the bars. Splice 40 bar diameters minimum.

Bars may be wired together at laps.

Wherever possible, stagger the splices of adjacent bars.

Wire fabric: Make all splices in wire fabric at least 1-1/2 meshes wide.

Other splices: Make only those other splices that are indicated on the approved Shop Drawings or specifically approved by District's Representative.

K. Dowels/Anchor Bolts: Place all required steel dowels/anchor bolts and securely anchor them into position before the concrete is placed. Bending the dowels after placement of concrete will not be permitted.

L. Obstruction: In the event conduits, piping, inserts, sleeves, or any other items interfere with placing reinforcement as indicated on the Drawings, or as otherwise required, immediately consult District's Representative and obtain review of new procedure before placing concrete.

3.4 CONCRETE FORMWORK CONSTRUCTION

A. Construct support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete.

B. Contractor assumes full responsibility in the removal of forms. The length of time forms must remain in place depends on the rate of time required for concrete to obtain a proper strength. Remove forms after the concrete is sufficiently hard to prevent damage to concrete.

C. Circular or curved formwork shall be continuous, complete radii as indicated on Drawings. No straight segments in circular/curved formwork shall be accepted.

D. Reuse of Forms:

Do not reuse forms if there is any evidence of surface wear or defect which would impair quality of surface.

Thoroughly clean and properly coat forms before reuse.

3.5 INSTALLATION

A. Notification: Notify the District's Representative at least 48 hours before placing concrete.

B. Placing Concrete:

Unless otherwise indicated or required by the Drawings, concrete paving shall be placed on compacted subgrade to thicknesses indicated on the Drawings to 95 percent compaction.

Place concrete in accordance with ACI-304 and Section 2605 of the California Building Code. Immediately after depositing, compact concrete thoroughly by mechanical vibration. No vibrating of form is allowed. Mixing shall be continuous, with no interruptions from the time the truck is filled until the time it is emptied. Concrete shall be placed within one and a half hours from the time water is first added.

Insure anchors, seats, plates, and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete.

Insure reinforcement, inserts, embedded parts, etc. are not disturbed during concrete placement.

Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur, unless otherwise indicated on the Drawings.

Lines and Grades: Elevations requiring accurate placement shall be set by a competent instrument man, using a professional type instrument.

For all concrete placed on soil, the subgrade shall be wet and compacted prior to placing.

Before placing concrete mixing, conveying and finishing equipment, forms and reinforcing shall be well-cleaned. Wet form before placing concrete, unless oiled forms are used.

3.6 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, from excessively hot or cold temperatures, and from mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for a period necessary for hydration of cement and hardening of concrete. In hot, dry and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation – control material. Apply according to manufacturer’s instruction.

B. As soon as building flat work has hardened sufficiently to prevent injury to finish, apply an approved concrete curing agent in accordance with the manufacturer's recommendation.

C. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than seven (7) days.

D. Excessive cracking as determined by the District’s Representative which is aesthetically unacceptable or which will result in premature disintegration of paving shall result in replacement of concrete.

E. Removal of Forms: Remove no sooner than at seven days after each pour.

F. Conform to all applicable requirements for curing and protection of concrete, Sections 90-7 and 90-8 of the Caltrans Standard Specifications.

G. Spraying: Spray concrete during the curing period as frequently as drying conditions may require.

H. Curing: Cure concrete in accordance with the ACI Manual of Concrete Practice. During curing period, maintain concrete above 70 degrees F. for at least 3 days or above 50 degrees F. for at least 5 days.

I. Damage and Defacement: Protect all concrete work against damage and defacement during subsequent construction operations until final acceptance.

3.7 CLEANING AND PATCHING

A. Removal: Remove all projecting fins, bolts, wire, nails, etc., not necessary for the work, or cut them back 1 in. from the surface and patch in an inconspicuous manner.

B. Snap Ties: Immediately after removal of forms, cut off snap ties extending from the face of concrete to at least 1 in. deep in the concrete. Fill or plug as detailed in Drawings.

C. Voids: Fill holes with a 1:3 cement/sand mortar with the same color as the adjoining concrete. Mix and place the mortar as dry as possible and finish flush with the adjacent surface.

D. Corrective Patching: Correct all defects in concrete work. Chip all voids to a depth of at least 1 in. with the edges perpendicular to the surface and parallel to form markings. Fill all voids, surface irregularities, or honeycombing by patching or rubbing. Ensure that all concrete surfaces so repaired duplicate the appearance of the unpatched work.

E. Finishing: Work finish surface texture as specified below.

3.8 FINISHES

A. Medium Broom Finish:

Floating: Float surface once it has sufficiently stiffened. Check planeness of surface with a 10 ft. straightedge in all directions. Cut down high spots and fill lows. Immediately refloat to a uniform non-directional sandy texture.

Obtain by drawing a stiff bristled broom across a floated finish.

Direction of brooming to be perpendicular to direction of paving.

3.9 JOINTS

A. Construction Joints:

Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.

All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.

B. Score Joints:

Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.

Score joints shall be formed in the fresh concrete using a jointer to cut the groove so that a smooth uniform impression is obtained. All joints shall be struck before and after sandblast.

Locate and form joints with 1/4 inch radius edges and 1 inch to 1-1/4 inch deep score at the location as shown on the Drawings.

All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.

C. Expansion Joints:

Locate and install joints as indicated on the Drawings so they do not impair strength or appearance of slab.

Expansion joints shall be provided at the location and 40-foot maximum intervals as shown on the plans, and at all locations where concrete paving abuts buildings, curbs or other proposed or existing structures. Install as per detail on the Drawings.

All joints and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression.

Install backer-rod and joint sealant as indicated on the Drawings.

Sealing of Expansion Joints: After the curing period, strip out all depth gauge strips and carefully clean expansion joints. Fill with joint compound as shown on Drawings. Avoid spilling compound on paved surfaces or overflowing from joint.

Protect expansion joints from damage until placement of filler or caulk.

3.10 FIELD QUALITY CONTROL

A. Samples: Contractor shall coordinate with the District to select a qualified testing laboratory to take samples for testing during the course of the work as described in Article 1.13 Tests and Observations.

B. Field inspection and testing will be performed by a qualified testing laboratory in accordance with ACI 318 and as described in Article 1.13 Tests and Observations.

C. Cost of Testing: Contractor shall be responsible for costs associated with testing.

D. Rejected Materials: Remove off the site all concrete below specified strength.

E. Cost of Removal and Retesting: Contractor shall be responsible for costs associated with removal and costs associated with retesting.

F. Integral color: Color shall be evenly saturated in concrete mix to provide consistent, even, and distinct color in finished installation, including after medium sandblast finish is applied.

G. Defective Work: Remove in its entirety and replace all defective concrete work which after corrective patching, rubbing, etc., fails to duplicate the appearance of unpatched work and/or conform to the standards set forth in these Specifications.

H. Observe formwork continuously while concrete is being placed to see that there are no deviations from desired elevation, alignment, plumbness or camber.

I. If during construction any weakness develops and falsework shows undue settlement or discoloration, stop work, remove affected construction if permanently damaged, and strengthen falsework.

END OF SECTION 32 13 13

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Section Includes painted pavement markings, lines, and legends.

1.2 RELATED SECTIONS

A. Section 32 12 16 Asphalt Paving

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 for definitions, acronyms, and abbreviations.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.

C. Caltrans State Standard Specifications, Latest Edition.

D. M.U.T.C.D California Supplement, Latest Edition

E. CBC - California Building Code, Latest Edition

1.2 SUBMITTALS

A. Product Data: Submit manufacturer’s printed product data on all coatings specified, including preparation and application instructions.

B. Samples:

1. Submit two paper chip samples, 3 inch by 5 in size illustrating range of colors and textures available for each surface finishing product scheduled.

2. Submit two painted samples, illustrating selected colors and textures for each color and system selected. Submit on white card stock, 8 inch by 10 inch in size.

C. Manufacturer’s Installation Instructions: Submit the manufacturer’s current recommended methods of installation, including relevant limitations, safety and environmental cautions, application rates, special surface preparation procedures, and substrate conditions requiring special attention.

D. Manufacturer’s Certificate: Certify Products meet or exceed specified requirements.

1.3 QUALIFICATIONS

A. Manufacturer Company specializing in manufacturing products specified in this section with minimum three (3) years documented experience.

B. Applicator: Company regularly engaged and specializing in the application of pavement markings, with minimum three (3) years documented experience.

C. Regulatory Requirements: Comply with applicable codes and regulations of cognizant governmental agencies having jurisdiction, including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provision.

D. Volatile Organic Compounds (VOC): Use only products in compliance with VOC content limits required by state and local regulations.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions. Protect materials from adulteration by infiltration.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Perform the Work of this Section under environmental conditions no less stringent than those stipulated by the manufacturers of the materials used.

1. Take precautions necessary to avoid and mitigate the effects of wind drift in the application of liquid materials.

2. Do not apply marking paint when weather is foggy or rainy, or ambient temperatures are below 40 degrees F, nor when such conditions are anticipated during eight hours after application.

B. Volatile Organic Content (VOC). Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint.

1.6 EXTRA MATERIALS

A. Supply one (1) gallon of each color, type, and surface texture of paint installed. Store where directed.

B. Label each container with color, type, texture, and room locations, in addition to manufacturer's label.

PART 2 – PRODUCTS

2.1 PAINTED PAVEMENT MARKINGS

A. Manufacturers:

1. Dunn-Edwards. Type: W801 Traffic Marking Paint

2. Frazee Industries, Inc. Type: 506 Traffic Line Paint

3. ICI Dulux. Type: 4800 Series Traffic Paint

4. Or Equal

B. Product Description: Dunn Edwards Vin-L-Stripe Traffic Marking Paint, W80l Series, epoxy modified acrylic latex based, specifically formulated for application to asphalt and concrete vehicular traffic surfaces. Provide paint certifiable by the manufacturer as being in accordance with the California Air Resources Board (CARB) rules in effect at the time of application.

1. Factory mixed, quick drying and non-bleeding.

2. Color

a.	Text	White and Blue as shown on drawings.
b.	Parking divider stripes:	White.
c.	No parking zone markings:	Yellow.
d.	No parking curb:	Red.
e.	Accessible Zone markings:	White and Blue as shown on drawings.
f.	Crosswalk striping:	White.
g.	Directional arrows:	White.
h.	Driving lane dividers:	White.

3. Blue paint for the symbol of accessibility: Match color No. 15090 in Federal Standard 595A as specified in Section 2-1720 of CCR Title 24 Handicap Regulations (similar to Royal Blue).

2.2 EQUIPMENT

A. Pressurized, self-contained paint machine capable of applying a straight line from 2 inches to 6 inches wide, with consistent coverage of a minimum of 150 square feet per gallon.

B. Machine Calibration:

1. Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of plus or minus 25 feet per mile.

2. Paint Guns: Calibrate to simultaneously apply paint binder at uniform rates as specified with an allowable tolerance of plus or minus 1 mil.

C. Other Equipment

1. For application of crosswalks, intersections stop lines, legends and other miscellaneous items by walk behind stripers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify surfaces are ready to receive Work as instructed by product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application.

3.2 PREPARATION

A. Maintenance and Protection of Traffic:

1. Provide short term traffic control in accordance with these specifications.

2. Prevent interference with marking operations and to prevent traffic on newly applied markings before markings dry.

3. Maintain travel lanes between 7: 00 AM to 9: 00 AM, and between 4: 00 PM and 6: 00 PM.

4. Maintain access to existing buildings and other properties requiring access.

B. Locate markings as shown on Drawings. Provide qualified technicians to supervise equipment and application of markings. Lay out markings using guidelines, templates

and forms. Obtain verification from Architect for confirmation of lay out; colors, and placement of markings.

C. Correct defects and clean surfaces affecting work of this section. Sand all gloss finishes to sheen. Remove existing coatings that are flaking or otherwise in unacceptable condition to receive paint Preparation or removal of coatings containing lead must be performed in accordance with all EPA and OSHA guidelines.

D. Concrete and Masonry Surfaces: Pressure wash to remove all dirt, loose mortar, scale, salts, alkalies, and other detrimental substances. Remove oils and grease with solution of trisodium phosphate; rinse well and allow to dry. Remove all plant growth, including all growth spores and spore residue where designated.

E. Asphalt Concrete: All surfaces must be cleaned free from grease, oil, dirt, mildew, stains and other contaminants that would cause adhesion problems. Remove loose, peeling or chalky paint by high-pressure washing or other appropriate methods. Surfaces must be completely dry before application.

1. Allow asphalt concrete to age for 30 days before starting pavement marking.

3.3 EXISTING WORK

A. Remove existing markings in an acceptable manner. Do not remove existing pavement markings by painting over with blank paint Remove by methods that will cause least damage to pavement structure or pavement surface. Satisfactorily repair any pavement or surface damage caused by removal methods.

B. Clean and repair existing remaining or reinstalled lines and legends.

3.4 APPLICATION

A. Agitate paint for 1-15 minutes prior to application to ensure even distribution of paint pigment.

B. Apply marking paint at rate of one gallon per 150 square feet (equivalent to approximately one gallon for 450 lineal feet of 4 inch wide stripe). Rate can increase to a maximum of 400 square feet per gallon based on conditions of surface to be coated.

C. Apply paint with mechanical equipment:

1. Provide uniform straight edges without overspray.

2. Uniform line width of 4 inches, unless otherwise noted on Drawings.

3. Provide hatching in accessible parking areas as required by Code.
4. Use single line striping between parking stalls.

5. Apply at manufacturer’s recommended rates to provide a minimum wet film thickness of 13 mils.

6. Identify parking spaces with text where shown on drawings.

D. Accessibility Symbol: Apply international accessibility symbol on pavement surface in accordance with CCR Title 24 Section 1129B. The surface of each accessible parking space or stall shall have a surface identification duplicating the following scheme:

1. By outlining a profile view of a wheelchair with occupant in white on blue background. Locate profile view so that it is visible to a traffic enforcement office when vehicle is properly parked in the space. Size: 36 inches high by 36 inches wide.

E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

F. Prior to applying, mix paint a sufficient length of time to thoroughly mix the pigment and vehicle together, and keep thoroughly agitated during its application.

G. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.

H. Apply markings to indicated dimensions at indicated locations.

I. Prevent splattering and over spray when applying markings.

J. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking and apply new markings.

K. Collect and legally dispose of residues from painting operations.

3.5 PROTECTION OF FINISHED WORK

A. Do not permit traffic over the painted striping and pavement markers until the paint has cured.

3.6 APPLICATION TOLERANCES

A. Maximum Variation from Wet Film Thickness: 1 mil.

B. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.

C. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F.

3.7 PROTECTION OF FINISHED WORK

A. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer’s recommendations or use minimum of 30

minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry lime.

3.8 SCHEDULE OF COLORS

A. Stripes between standard parking stalls: White.

B. Stripes between accessible parking stalls: White.

C. No parking zones diagonal striping: White.

D. Accessible pedestrian crosswalks: White.

E. Accessible Parking Curb: Blue.

F. Direction Arrows: White.

G. NO PARKING stenciled letters: White and Blue as shown on drawings.

END OF SECTION

SECTION 32 31 00

FENCES AND GATES

PART 1 GENERAL

1.1 DESCRIPTION

A. This section specifies labor, materials and appurtenances necessary for installation of a panelized welded ornamental steel fence system.

B. Supply a panelized ornamental fence system of welded and rackable construction. The fence height shall be per plan. The system shall include all components (i.e., panels, posts, gates and hardware) required.

1.2 RELATED SECTIONS

A. Section 01 32 19 Submittal Procedures.

1.3 REFERENCES

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.

C. ASTM D523 - Test Method for Specular Gloss. 0020

D. ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.

E. ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.

F. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.

G. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

H. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

I. ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.

J. ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.4 SUBMITTALS

A. Conform to the requirements of Section 01 32 19 for submittal procedures.

B. Product Data: Provide data for Products specified.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.6 DELIVERY, STORAGE AND HANDLING

A. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.

1.7 WARRANTY

A. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 20 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufactures warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 PRODUCTS

2.1 MATERIALS

A. The fence system shall conform to the Commercial standard picket Welded and Rackable Ornamental Steel, Invincible design, extended picket bottom rail treatment, 3 rail style, as manufactured by Ameristar Fence Products, Inc., in Tulsa, Oklahoma.

B. Steel material for fence panels and posts shall conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 45,000 psi (310 MPa) and a minimum zinc (hot-dip galvanized) coating weight of 0.60 oz/ft2 (184 g/m2), Coating Designation G-60.

C. Material for pickets shall be 3/4” square x 14 Ga. tubing. The rails shall be steel channel, 1.5” x 1.4375” x 14 Ga. Picket holes in the rail shall be spaced (specify 4.675” o.c. for standard picket space or 3.500” o.c. for 3” air space). Fence posts and gate posts shall meet the minimum size requirements of Table 1.

2.2 FABRICATION

A. Pickets, rails and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.

B. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and rails shall be joined at each picket-to-rail intersection by Ameristar’s proprietary fusion welding process, thus completing the rigid panel assembly (Note: The process produces a virtually seamless, spatter-free good-neighbor appearance, equally attractive from either side of the panel).

C. The manufactured panels and posts shall be subjected to an inline electrode position coating (E-Coat) process consisting of a multi-stage pretreatment/wash (with zinc phosphate), followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum

cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm). The color shall be determined by the District. The coated panels and posts shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2 (Note: The requirements in Table 2 meet or exceed the coating performance criteria of ASTM F2408).

D. The manufactured fence system shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for Industrial weight fences under ASTM F2408.

E. Gates shall be fabricated using fusion welded ornamental panel material and 1-3/4" sq. x 14ga. gate ends. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding.

PART 3 EXECUTION

3.1 PREPARATION

A. All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 INSTALLATION

A. Fence posts shall be spaced according to Post Spacing by Bracket Type Table below, plus or minus 1/4". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer.

B. Posts shall be set in concrete footers having a minimum depth of 36." Footing concrete shall conform to Section 32 13 13 Site Concrete.

C. Post Sizing and spacing shall be per the following:

Minimum Sizes for Commercial Posts	
Fence Posts	Panel Height
2-1/2" x 14 Ga.	7' & 8' Heights
Gate Leaf	Gate Height
	7' & 8' Heights
Up to 4'	3" x 12 Ga.
4'1" to 6'	4" x 12 Ga.
6'1" to 16'	6" x 12 Ga.

Post Spacing By Bracket Type										
Span	For INVINCIBLE® 8' Nominal (90.445" Rail)				For CLASSIC, GENESIS, & MAJESTIC 8' Nominal (91.95" Rail)					
Post Size	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Montage Commercial Invincible Flat Mount (BB118)		Montage Commercial Invincible Line 2-1/2" (BB119) 3" (BB120)		Montage Commercial Universal (BB112)	Montage Commercial Line Blvd. (BB114)	Montage Commercial Flat Mount (BB111)		Montage Commercial Swivel (BB113)*	
Post Settings	94"	94-1/2"	94"	94-1/2"	95"	95"	95"	95-1/2"	*95"	*95-1/2"

± 1/4" O.C.										
*Note: When using BB304 swivel brackets on either or both ends of a panel installation, care must be taken to ensure the spacing between post and adjoining pickets meets applicable codes. This will require trimming one or both ends of the panel.										

3.3 FENCE INSTALLATION MAINTENANCE

A. Sealing metal surfaces after cutting or drilling, shall be performed according to the following, or as required by the panelized system manufacturer to avoid voiding the warranty:

1. Remove all metal shavings from cut area.
2. Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry.
3. Apply 2 coats of custom finish paint matching fence color, with products conforming to the requirements below or otherwise approved by the manufacturer.

Table 2 – Coating Performance Requirements

Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117, D714 & D1654	Corrosion Resistance over 1,500 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822 D2244, D523 (60˚ Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

3.4 CLEANING

A. The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

END OF SECTION

SECTION 32 84 00

LANDSCAPE IRRIGATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Trenching.
2. Pipe and fittings.
3. Valves.
4. Emitters: pop-up bodies, nozzles, bubblers and accessories.
5. Control system.

1.2 REFERENCES

A. ASTM International:

6. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
7. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

B. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.3 SYSTEM DESCRIPTION

A. Electric solenoid controlled underground irrigation system.

B. Source Power: 120 volt.

C. Low Voltage Controls: 24 volt 2.08 amps.

1.4 SUBMITTALS

A. Section 01 32 19 - Submittal Procedures:

B. Product Data: Submit component and control system and wiring diagrams.

C. Samples: Submit one outlet of each type, with housing.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 77 00 – Contract Closeout

B. Project Record Documents: Record actual locations of concealed.

C. Operation and Maintenance Data:

1. Submit instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.

2. Submit schedule indicating length of time each valve is required to be open to deliver determined amount of water.

1.6 COORDINATION

A. Section 01 31 00 – Project Coordination: Coordinate the Work with site backfilling, landscape grading and delivery of plant life.

1.7 GUARANTEE

The contractor shall guarantee the irrigation system for a period of one year from the date of final acceptance. With final closeout materials, provide a typed statement of guarantee indicating the following and on the contractor's letterhead:

"We hereby gurantee that the irrigation system installed at Yerba Buena High School has been completed per the drawings, specifications, and all applicable codes. We further warranty the work by agreeing to repair or replace with originally installed materials, any defect in material or workmanship which may develop within a one (1) year period from this date _____(Date of Final Acceptance). Any damage resulting from such repairs will also be repaired at no additional cost to the owner. We will make all repairs within 48 hours of written notification by the owner. In the event of our failure to make repairs within this period, we authorize the owner to make said repairs and will reimburse all associated material and labor charges.

Company Name:
Company Address:
Company Phone:
Authorized Representative (print)
Signature of Authorized Representative:
Project Name:
Project Location:
Date of Final Acceptance:

PART 2 PRODUCTS

2.1 PIPE MATERIALS

A. PVC Pressure Mainline and Fittings:

1. Pressure main line piping for sizes two (2) inch and smaller shall be PVC Schedule 40 with solvent-welded joints.

    a. Pipe shall be made from NSF approved Type I, Grade I, PVC compound conforming to ASTM resin specification D1785. All pipe shall meet requirements set forth in Federal Specification PS-21-70. (Solvent-weld Pipe).

2. Pressure main line piping for sizes two and one-half (2-1/2) inches through four (4) inches shall be PVC Class 315 with solvent weld joints.

    a. Pipe shall be made from an NSF (National Sanitation Foundation) approved Type I, Grade I, PVC compound conforming to ASTM resin specification D1784. All pipe shall meet requirements as set forth in Federal Specification PS-22-70, with an appropriate standard dimension ratio (S.D.R./ (Solvent-weld Pipe).

3. PVC solvent-weld fittings shall be Schedule 40, NSF approved conforming to ASTM D2466.

4. Solvent cement and primer for PVC solvent-weld pipe and fittings shall be of the type and installation methods specified by the manufacturers for each type of pipe.

5. All PVC pipe shall be marked continuously and permanently with the following information: Manufacturer's name, nominal pipe size, schedule or class of pipe, pressure rating in P.S.I. extrusion, NSF approval and date of extrusion.

6. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable I.P.S. schedule and NSF seal of approval.

7. Male fittings shall not be allowed on mainline pipe. Use female fittings with PVC Sch. 80 male nipples.

B. PVC Non-Pressure Lateral Line Piping

1. Non-pressure buried lateral line piping shall be PVC schedule 40 (up to 2”) with solvent-weld joints.

a. Pipe shall be made from NSF approved, Type I, Grade II, PVC compound conforming to ASTM resin specification D1784. All pipe shall meet requirements set forth in Federal Specification PS-22-70, with an appropriate standard dimension ratio.

2. Except as noted in paragraph 1 of 2.1 B, all requirements for non-pressure lateral line pipe and fittings shall be the same as for solvent-weld pressure main line pipe and fittings as set forth in Section 2.1 A of these Specifications.

3. All outlets shall be a minimum three-quarter (3/4) inch unless contractor receives written approval from the Landscape Architect.

2.2 VALVES

A. Remote Control Valves:

1. All electric remote control valves shall be of the same type, manufacturer and sizes as indicated on the Drawings and/or as specified herein or approved by the Landscape Architect.

2. All remote control valves shall have a manual flow adjustment.

B. Other: Per Irrigation Plan legend.

2.3 EMMITERS/SPRINKLERS

A. Per Irrigation Plan legend.

2.4 CONTROLS

A. Irrigation Controller: Per drawings.

B. Controller Housing: UL-listed, NEMA 250 Type 3; weatherproof, watertight, with lockable access door.

C. Rain/Weather Sensors: Per drawings

D. Control Wiring:

1. Connections between the automatic controllers and the electric control valves shall be made with direct burial copper wire AWG-U.F. 600-volt. Pilot wires shall be a different color wire for each automatic controller. Common wires shall be white with a different color stripe for each automatic controller. Size wire in accordance with valve manufacturer's specifications and wire chart. In no case shall wire size be less than #14.

2. All splices shall be made with 3M DBY/DBR, Rainbird snap-tie wire connector or approved equal.

3. Control Wire Conduit: Gray PVC Schedule 40 electrical conduit ASTM F-512 size as required.

2.5 BOXES

A. Quick coupling valve box shall be Brooks Model #910 with bolt down cover or approved equal. Install extension if required.

B. Gate valve box shall be Brooks Model #1419 with bolt down cover or approved equal. Install extension if required.

C. Remote Control valve boxes shall be Brooks, rectangular Model #1419 with bolt down green cover, or approved equal. Install extension Model #1419 6IN, if required.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify location of existing utilities.

B. Verify required utilities are available, in proper location, and ready for use.

3.2 PREPARATION

A. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, and structures.

B. Layout and stake locations of system components.

C. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

3.3 TRENCHING

A. Trench in accordance with Section 31 23 33, and the project drawings.

B. Trenching and Backfilling for Irrigation mainline shall comply with all requirements of section 31 23 33, except that irrigation mainline depth shall be 24”.

C. Irrigation lateral depth shall be not more than 18” and not less than 12”.

D. Trench to accommodate grade changes.

E. Maintain trenches free of debris, material, or obstructions damaging to pipe.

3.4 INSTALLATION

A. Connect to utilities.

B. Set outlets and box covers at finish grade elevations.

C. Provide for thermal movement of components in system.

D. Slope piping for self drainage to lowest head.

E. Use threaded nipples for risers to each outlet.

F. Install control wiring in accordance with project plans.

G. After piping is installed, but before outlets are installed and backfilling commences, open valves and flush system with full head of water.

H. Coordinate pipe installation and conduit installation.

3.5 BACKFILLING

A. Irrigation Mainline: Backfill in accordance with Section 31 23 33, except that depth shall be 24."

B. Irrigation Laterals: Backfill with clean native or imported soil free from debris or rocks larger than ½". Sand backfill requirements do not apply to irrigation laterals.

C. Protect piping from displacement while backfilling

3.6 FIELD QUALITY CONTROL

A. Prior to backfilling, test system for leakage for whole system to maintain 100 psi pressure for one hour, using a minimum of two pressure gauges.

B. System is acceptable when no leakage or loss of pressure occurs during test period.

3.7 ADJUSTING

A. Adjust control system to achieve time cycles required.

B. Change or adjust head types for full water coverage and to minimize overspray and runoff as directed by LANDSCAPE ARCHITECT.

3.8 DEMONSTRATION AND TRAINING

A. Instruct Owner's personnel in operation and maintenance of system, including adjusting of sprinkler heads. Use operation and maintenance manual as basis for demonstration.

END OF SECTION

SECTION 32 93 00

LANDSCAPE INSTALLATION

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide trees, plants, and groundcovers as shown and specified. The work includes:

1. Soil preparation.

2. Trees, plants, and groundcovers.

3. Planting mixes.

4. Mulch and planting accessories.

5. Maintenance.

1.2 QUALITY ASSURANCE

A. Contractor shall contact Landscape Architect for inspection of delivered plant material. Landscape Architect shall confirm plant material matches approved plant palette and meets standard size and health requirements. Contractor shall provide notification at least two (2) working days before requested inspection date.

B. Subcontractor responsible for installation of plant material shall be required to demonstrate their experience with a comparable project with a similar scope. Subcontractor’s supervision of work must be by a Certified Nurseryman.

C. Plant names indicated, comply with "Standardized Plant Names" as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.

D. Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock". A plant shall be dimensioned as it stands in its natural position.

E. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of two (2) years.

F. Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, and providing that the larger plants will not be cut back to size indicated. Provide plants indicated by two measurements so that only a maximum of 25% are of the minimum size indicated and 75% are of the maximum size indicated.

G. Provide "specimen" plants with a special height, shape, or character of growth. Tag specimen trees or shrubs at the source of supply. The District will inspect specimen selections at the source of supply for suitability and adaptability to selected location. When specimen plants cannot be purchased locally, provide sufficient photographs of the proposed specimen plants for approval.

H. Plants may be inspected and approved at the place of growth, for compliance with specification requirements for quality, size, and variety.

1. Such approval shall not impair the right of inspection and rejection upon delivery at the site or during the progress of the work.

I. Provide and pay for material testing. Testing agency shall be acceptable to the District. Provide the following data:

1. Test representative material samples proposed for use.

2. Topsoil:
   a. pH factor.
   b. Mechanical analysis.
   c. Percentage of organic content.
   d. Recommendations on type and quantity of additives required to establish satisfactory pH factor and supply of nutrients to bring nutrients to satisfactory level for planting.

3. Peat Moss:
   a. Loss of weight by ignition.
   b. Moisture absorption capacity.

1.3 SUBMITTALS

A. Submit the following material samples:

1. Mulch.

B. Submit the following materials certification:

1. Topsoil source and pH value.

2. Peat moss.

3. Plant fertilizer.

C. Provide plant material record drawings:

1. Legibly mark drawings to record actual construction.

2. Indicate horizontal and vertical locations, referenced to permanent surface improvements.

3. Identify field changes of dimension and detail and changes made by Change Order.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver fertilizer materials in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. Store in manner to prevent wetting and deterioration.

B. Take all precautions customary in good trade practice in preparing plants for moving. Workmanship that fails to meet the highest standards will be rejected. Spray deciduous plants in foliage with an approved "Anti-Desiccant" immediately after digging to prevent dehydration. Dig, pack, transport, and handle plants with care to ensure protection against injury. Inspection certificates required by law shall accompany each shipment invoice or order to stock and on arrival, the certificate shall be filed with the District. Protect all plants from drying out. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the District. Water heeled-in plantings daily. No plant shall be bound with rope or wire in a manner that could damage or break the branches.

C. Cover plants transported on open vehicles with a protective covering to prevent wind burn.

D. Provide dry, loose topsoil for planting bed mixes. Frozen or muddy topsoil is not acceptable.

1.5 PROJECT CONDITIONS

A. Work notification: Notify District at least seven (7) working days prior to installation of plant material.

B. Protect existing utilities, paving, and other facilities from damage caused by landscaping operations.

C. A complete list of plants, including a schedule of sizes, quantities, and other requirements is shown on the drawings. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting plans shall govern.

D. The irrigation system will be installed prior to planting. Locate, protect, and maintain the irrigation system during planting operations. Repair irrigation system components, damaged during planting operations, at Contractor’s expense.

1.6 WARRANTY

A. Warrant plant material to remain alive and be in healthy, vigorous condition for a period of one (1) year after completion and acceptance of entire project.

1. Inspection of plants will be made by the District at completion of planting.

B. Replace, in accordance with the drawings and specifications, all plants that are dead or are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes due to the Contractor's negligence. The cost of such replacement(s) is at the Contractor's expense. Warrant all replacement plants for one (1) year after installation.

C. Warranty shall not include damage or loss of trees, plants, or groundcovers caused by fires, floods, freezing rains, lightning storms, or winds over 75 miles per hour, winter kill caused by extreme cold and severe winter conditions not typical of planting area; acts of vandalism or negligence on the part of the District.

D. Remove and immediately replace all plants to be unsatisfactory during the initial planting installation.

PART 2 PRODUCTS

2.1 MATERIALS

A. Plants: Provide plants typical of their species or variety; with normal, densely-developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sun scald injuries, frost cracks, abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids and open spaces. Plants held in storage will be rejected if they show signs of growth during storage.

1. Dig balled and burlapped plants with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide ball sizes complying with the latest edition of the "American Standard for Nursery Stock". Cracked or mushroomed balls are not acceptable.

2. Container-grown stock: Grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole.
   a. No plants shall be loose in the container.
   b. Container stock shall not be pot bound.

3. Provide tree species that mature at heights over 25 feet with a single main trunk. Trees that have the main trunk forming a "Y" shape are not acceptable. The central leaders of all specified trees shall remain intact. Any tree which has had its central leader cut or removed is subject to rejection.

4. Plants planted in rows shall be matched in form.

5. Plants larger than those specified in the plant list may be used when acceptable to the District.

   a. If the use of larger plants is acceptable, increase the spread of roots or root ball in proportion to the size of the plant.

6. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the plant list (if shown)

7. No pruning wounds shall be present with a diameter of more than 1 inch and such wounds must show vigorous bark on all edges.

8. Evergreen trees shall be branched to the ground.

9. Shrubs and small plants shall meet the requirements for spread and height indicated in the plant list.
   a. The measurements for height shall be taken from the ground level to the height of the top of the plant and not the longest branch.
   b. Single stemmed or thin plants will not be accepted.
   c. Side branches shall be generous, well-twigged, and the plant as a whole well-bushed to the ground.
   d. Plants shall be in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries.

2.2 ACCESSORIES

A. Topsoil for Planting Beds: Fertile, friable, natural topsoil of loamy character, without admixture of subsoil material, obtained from a well-drained arable site, reasonably free from clay, lumps, coarse sands, stones, plants, roots, sticks, and other foreign materials, with acidity range of between pH 6.0 and 6.8 and a minimum organic matter content of 5%.

1. Topsoil that has been stripped and stockpiled on site shall be the topsoil to be utilized on this project. Provide additional topsoil if necessary.

2. Provide topsoil free of substances harmful to the plants that will be grown in the soil.

B. Soil Conditioner

1. Gro-Power Plus: Humus (bacteria included based fertilizer and soil conditioner with soil penetrant shall consist of the following percents by weight:

5 %	nitrogen
3 %	phosphoric acid
1 %	potash
50 %	humus
15 %	humic acids

C. Soil Amendment

1. Nitrogen Stabilized Shavings: 0.56 to 0.84% N based on dry weight for fir bark mulch, treated with relative form of nitrogen (NH3), 1/2" or less in size.
   a. Particle Size: 95% - 100% passing 6.35 mm standard sieve.

80% - 100% passing 2.33 mm standard sieve.
10% - 20% passing 0.50 mm standard sieve.

b. Salinity: The saturation extract conductivity shall not exceed 3.5 millimhos/centimeter at 25 degrees (25°) centigrade as determined by saturation extract method.
c. Iron Content: Minimum 0.08% dilute acid soluble Fe on dry weight basis.
d. Ash: 0 - 25% (dry weight)
e. pH range: 5.5 - 7.5
f. Actual organic matter content: minimum 280 pounds per cubic yard

D. Peat Moss: Brown to black in color, weed and seed free granulated raw peat or baled peat, containing not more than 9% mineral on a dry basis.

1. Provide ASTM D2607 sphagnum peat moss with a pH below 6.0 for ericaceous plants.

E. Fertilizer:

1. Plant Fertilizer Type "A": Commercial type approved by the DISTRICT, containing 5% nitrogen, 10% phosphoric acid, and 5% potash by weight. 1/4 of nitrogen in the form of nitrates, 1/4 in form of ammonia salt, and 1/2 in form of organic nitrogen.

2. Plant Fertilizer Type "B": Approved acid-base fertilizer.

3. Pot Fertilizer: Shall be Gro-Power controlled release fertilizer and soil conditioner in the following percents by weight:

12% nitrogen
8% phosphoric acid
8% potash
25% humus
5% humic acid

4. Turf Starter Fertilizer: Shall consist of the following percents by weight:

16% nitrogen
20% phosphoric acid
0% potash

5. Planting Tablets: Slow-release 21 gram tablets as manufactured by Agriform or approved equal, containing the following percentages of nutrients by weight:

20 % nitrogen
10 % phosphoric acid
5 % potash

F. Anti-Desiccant: Protective film emulsion providing a protective film over plant surfaces; permeable to permit transpiration. Mixed and applied in accordance with manufacturer's instructions.

G. Mulch: 6 month old well rotted shredded native hardwood bark mulch not larger than 4 inches in length and 1/2 inch in width, free of wood chips and sawdust.

H. Water: Free of substances harmful to plant growth. Hoses or other methods of transportation furnished by Contractor.

I. Stakes for Staking: Lodgepoles, 2" diameter x length as required and pointed at one end. Stakes shall be reasonably straight (no more than 3” deflection for a 10’ stake, or 2” deflection for a 8’ stake), and free from knots, splits, or other structural defects.

J. Staking Ties: 24" length cinch tie as manufactured by V.I.T. Company (714) 871-2309 or approved equal.

K. Twine: Two-ply jute material.

L. Raised Planter/Decorative Pot Backfill Mix:

1. Planter mix shall be lightweight potting soil in the following percents by volume:
   a. 0-1/4" nitrogen stabilized fir bark
   b. 0-1/8" nitrogen stabilized fir bark
   c. Washed sand
   d. Perlite
   e. Vermiculite
   f. Oyster shell lime

2. Install as per manufacturer's recommendations.

3. Submit sample and mixture soil/analysis to Landscape Architect for approval prior to ordering.

M. Root Barriers

1. The root control barrier shall be an injection molded or extruded modular component made of high density polypropylene or polyethylene plastic.

2. Panels shall measure 24" in width with a depth of 24” unless otherwise specified, with a mean thickness of 0.08". Plastic shall be recyclable and contain ultra-violet inhibitors.

3. Basic properties shall equal or exceed the following:
   a. Tensile Stress Yield: ASTM D638 3800
   b. Elongation at break (%): ASTM D638 10%
   c. Tensile Modulus: ASTM D638 150,000 psi
   d. Notched Izod Impact: ASTM D256A 0.4-4.0
   e. Flexual Modulus 73 psi: ASTM 0790 145,000

f. Hardness Shore: ASTM D2240 P66

4. The contractor shall furnish and install tree root barriers as specified. The tree root barriers shall be RS Series manufactured by Root Solutions, San Rafael, CA 94901 800. 554.0914; CP Series manufactured by Century Products 1144 N. Grove St. Anaheim, CA 92806, 715.632.7083, or approved equal.

N. Weed Control

1. Enide (Upjohn), Dymid (Elanco Products Co.), Treflan, Eptan, Surflan or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine proposed planting areas and conditions of installation. Do not start planting work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Weed Eradication:

1. Eradicate and remove weeds by means of post emergent herbicide. Apply herbicide as per manufacturer's recommendations.

B. Soil Amendment:

1. After approximate finished grades have been established, soil shall be conditioned and fertilized in the following manner. Soil conditioner shall, at the following rate, be uniformly spread and cultivated thoroughly by means of mechanical tiller into the top six (6) inches of soil. Existing planting areas shall be cultivated by hand tools.

Application Rates:

a. One hundred fifty (150) pounds of soil conditioner per 1,000 square feet.
b. Three (3) cubic yards of soil amendment per 1,000 square feet.
c. Eighteen (18) pounds of soil amendment fertilizer per 1,000 square feet.

2. All soil areas shall be compacted and settled by application of heavy irrigation to a minimum depth of twelve (12) inches.

3. At time of planting, the top six (6) inches of all areas to be planted shall be free of stones, stumps, or other deleterious matter one (1) inch in diameter or larger, and shall be free from all wire plaster, or similar objects that would be a hindrance to planting and maintenance.

C. Time of planting:

1. Evergreen material: Plant evergreen materials between September 1 and November 1 or in spring before new growth begins. If project requirements require planting at other times, plants shall be sprayed with anti-desiccant prior to planting operations.

2. Deciduous material: Plant deciduous materials in a dormant condition. If deciduous trees are planted in-leaf, they shall be sprayed with an anti-desiccant prior to planting operation.

3. Planting times other than those indicated shall be acceptable to the District.

D. Planting shall be performed only by experienced workmen familiar with planting procedures under the supervision of a qualified supervisor.

E. Locate plants as indicated or as approved in the field after staking by the Contractor. If obstructions are encountered that are not shown on the drawings, do not proceed with planting operations until alternate plant locations have been selected.

F. Excavate circular plant pits with vertical sides, except for plants specifically indicated to be planted in beds. Provide pits at least twice the diameter of the root system for trees and shrubs. Depth of pit shall accommodate the root system. Provide undisturbed subgrade to hold root ball at nursery grade as shown on the drawings. Remove excavated materials from the site if unacceptable for backfill material.

G. Provide pre-mixed planting mixture for use around the balls and roots of the plants consisting of planting topsoil and 1/2 lb. plant fertilizer Type "A" for each cu. yd. of mixture.

H. Provide pre-mixed groundcover bed planting mixture consisting of 3 parts planting topsoil to 1 part peat moss and 1/2 lb. plant fertilizer Type "A" per cu. yd. Provide beds a minimum of 8 inch deep. If slopes are greater than 4 to 1 increase depth to 12 inches.

I. Provide pre-mixed planting mixture for use around the balls and roots of ericaceous plants consisting of 1 part planting topsoil to 1 part sphagnum peat moss and 1/2 lb. plant fertilizer Type "B" per cu. yd. of mixture.

J. Install root barriers at least 5’ in each direction from the centerline of any tree that is planted 5’ or less to any hardscape (paved) surface or vertical element.

3.3 INSTALLATION

A. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent structure. Set plant material 2 to 3 inches above the finish grade. No filling will be permitted around trunks or stems. Backfill the pit with planting mixture. Do not use frozen or muddy mixtures for backfilling. Form a ring of soil around the edge of each planting pit to retain water.

B. After balled and burlapped plants are set, muddle planting soil mixture around bases of balls and fill all voids.

1. Remove all burlap, ropes, and wires from the top 2/3 of balls.

C. Space groundcover plants in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Plant to within 24 inches of the trunks of trees and shrubs within planting bed and to within 6 inches of edge of bed.

D. Mulching:

1. Mulch tree and shrub planting pits and shrub beds with required mulching material 4 inches deep immediately after planting. Thoroughly water mulched areas. After watering, rake mulch to provide a uniform finished surface.

2. Mulch groundcover beds with peat moss 2 inches deep immediately after planting.

E. Staking:

1. Inspect trees for injury to trunks, evidence of insect infestation, and improper pruning before wrapping.

2. Staking:
   a. Stake all trees immediately after lawn seeding or sodding operations and prior to acceptance. When high winds or other conditions, which may effect tree survival or appearance, occur, the District may require immediate staking/guying.
   b. Stake deciduous trees with less than 3 inch caliper. Stake evergreen trees less than 8'-0" tall.

3. All work shall be acceptable to the District.

F. Pruning:

1. Prune branches of deciduous stock, after planting, to balance the loss of roots and preserve the natural character appropriate to the particular plant requirements. In general, remove 1/4 to 1/3 of the leaf bearing buds, proportion shall in all cases be acceptable to the District. Remove or cut back broken, damaged, and unsymmetrical growth of new wood.

2. Multiple leader plants: Preserve the leader which will best promote the symmetry of the plant. Cut branches flush with the trunk or main branch, at a point beyond a lateral shoot or bud a distance of not less than 1/2 the diameter of the supporting branch. Make cut on an angle.

3. Prune evergreens only to remove broken or damaged branches.

G. Weed Control

1. Apply weed control to all non-turf areas after completion of all planting and one (1) complete watering (to "set" plants). Apply as per manufacturer's recommendations.

3.4 MAINTENANCE

A. Maintain landscape until completion of the project, including the maintenance period or until acceptance of the entire project by the District, whichever is longer.

B. Refer to Section 32 94 00 Landscape Maintenance

3.5 ACCEPTANCE

A. Inspection to determine acceptance of planted areas will be made by the District, upon Contractor's request. Provide notification at least ten (10) working days before requested inspection date.

1. Planted areas will be accepted provided all requirements, including maintenance, have been complied with and plant materials are alive and in a healthy, vigorous condition.

B. Upon acceptance, the District will assume landscape maintenance.

3.6 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soils, debris, and equipment. Repair damage resulting from planting operations.

END OF SECTION

SECTION 32 94 00

LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 CONDITIONS

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the Work specified in this Section.

1.2 SCOPE OF WORK

A. Furnish all labor, material, equipment and services required to maintain landscape in a healthy growing condition and in a neat and attractive appearance throughout the maintenance period.

1.3 QUALITY ASSURANCE

A. The Contractor shall be experienced in horticulture and landscape maintenance, practices and techniques, and shall provide sufficient number of workers with adequate equipment to perform the work during the maintenance period.

1.4 MAINTENANCE PERIOD

A. Maintain the entire project area during progress of work and during the ninety (90) calendar-day maintenance period or until final acceptance of the project by the District's Representative. Native grass areas shall be maintained for 365 calendar days, including the 90 calendar day overall project maintenance period, or until establishment of a full, healthy and competitive stand of grass is achieved, whichever is later.

B. Maintenance period shall not start until all elements of construction, planting and irrigation for the entire project are in accordance with Plans and Specifications. A requirement is that all lawn and landscape areas be planted and that all lawn areas show an even, healthy stand of grass seedlings or sod, either of which shall have been mown twice. If such criteria are met to the satisfaction of the District's Representative, written notification shall be issued to establish the effective beginning date of maintenance period.

C. Any day of improper maintenance, as determined by the District's Representative, shall not be credited as an acceptable maintenance period day. The maintenance period shall be extended on a daily basis if the work is not in accordance to the Plans and Specifications. Project shall not be segmented into maintenance areas or phases, unless authorization of the District's Representative is obtained.

D. Maintenance shall continue beyond the maintenance period, as required, until final acceptance is given by the District's Representative.

E. Contractor shall provide protection to the project site during the maintenance period. Any damage caused by the lack of adequate site protection shall be repaired or replaced at no additional cost to the District.

1.5 GUARANTEE AND REPLACEMENT

A. All plant material and other materials installed under the Contract shall be guaranteed for the duration of the landscape maintenance period against any and all poor, inadequate or inferior materials and/or workmanship, acts of God, animal or insect damage or improper maintenance, as determined by the District's Representative. Material shall be replaced by the Contractor at Contractor's expense.

B. Any materials found to be dead, missing, or not in a satisfactory or healthy condition during the maintenance period shall be replaced immediately. The District's Representative shall be the sole judge as to the condition of material. Material to be replaced within the guarantee period shall be replaced by the Contractor within five (5) days of written notification by the District's Representative. All replacement materials and installations shall comply with the Plans and Specifications. Any plant missing due to suspected theft shall be replaced by the Contractor. If the Contractor suspects theft may be a problem, the Contractor shall provide written documentation to the District's Representative that security on this site needs to be intensified. The Contractor may relieve himself of theft responsibility if, after the security notice, with no result, a written notice to the District's Representative shall be given that plant material will not be replaced for theft or vandalism due to lack of site security being maintained. This procedure may take place only during the Landscape Maintenance Period.

1.6 OBSERVATION SCHEDULE

A. Observations shall be requested by the Contractor from the District's Representative as per observations listed in specifications sections: 32 84 00 Planting Irrigation and 32 90 00 Planting.

1.7 FINAL ACCEPTANCE OF THE PROJECT

A. Upon completion of all project work, including maintenance period, the District's Representative will, upon proper request, make an observation to determine final project acceptability.

B. Where observed work does not comply with the Plans and Specifications, replace rejected work and continue specified maintenance period until reinspected by the District's Representative and determined to be acceptable. All replacement materials and installations shall be in accordance with the Plans and Specifications. Remove rejected work and materials immediately from project. Prior to date of final observation, Contractor shall provide the District's Representative with all Record Drawings, turnover items and written Guarantee Statement in accordance with the Plans and Specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials used shall conform to Specifications or shall otherwise be acceptable to the Owner. The Owner shall be given a monthly record of all herbicides, insecticides and disease control chemicals used.

B. General fertility maintenance fertilizer: shall consist of the following percents by weight:

16%	nitrogen
6%	phosphoric acid
8%	potash

C. Slow release fertilizer: shall consist of the following percents by weight:

21%	nitrogen
3%	phosphoric acid
5%	potash

PART 3 - EXECUTION

3.1 MAINTENANCE

A. Maintenance shall be according to the following standards. All areas shall be weeded and cultivated at intervals of not more than ten (10) days. Watering, trash and debris removal, mowing, rolling, edging, trimming, fertilization, spraying and pest control, as required, shall be included in the maintenance period. Street gutters and sidewalks shall be included. The Contractor shall be responsible for maintaining adequate protection of the area. Damaged areas shall be repaired at the Contractor's expense. Between the 15th day and the 20th day of the maintenance period, the Contractor shall reseed or re-sod all spots or areas within the lawn where normal turf growth is not evident.

3.2 TREE AND SHRUB CARE

A. Watering

1. Maintain a large enough water basin around plants so that enough water can be applied to establish moisture through the major root zone. When hand watering use a water wand.

B. Pruning

1. Trees:

a. Prune trees only as required to select and develop permanent scaffold branches that are smaller in diameter than the trunk or branch to which they are attached and which have a vertical spacing of from 18” to 48” and radial orientation so as not to overlay one another; to eliminate diseased or damaged growth; to eliminate narrow V-shaped branch forks that lack strength; to reduce toppling and wind damage by thinning out crowns; to maintain growth within space limitations; to maintain a natural appearance to balance crown with roots.
b. Evergreen trees shall be thinned out and shaped when necessary to prevent wind and storm damage.
c. The primary pruning of deciduous trees shall be done during the dormant season. Damaged trees or those that constitute health or safety hazards shall be pruned at any time of the year as required.

2. Shrubs:
a. The objectives of shrub pruning are the same as trees. Under no circumstances shall shrubs be clipped into balled or boxed forms unless required by the design.
b. All pruning cuts shall be made to lateral branches or buds or flush with the trunk. “Stubbing” will not be permitted.

C. Staking

Stakes shall remain in place through acceptance and are to be inspected to prevent girdling of trunks or branches and to prevent rubbing that causes bark wounds.

D. Weed Control

Keep basins and areas between plants free of weeds. Use recommended, legally approved herbicides. Avoid frequent soil cultivation that destroys shallow roots. Use mulches to help prevent weed germination.

E. Insect and Disease Control

1. Maintain a reasonable control with approved materials.

F. Fertilization

1. Fertilize all planting areas with the following:
a. Commencement of maintenance period - 5 lbs. per 1,000 square feet with general fertility maintenance fertilizer.
b. At the end of the first 30-day maintenance period - 5 lbs. per 1,000 square feet with general fertility maintenance fertilizer.
c. At the end of the maintenance period and at 30-day intervals should maintenance period be extended - 10 lbs. per 1,000 square feet with slow release fertilizer.

2. Avoid applying fertilizer to the root ball and base of main stem; rather, spread evenly under plant to drip line. Rates will vary from about a cup of nitrate

fertilizer (depending on nitrogen percentage) around a newly installed small plant to about one-half (1/2) lb. of actual nitrogen per inch of trunk diameter measured four feet from the ground for mature trees.

G. Replacement of Plants

1. Replace dead, dying and missing plants with plants of a size, condition and variety to match plants acceptable to Owner at Contractor's expense under the conditions stated in the Guarantee and Replacement section of these specifications.

3.3 GROUND COVER CARE

A. Weed Control

1. Control weeds, preferably with preemergent herbicides, but also with selective systemic herbicides. Hoe weeds as little as possible since this may result in plant damage.

B. Watering

1. Water enough that moisture penetrates throughout root zone and only as frequently as necessary to maintain healthy growth. Refer to irrigation schedule as noted on Plans.

C. Trash

1. Remove trash and debris weekly. Dispose in a legal manner.

D. Edging and Trimming

1. Edge ground cover to keep in bounds and trim growth as necessary to achieve an overall even appearance.

E. Replacement

1. Replace dead and/or missing plants at Contractor's expense per the conditions stated in the Guarantee and Replacement section of these Specifications.

3.04 TURF CARE

A. Mowing and Edging

1. Mowing of turf will commence when the grass has reached a height of two inches. The height of cut will be 1 to 1-1/2". Mowing will be at least weekly after the first cut. Turf must be well established and free of bare spots and weeds to the satisfaction of the Landscape Architect prior to final acceptance.

2. Grass clippings shall be picked up and removed from the site and premises in a legal manner.

3. Edges shall be trimmed at least twice monthly or as needed for neat appearance. Clippings shall be removed from paved areas and planting areas and removed from the site.

B. Watering

1. Lawns shall be watered at such frequency as weather conditions require to replenish soil moisture below root zone and to establish healthy stands of turf.

C. Weed Control

1. Control broad leaf weeds with selective herbicides. In areas where crabgrass has infested the lawn, apply pre-emergent herbicides such as Dacthal, Balan, or Beteasan for control prior to crabgrass germination.

D. Fertilization

1. During maintenance period an application of general fertility maintenance fertilizer, as specified, shall be made every thirty (30) days and again at sixty (60) days from the date of lawn installation at a rate of five (5) pounds per 1,000 square feet. At the end of the maintenance period apply slow release fertilizer at a rate of ten (10) pounds per 1,000 square feet or as per manufacturer's recommendations.

E. Replacement

1. At conclusion of maintenance period a final observation of turf areas shall be made. Remove diseased areas and unhealthy stands of grass from the site; do not bury into the soil. Replant areas with materials and in a manner as specified on the Plans and Specifications at no additional cost to the Owner.

3.5 IRRIGATION SYSTEM

A. System Observation

1. The Contractor shall check all systems for proper operation. Lateral lines shall be flushed out by removing the last sprinkler head at each end of the lateral, and then

again by installing all heads with flush caps (or for rotors, without nozzles) and then pressurizing the system.

2. All heads are to be adjusted as necessary for unimpeded, head to head coverage, and to minimize overspray and runoff.

B. Controllers

1. Set and program automatic controllers for seasonal water requirements. Give the Owner's representative instructions on how to turn off system in case of emergency.

C. Repairs

1. Repair all damages to irrigation system at the Contractor's expense. Repairs shall be made within twenty-four (24) hours.

END OF SECTION

SECTION 33 05 13

MANHOLES AND STRUCTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Modular precast concrete manhole sections with tongue-and-groove joints, covers, and accessories for sanitary sewer and storm drain systems.

1.2 RELATED SECTIONS

A. Section 01 32 19 Submittal Procedures.

B. Section 33 30 00 Sanitary Sewerage Utilities.

C. Section 33 40 00 Storm Drainage Utilities.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) A 48/A - Standard Specification for Gray Iron Castings; 2003.

B. ASTM C 478 - Standard Specification for Precast Reinforced Concrete Manhole Sections; 2006a.

C. ASTM C 923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals; 2002.

D. The term “State Standard Specifications” is understood to refer to the Standard Specifications, State of California, California State Transportation Agency, Department of Transportation (CALTRANS), latest edition. In cases of conflict between the State Standard Specifications and these specifications, these specifications shall govern.

1. Any provisions for measurement and payment specified within the State Standard Specifications shall be disregarded and the provisions of this contract shall govern.

1.4 SUBMITTALS

A. Conform to the requirements of Section 01 32 19 for submittal procedures.

B. Product Data: Provide data for Products specified.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents: Record actual locations of pipe mains, valves, connections, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide precast reinforced manholes as indicated on Drawings.

B. Manhole Sections: Reinforced precast concrete in accordance with ASTM C 478, with resilient connectors complying with ASTM C 923.

C. Concrete: State Standard Specifications, Section 90-2, Minor Concrete.

2.2 COMPONENTS

A. Provide Lid and Frame as indicated on Drawings.

B. Lid and Frame: ASTM A48/A, Class 35B, H-20 Traffic Rated, minimum weight 130 pounds (cover) 135 pounds (frame), D&L Supply A-1024, South Bay Foundry SBF 1900 CPH, or equal.

2.3 CONFIGURATION

A. Shaft Construction: Concentric with eccentric cone top section; lipped male/female joints, as indicated on Drawings.

B. Shape: Cylindrical.

C. Clear Inside Dimensions: As indicated on Drawings.

D. Design Depth: As indicated on Drawings.

E. Clear Lid Opening: As indicated on Drawings.

F. Pipe Entry: Provide openings as indicated on Drawings.

PART 3 EXECUTION

3.1 MANHOLES

A. Place concrete base pad, trowel top surface level.

B. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.

C. Place manhole cylinder plumb and level, to correct dimensions and elevations.

D. Cut and fit for pipe.

E. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.

F. Set cover frames and covers level without tipping, to correct elevations.

3.2 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Section 01 74 00 - Cleaning including, but not limited to:

1. Separate packaging materials by type and place in locations designated by the Contractor.

2. Place unused scrap material in locations designated by the Contractor.

END OF SECTION

SECTION 33 11 00

WATER DISTRIBUTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe and fittings for site domestic and utility water (irrigation service).

B. Valves and appurtenances.

1.2 RELATED SECTIONS

A. Section 31 23 33 Trenching and Backfilling: Excavating, bedding, and backfilling.

B. Section 31 25 13 Erosion Controls

C. Section 33 13 00 Disinfection of Domestic Water Piping

1.3 REFERENCES

A. American Water Works Association (AWWA) C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water; American Water Works Association; 2003 (ANSI/AWWA C104/A21.4).

B. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 1999 (ANSI/AWWA C105/A21.5).

C. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; American Water Works Association; 2000 (ANSI/AWWA C111/A21.11).

D. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast, for Water; American Water Works Association; 2002 (ANSI/AWWA C151/A21.51).

E. AWWA C508 - Swing-Check Valves for Waterworks Service, 2 In. Through 24 In. NPS; American Water Works Association; 2001 (ANSI/AWWA C508).

F. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; 2001 (ANSI/AWWA C509).

G. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution; American Water Works Association; 1997 (ANSI/AWWA C900/C900a).

H. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001(R 2002) (ANSI B16.18).

I. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001.

J. ASTM B 88 - Standard Specification for Seamless Copper Water Tube; 2003.

K. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2004 and errata.

1.4 SUBMITTALS

A. See Section 01 32 19 for submittal procedures.

B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Restraint Calculation: Provide calculations for mechanical restraint distances for all pipe joints. Provide data acknowledging that calculations provided conform to manufacturer’s recommendations for size of pipe, type of pipe, and site soil type.

F. Project Record Documents:

1. Record location of pipe runs, connections, valves, restraints and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.1 PIPE MATERIALS

A. Ductile Iron: Ductile Cast Iron cement lined pressure class 350.

B. Plastic - 4 inches and over: PVC pipe shall be minimum Class 200 AWWA C900 (minimum Class 165 AWWA C905 for pipes 16 inches and larger). Underwriters' Laboratories, Inc. (UL) listed, Factory Mutual and National Sanitation Foundation (NSF) approved. Pipe shall be furnished in minimum standard lengths of 20 feet

1. Fittings: AWWA C111, cast iron mechanical joint type, 250 pound working pressure, ductile iron, mechanical joints with SBR rubber ring gaskets. Flanged outlets shall conform to ANDI B16.1, 125 pounds.

2. Bolts and nuts for flanges shall be Type 304 stainless steel, American Society for Testing and Materials (ASTM) A193, Grade B8M hex head bolts and American Society for Testing and Materials A194, Grade 8M, hex head nuts. Washers shall be of the same material as the bolts.

C. Copper - Less than 4 inches: Copper Tubing ASTM B 88, Type K:

1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.

2. Joints: Compression connection or AWS A5.8, BCuP silver braze.

2.2 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Valves less than 2 Inches:

1. Bronze Gate Valve: Stockham Model B103/B104, Nibco Model T-113/S-113, or equal with non rising stem, class 125 minimum.

C. Valves 2 inches through 12 inches:

1. Gate valve: American Flow Control Series 2500, Mueller 2360 Series, or equal. Valve shall be resilient seat, with non-rising stem opening counter-clockwise with O-ring stem seal and suitable ends for connection to the type of pipe or fitting used. The working pressure rating of gate valve shall be a minimum of 250 p.s.i.g. Buried valves shall have a 2 inch square operating nut. The interior and exterior of the body and bonnet shall be coated with fusion bonded epoxy. The body to bonnet bolts and nuts shall be stainless steel.

D. Valves greater than 12 inches:

1. Class 150B Butterfly valve: Pratt Groundhog Buried Service, Mueller Lineseal III, or equal. Valves shall be flanged or mechanical joint type and shall be of the rubber seat type. Valve discs shall rotate 90 degrees from the full open position to the tight shut position. The valve seat shall provide a tight shutoff at a pressure differential of 150 p.s.i. upstream and 0 p.s.i. downstream in either direction. The valve operator shall be the traveling nut type. Valve shall open with a counter-clockwise rotation of the 2 inch operating nut, and have o-ring seals.

2.3 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 23 33 Trenching and Backfilling.

B. Cover: As specified in Section 31 23 33 Trenching and Backfilling.

2.4 COUPLINGS AND SLEEVES

A. General: All couplings and sleeves shall be a minimum of 250 psi working pressure-rated unless otherwise noted.

B. For DIP and PVC pipe:

1. Unless otherwise noted, couplings and sleeves for DIP and PVC shall be ductile iron conforming to AWWA C153, size 3 through 24 inch and AWWA C110

greater than 24 inch, and shall be 350 psi working pressure rated. AWWA C100 fittings shall be ductile iron only. Couplings, sleeves, and accessories shall be manufactured by U.S. Pipe TrimTyte, Union Foundry, Tyler; or equal.

2. Unless otherwise noted, flanges on all DIP spools shall conform to AWWA C115.

3. Push-on joints shall have SBR rubber ring gaskets.

4. All fittings shall be restrained joints. Pipes shall be restrained using a wedge-action, self-actuating lug type restraint devise as manufactured by EBAA Iron Sales, StarGrip, or equal. Concrete thrust blocks are not permitted except at connections to existing unrestrained pipe or fittings or at fire hydrants.

5. All pipe joints within the minimum distances listed in the following table shall be restrained. Restraint shall be by use of locking gasket for ductile iron pipe. Restraint for PVC pipe shall by use of a restraint harness EBAA Series 2800, StarGrip, or equal.

	Minimum Restraint Length, feet						
	Horizontal Elbows				Tee, Run & Branch	One-Size Reducer	Dead End
Pipe Diameter, inches	11.25	22.5	45	90			
3	1	2	3	8	8		24
4	1	2	4	10	10	9	29
6	1	3	6	14	14	21	42
8	2	4	7	18	18	23	55
10	2	4	9	21	21	22	66
12	2	3	7	17	17	26	53
14	2	4	8	20	20	16	61
16	2	4	9	22	22	16	69
18	2	5	10	25	25	16	77
20	3	5	11	27	27	16	84
24	3	6	13	32	32	30	100
30	4	8	16	38	38	42	121
36	4	9	18	45	45	43	143

2.5 ACCESSORIES

A. Mechanical Restraints:

1. PVC Pipes: Certain Teed Certa Lock, Romac Grip Rings, or equal.

2. Ductile Iron Pipes: Field Lock Gaskets, Mega Lug 1100 series, TR Flex, or equal.

B. Domestic Backflow Preventer: reduced pressure type backflow preventer, matching service size (unless otherwise indicated on Drawings), FEBCO 860 or 880/880V, Watts, or equal. Provide removable, U.V. resistant, insulated blanket (fiberglass jacketing is not acceptable).

C. Valve Boxes: Precast concrete with cast iron traffic covers with the word WATER

embossed on the top surface of the lid. Christy G5 or equal. Cover shall be painted light blue (ICI Devoe DC41000 semi gloss or equal) for domestic water valves and white (ICI Devoe, DevFlex-659 White Semi Gloss 4206, or equal) for Utility water valves. For chilled water valves, the letters “CHW” shall be welded or embossed on the top surface of the lid and the cover shall be painted green. For all valves an identification number shall be welded onto valve box rim. Identification number shall be assigned by Operations and Maintenance, Engineering Services.

D. Miscellaneous nuts and bolts shall be stainless steel.

E. Rods and Clamps: Socket clamps shall be stainless steel, four bolt type, equipped with stainless steel socket clamp washers and nuts Grinnell Fig. 595 and 594, Elcen Fig. 37 and 37X, or equal.

1. Rods shall be stainless steel, 3/4 inch diameter.

F. All underground water piping shall be accompanied by a Solid Core #10 copper tracer wire. Both ends of tracer wire shall be accessible at all utility valve boxes.

G. Line Marker: Underground-type conductive line marker, permanent, brightly colored, continuous-printed plastic tape, intended for direct burial service; not less than 6 inches wide by 4 mils thick. Provide blue tape with "CAUTION WATER LINE BURIED BELOW" in black letters; Allen Systems Inc., Emed Co. Inc., or equal.

H. Tapping Sleeve: Cast iron or stainless mechanical joint type sleeve, sized specifically for actual O.D. and piping material, Mueller, Clow, or equal.

PART 3 EXECUTION

3.1 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.2 TRENCHING

A. See Section 31 23 33 Trenching and Backfilling for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Buried pipe shall have at least 36 inches of cover for pipes up to 8 inches, 40 inches of cover for 10 inch pipes, 44 inches of cover for 12 inch pipes and 48 inches of cover for 16” pipes and larger and 12 inches of clearance from other utilities.

D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, and then complete backfilling.

3.3 INSTALLATION – PIPE

A. Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.

B. Follow manufacturer instructions, where such are provided, in all cases that cover points not shown on the Drawings or specified herein. Manufacturer's instructions do not take precedence over the Drawings and Specifications. Where manufacturer's instructions are in conflict with the Drawings and Specification, submit the conflicting instructions to the District's Representative for clarification before performing the work.

C. Use fittings to make all changes in direction and size unless otherwise indicated on the Drawings.

D. Maintain factory plastic end covers on the pipe during storage. Caps shall be removed upon installation of pipe to insure cleanliness.

E. Lay piping on a bed of the specified sand, at least 6-inches thick, on firm undisturbed earth. Remove loose rock, clods, and debris from the trench before placing bedding sand and before laying any pipe.

F. The piping shall be made up with the pipe barrel bearing evenly along its full length on the sand bed on the bottom of the trench.

G. In the case of steel or other rigid joint piping, excavate holes under joints and connections for access for making up, welding, testing and wrapping joints.

H. Thoroughly clean out each section of pipe and fitting before lowering into the trench. Clean each pipe or fitting by swabbing-out, brushing-out, blowing-out with compressed air, washing-out with water, or by any combination of these methods necessary to remove all foreign matter.

I. If cleaned pipe sections and fittings cannot be placed in the trench without getting dirt into the open ends, tie tightly woven canvas or other type of approved cover over the ends of the pipes and fittings until they have been lowered into position in the trench. After removal of the covers in the trench, completely remove foreign matter from the pipe ends and fittings.

J. Do not lower any pipe or fitting into a trench that contains water. Pump water from wet trenches, and keep the trenches dry until the joints have been completed and the open ends of the pipes have been closed with watertight plugs or bulkheads. Do not remove the plug or bulkhead unless the trench is dry.

K. Assemble lengths of PVC that are joined by couplings, Tyton type push-on joints, Ring-Tite, Fluid-Tite, or equal, such that centerline of two pipes being joined do not form an angle exceeding 2 inches in any plane. In addition, the angle formed in the vertical plane shall not exceed 1-1/2 inch.

L. Transition plastic pipe to ductile iron when within 10 feet of a steam line. Provide 6

inches minimum powdered insulation around ductile iron sewer pipe when within 5 feet of steam line. Install insulation according to manufacturer's recommendations.

M. Install trace wire on top of pipe.

N. Install continuous line marker 18 inches above top of pipe; coordinate with Section 31 23 33 Trenching and Backfilling.

3.4 INSTALLATION – VALVES

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

3.5 CONNECTIONS TO EXISTING WATER SYSTEM

A. Under no circumstances shall existing lines or utilities be interrupted without prior approval of the District. Submit a request for this approval to the District's Representative, and also state the maximum duration of shutdown. Operation of the central plant governs. The Contractor's schedule may have to be adjusted or work performed during off-hours.

B. Schedule all outages for utility tie-in work well in advance, and by written notice to the District at least 7 working days in advance of the desired shutdown.

C. In preparation for tie-ins to the utility systems, the Contractor shall coordinate with the District's Representative before draining and/or blowing the existing piping prior to start of tie-in work by the Contractor. In all cases, the District will close the appropriate valves to isolate the area of work.

3.6 FLUSHING

A. The entire piping system shall be thoroughly flushed out until acceptance of the District's Representative. All tests shall be conducted at such times as directed by and in the presence of the District's Representative.

3.7 PIPE TESTING

A. Water piping shall be hydrostatically tested at 150 psi pressure for four hours and proven watertight. Provide all instruments, facilities, and labor to conduct testing and placing in operation.

B. Piping shall be tested in sections. Testing under this Section of the work shall be done before final connections to existing utility piping is made, with the provision that subsequent leaks, if developed, at these conditions shall be corrected.

C. Any part of the system, including all accessories, that shows failure during testing shall immediately be repaired or replaced with new materials. The system shall be completely retested after repair for replacement. This procedure shall be repeated, if necessary, until all parts of the system withstand the specified tests. All retesting costs shall be part of the Contract.

D. Leakage rate shall not exceed 1.5 gallons/hour/1000 feet of pipe over a 2-hour test period.

E. Tests shall be witnessed by the District's Representative. At least 48 hours notice of tests shall be given.

3.8 DISINFECTION

A. Disinfect fire hydrant lateral and fire sprinkler line from point of connection to double check assembly per Section 33 13 00 Disinfection of Domestic Water Piping.

3.9 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 45 00 Quality Control.

3.10 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Section 01 74 00 Cleaning including, but not limited to:

1. Separate packaging materials by type and place in locations designated by the Contractor.

2. Place unused scrap material in locations designated by the Contractor.

END OF SECTION

SECTION 33 11 19

FIRE SUPPRESSION UTILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Pipe and fittings for fire water lines.

B. Valves and Fire hydrants.

C. All design, work, and materials described herein shall be approved by the District's Representative and by the San Jose Fire Department (SJFD). All work shall be designed in accordance with the National Fire Protection Association 13 (2013 edition). All shall also comply with Title 24, (2005) and the appropriate editions of the California Building Code and the California Fire Code.

D. Work included for the Underground Fire Protection System:

1. Connection to existing water main, as required.
2. Underground fire sprinkler mains complete with underground risers ending at a point 5 feet-0 inches outside of the building with a blank flange bolted on top.
3. New gate valves, and related pipe and fittings.
4. Building and system designation signs on the fire department connections.
5. Coordination of electrical conduit installation for supervisory systems.
6. Painting of portions of the fire protection system.
7. Compliance with the design requirements of SJFD and District's Representative. Prepare shop drawings and details for the approval and installation of the system per NFPA 24 (2013 edition.)
8. Coordination required to obtain approval of the SJFD and District's Representative.
9. Arrangement for all required inspections by the SJFD and District's Representative. Cost of all testing and of special inspection required by them shall be paid by the Contractor.
10. Provide all labor, materials and equipment required to complete the mechanical site utility work of the contract documents. Verify all existing utilities and exact locations prior to installation of new piping and provide all necessary trim and fittings for required connections.
11. Fire Service double check valve assembly, OS&Y rising stem gate valves and fire department connections.
12. New fire hydrants, key gate valves, and related pipe and fittings.
13. Coordination of electrical conduit installation for alarm supervisory for systems.

E. Related Sections:

1. Section 31 25 13 Erosion Controls.

1.2 SUBMITTALS

A. See Section 01 32 19 for submittal procedures.

B. Underground fire protection shop drawings shall show all information required by NFPA 24 for Residential buildings.

C. Materials List: Accompanying the Shop Drawings, submit a complete list of all materials proposed to be furnished and installed under this section, giving manufacturer's name and catalog number for each item.

D. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide U.L. numbers for all materials submitted.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Shop Drawings: Prepare shop drawings and details for the approval and installation of the system per NFPA 24.

G. NFPA 24 Underground Check list: Installing Contractor shall complete, sign, and submit NFPA 24 Underground Check List to District's representative.

H. Project Record Documents: Record actual locations of piping mains, valves, connections, restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.3 SYSTEM DESCRIPTION OF UNDERGROUND FIRE PROTECTION

A. All work shall be designed in accordance with the requirements of the applicable editions of National Fire Protection Association (NFPA) 13, 14, and 24, and the appropriate editions of the California Building code and the California Fire Code.

B. Fire protection system lines shall be designed to avoid all other utility conduit and structural components shown on the Drawings. Fire protection system lines must give way to all gravity lines. Prior to completion of shop drawings, the Contractor shall coordinate the design of all work to be installed under this section with other work to avoid conflicts.

C. Underground fire protection system shop drawings shall show all information required by NFPA 24.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.1 MATERIAL FOR UNDERGROUND FIRE PROTECTION SYSTEM

A. All material installed under this section shall meet the following requirements:

1. All material shall be in compliance with NFPA 13, (2013 editions).

2. All material shall be new and currently listed in the Underwriters Laboratories, Inc., Fire Protection Equipment Directory, and/or the Factory Mutual Approval Guide for use as intended in underground fire line installations. Material that is pending approval shall not be acceptable.

3. All vertical piping shall be cast or ductile iron.

4. Uniflanges shall not be used on vertical piping or above ground. Tops of vertical risers shall be rodded down to the 90 degree bend at the base of

the riser. Horizontal risers shall be rodded back to deadman of sufficient size to secure the flanged fitting.

5. Cast or ductile iron pipe shall be installed within 5 feet of the building and under all footings and slabs.

6. Fire department connection (FDC) shall be a 90 degree pattern with plugs and chains or sensible caps as identified on Drawings. Building System signs, acceptable to the SJFD, shall be installed on the fire department connection.

7. Fire department connection check valve shall be installed at the top of the FDC riser with the FDC installed on top per Drawings.

8. Control valve locks shall be provided by District, chains shall be provided by Contractor.

2.2 VALVES

A. All gate valves 4-inch and larger in size shall conform to AWWA Standard Specification C509. All valves shall be iron body, bronze mounted, double-disk, parallel seat gate valves. All valves shall open by turning the stem counterclockwise. Buried valves shall be non-rising type with O ring seal equipped with 2 inch square operating nut, and shall be bituminous coated. End connections shall be flanged or mechanical joint as required for the type of pipe used. Buried valves shall have stem extensions to place operating nut within 6 inches of top of valve box.

B. Tapping valve shall be cast iron, 200 psi working pressure, mechanical joint, with "O" ring seals, non-rising stem, Mueller H-667, Kennedy, or equal.

C. Valves: Manufacturer's name and pressure rating marked on valve body.

D. Gate Valves Up To 3 inches:

1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, post indicator, valve key, and extension box.

E. Swing Check Valves from 2 inches to 24 inches:

1. AWWA C508, iron body, bronze trim, 45 degree swing disc, renewable disc and seat, flanged ends.

F. Valve Supervisory Switch:

1. Potter OSYSU-1.

2. System Sensor.

3. Or equal.

2.3 HYDRANTS

A. Hydrant shall be Clow Corporation Model #92, Slim Line, or equal (no known equal), low silhouette, with two 2-1/2 inch outlets and one 4-1/2 inch outlet. All outlets shall have National Standard fire hose thread.

B. Hydrants shall be wet barrel type.

2.4 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 23 33 Trenching and Backfilling

B. Cover: As specified in Section 31 23 33 Trenching and Backfilling

2.5 ACCESSORIES

A. Tapping Sleeve: Cast iron or stainless mechanical joint type sleeve, sized specifically for actual O.D. and piping material, Mueller, Clow, or equal.

B. Valve Boxes: Valve boxes shall be precast concrete with cast iron traffic covers. Traffic box shall be circular with the word WATER embossed on the top surface. Christy G-5, or equal (no known equal).

C. Tracer Wire: Provide #10 insulated solid core copper trace wire installed parallel to piping and attached to valves as indicated on Drawings.

D. Miscellaneous nuts and bolts shall be stainless steel.

E. Rods and Clamps: Socket clamps shall be stainless steel, four bolt type, equipped with stainless steel socket clamp washers and nuts Grinnell Fig. 595 and 594, Elcen Fig. 37 and 37X, or equal.

1. Rods shall be stainless steel, 3/4 inch diameter.

F. Backflow Protection: Armored, double check type backflow preventer shall be approved on the most recent “List of Approved Backflow Prevention Assemblies,” USC Foundation for Cross-Connection Control and Hydraulic Research. System-side OS&Y indicating-stem gate valve to be Underwriters Laboratory (UL) “Fire Protection Equipment” listed.

G. Fire department connection (FDC): 4-inch by 2-1/2 inch 2-way (siamese) brass, dual clapper freestanding or integral with fire backflow assembly, brass finish with caps and chains as identified on Drawings. Building System signs, acceptable to the SJFD, shall be installed on the fire department connection.

H. Fire Protection Control valve locks shall be provided by District, Contractor shall provide chains.

2.6 IDENTIFICATION MARKERS

A. Identification Materials: Provide single selection for each product category stencils are not acceptable.

B. Underground-Type Plastic Line Markers: Provide 6” wide by 4 mils thick multi-ply tape, consisting of solid metallic foil core between 2 layers of plastic tape. Markers to be permanent, bright colored, continuous printed, intended for direct burial service.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that building service connection and water main size, location, and invert are as indicated.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.3 EXCAVATION, TRENCHING, AND BACKFILLING

A. See Section 31 23 33 Trenching and Backfilling

B. Special preparation shall be taken to keep the inside of the piping clean of all debris, especially sand, during installation and testing. Maintain factory covers on open ends of pipe until lowered into trench.

C. After testing and acceptance, the trench shall be backfilled with sand for the first 12-inch depth. Mechanical tamping of rock-free soil shall be carefully done to achieve a minimum of 90 percent compaction at depth of 12 inches and below, and 95 percent compaction for top 12 inches of depth.

D. Hand trim excavation for accurate placement of pipe to elevations indicated.

E. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, and then complete backfilling.

3.4 GENERAL INSTALLATION

A. Have on hand all installation manuals, brochures, and procedures for the equipment and materials concerned.

B. Follow manufacturer instructions, where such are provided, in all cases that cover points not shown on the Drawings or specified herein. Manufacturer's instructions do not take precedence over the Drawings and Specifications. Where manufacturer's instructions are in conflict with the Drawings and Specification, submit the conflicting instructions to the District's Representative for clarification before performing the work.

C. Use fittings to make all changes in direction and size unless otherwise shown on the Drawings.

D. Maintain factory plastic end covers on the pipe during storage. Caps shall be removed upon installation of pipe to insure cleanliness.

E. Installation of Backflow Assemblies shall not be considered complete until tested by a certified tester.

3.5 INSTALLATION OF UNDERGROUND FIRE PROTECTION SYSTEM

A. Connect to the existing water mains and comply with the following requirements and procedures:

1. Piping shall be installed in accordance with the requirements of NFPA 13 (2013 edition), and the appropriate editions of the California Building code and the California Fire Code.

2. Give special attention to materials and coatings. A backflow prevention assembly is required on all fire lines in accordance with the requirements of the applicable editions of National Fire Protection Association (NFPA) 13, 14, and 24, and the appropriate editions of the California Building code and the California Fire Code.

3. Underground piping and backfill shall be installed in strict accordance with the Manufacturer's Installation Guide.

4. All mechanical restraints shall be designed to conform to the requirements of NFPA 24. Design of mechanical restraints shall be shown on shop drawings.

5. All equipment shall be properly rodded. The Contractor shall be responsible for the proper design and installation of the equipment. Shop drawings shall show details of rodding.

6. The underground fire protection system installer shall furnish and install all sleeves required for the work where it passes through concrete. If

sleeves are not installed, all penetrations shall be core drilled. Coordinate criteria with District's Representative. All penetrations shall be approved by the District's Representative and by the SJFD before drilling. All penetrations shall be in accordance with NFPA Standard #13 and #24.

7. The tops of the Fire Department connections shall be 36 inches above grade, or as approved by the District's Representative and the SJFD. The devices shall be painted and signage provided as specified by the SJFD.

3.6 CONNECTIONS TO EXISTING WATER MAINS

A. Under no circumstances shall existing lines or utilities be interrupted without prior approval of the District. Submit a request for this approval to the District's Representative in accordance with Section 013513 Special Project Procedures, and also state the maximum duration of shutdown. The Contractor's schedule may have to be adjusted or work performed during off-hours.

B. Schedule all outages for utility tie-in work well in advance and by written notice to the District's Representative at least 7 working days in advance of the desired shutdown.

C. In preparation for tie-ins to the utility systems, the Contractor shall coordinate with the District's Representative before draining or blowing the existing piping prior to start of tie-in work by the Contractor. In all cases, the District will close the appropriate valves to isolate the area of work.

3.7 FLUSHING

A. The entire piping system shall be thoroughly flushed out until reasonably clean in the opinion of the SJFD inspector through the District's Representative. All tests shall be conducted at such times as directed by and in the presence of the SJFD inspector through the District's Representative.

3.8 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.

D. Hydrant shall be installed with the outlets facing the street, with 4-1/2 inch opening no less than 2 feet or more than 7 feet from the street curb or edge of pavement.

E. The center of the lowest outlet shall be no less than 18 inches above finished grade.

F. Hydrants to be painted by District in accordance with National Fire Protection Association (NFPA) NFPA 24, edition 2013 requirements.

G. Where subject to mechanical injury, hydrants to be protected in accordance with the requirements of the applicable editions of National Fire Protection Association (NFPA) 13, 14, and 24, and the appropriate editions of the California Building code and the California Fire Code, so as not to interfere with connection to the outlets.

3.9 PIPE TESTING

A. Water piping from the backflow device to the building riser shall be hydrostatically tested at 200 psi pressure for two hours in accordance with NFPA 24, "Standards for the Installation of Private Fire Service Mains and Their Appurtenances" and

proven watertight. Provide all instruments, facilities, and labor to conduct testing and placing in operation. Water piping from the backflow devise to the main shall be tested in accordance with Section 33 11 00 Water Distribution.

B. Piping may be tested in sections. Testing under this Section of the work shall be done before final connections to existing utility piping are made, with the provision that subsequent leaks, if developed, at these conditions shall be corrected.

C. Any part of the system, including all accessories, that shows failure during testing shall immediately be repaired or replaced with new materials. The system shall be completely retested after repair for replacement. This procedure shall be repeated, if necessary, until all parts of the system withstand the specified tests. All retesting costs shall be at no additional cost to the District.

D. Leakage rate shall hold with no loss over a 2-hour test period.

E. Tests shall be witnessed by the District's Representative and SJFD. At least 48 hours notice of tests shall be given.

F. Underground piping shall be center-loaded and all fittings, joints and strapping shall be exposed for hydrostatic pressure testing and inspection. Center loading test is acceptable by SJFD.

G. Piping shall be inspected, pressure tested and flushed according to the procedures set forth in NFPA 13 and 24. An inspection of underground installation, backflush, and hydrostatic test shall be conducted by the Contractor and witnessed by the District’s Representative and by a representative of the SJFD prior to backfill.

3.10 DISINFECTION

A. Disinfect fire hydrant lateral and fire sprinkler line from point of connection to double check assembly per Section 33 13 00 Disinfection of Domestic Water Piping.

END OF SECTION

SECTION 33 13 00

DISINFECTION OF DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This specification applies to the installation of all new and repaired potable (domestic) water lines. All new domestic water lines shall be disinfected before they are connected to existing piping and placed in service. All domestic water lines taken out of service for inspection, repair, or other activities that might lead to contamination of water shall be disinfected before they are returned to service.

B. Except as specifically noted, Contractor shall furnish all labor, equipment, and materials to prepare, disinfect and test domestic water lines in conformity with the procedures and standards described in this section.

C. Related Sections:

1. Section 01 32 19 Submittal Procedures
2. Section 33 11 00 Water Distribution

1.2 SUBMITTALS

D. Submit a Disinfection Plan describing flushing procedures; type, form, and dose of disinfectant to be used; proposed locations for adding disinfectants and collecting disinfection verification samples; final flushing procedures; and location for disposal of flushing water.

E. Following completion of disinfection, provide a Disinfection Certification Report confirming compliance with specification to the District’s Representative. This report, together with acceptable disinfection verification sample results collected and analyzed by the District's Representative will form the basis for approval of disinfection.

F. Submit in accordance with Section 01 32 19.

1.3 SUPERVISION AND TESTING

G. Disinfection shall not commence until the District's Representative has accepted the Disinfection Plan. The District’s Representative shall supervise the start of disinfection and the conclusion of the disinfection retention period.

H. Unless otherwise approved by the District's Representative the final disinfection verification water samples will be collected by the District's Representative with analysis performed by a California Department of Health Services laboratory selected and paid for by the District. Contractor shall assist the District's Representative in completing this task.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The following forms of chlorine are approved for use as disinfecting agents:

1. Sodium hypochlorite in liquid form, conforming to American National Standards Institute/American Water Works Association (ANSI/AWWA) B300.

B. Contractor shall comply with all applicable local, state and federal regulations concerning transport, handling and reporting of the materials used for disinfection.

PART 3 - EXECUTION

3.1 PREVENTIVE AND CORRECTIVE MEASURES DURING CONSTRUCTION

A. General. The procedures of this section must be observed to assure that water pipelines and appurtenances have been thoroughly cleaned for the final disinfection by chlorination. New pipelines must be isolated until bacteriological tests described in this section, are satisfactorily completed and disinfection is approved by the District's Representative.

B. Keeping pipe clean and dry. The interiors of pipes, fitting, and valves shall be protected from contamination. Pipe delivered for construction shall be strung to minimize the entrance of foreign material. All opening in the pipelines shall be closed with water tight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.

C. Packing materials. Yarning or packing material shall consist of molded or tubular rubber rings, rope of treated paper, or other approved materials. Materials such as jute or hemp shall not be used. Packing material shall be handled in a manner that avoids contamination. Packing materials are only acceptable if specified as part of the piping system and provided in accordance with piping requirement specified in other sections of specification. Refer to piping specification Section 33 11 00 Water Distribution.

D. Sealing materials. No contaminated material or any material capable of supporting prolific growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. Sealing materials are only acceptable if specified as part of the piping system and provided in accordance with piping requirement specified in other sections of specification. Refer to Section 33 11 00 Water Distribution.

E. Cleaning and swabbing. If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a 1 to 5 percent hypochlorite disinfecting solution. If, in the opinion of the District's Representative, the dirt remaining in the pipe will not be removed using the flushing operation, then the interior of the pipe shall be cleaned using mechanical means, such as a hydraulically propelled foam pig (or other suitable device acceptable to the District's Representative in conjunction with the application of a 1 percent hypochlorite disinfecting solution. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the District's Representative.

F. Flooding by storm or accident during construction. If the pipeline is flooded during construction, it shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with chlorinated potable water that, at the end of a 24-hour holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the pipeline. After construction is completed, the pipeline shall be disinfected using the continuous-feed method.

3.2 METHODS OF CHLORINATION

G. General. The continuous feed method shall be used for disinfection. AWWA's "tablet method" and "slug method" are not allowed. All valves, faucets, and fixtures shall be installed and piping installation shall be completed before chlorination is initiated.

H. Notification and Scheduling. Contractor shall notify the District's Representative of their intent to begin the disinfection process. Prior to scheduling this work, the disinfection submittal must have been approved by the District. The Contractor will coordinate the disinfection, final flushing, and disinfection verification sampling with the District's Representative at least 72 hours prior to commencing chlorination. Disinfection verification sampling must be scheduled only on Mondays, Tuesdays, Wednesdays or Thursdays and be completed prior to 3:30 P.M.

I. Preflushing of source water. The source water (typically a District fire hydrant) used for disinfection and pressure testing shall be flushed prior to its use to ensure that contaminants or debris are not introduced into the new pipe. Flushed water shall not be discharged, either directly or indirectly, into storm drainage systems. Flushed water shall either be discharged into the sanitary sewer system, or managed in a manner to retain the water on site. The District's Representative will provide the Contractor a location to discharge flushing water during formation of the Disinfection Plan.

J. Preliminary flushing. Before the pipeline is chlorinated, it shall be filled to eliminate air pockets and flushed to remove particulates. The flushing velocity in the pipeline shall not be less than 2.5 ft/s unless the District's Representative determines that conditions do not permit the required flow to be discharged to waste. As practical, as determined by the District's Representative, all fixtures shall be flushed in the full-open position until the water is clear. The District's Representative will provide the Contractor the duration of flushing at 2.5 ft/s during formation of the Disinfection Plan.

K. Critical service disruptions. When emergency eyewashes and/or emergency showers for in-use laboratories are removed from service due to disinfection procedures, alternative emergency eyewashes and showers shall be provided.

L. Procedure for chlorinating the pipeline.

1. Water supplied from a temporary, backflow-protected connection to the existing domestic water system shall flow at a measured rate into the newly installed water pipeline. In the absence of a meter, the rate may be approximated using a Pitot gauge in the discharge, measuring the time to fill a container of known volume, or other approved method.

2. A service cock shall be installed on piping intended for disinfection for the introduction of hypochlorite solution and for use as a sample bib for testing purposes. Service cock shall be located no more than 10 feet downstream of the supply point for disinfection water.

3. For disinfection of hot water systems, the temperature of the hot water system shall be reduced to that of the cold water system before initiating chlorination.

4. Prior to initiating chlorination, each outlet and valve shall be posted with signs indicating water may not be used; e.g., “Do Not Use”, “Chlorinated Water – Do Not Drink”. Postings must be made in English and Spanish. Water lines must remain isolated from use, and faucets and valves must remain posted until conditional or final approval for use has been given by District's Representative.

5. At a point not more than 10 feet downstream from the beginning of the new pipeline, water entering the new pipeline shall receive a dose of hypochlorite fed at a constant rate such that the water will have not less than 25 mg/L and not more than 35 mg/L free chlorine. To ensure that this concentration is provided, measure chlorine concentration at regular intervals in accordance with the procedures described in the current edition of Standard Methods for the Examination of Water and Wastewater or AWWA Manual M12, or using approved chlorine test kits. The hypochlorite solution may be applied to the water pipeline with a gasoline or electrically powered chemical-feed pump designed for feed chlorine solutions. Feed lines shall be made of material capable of withstanding the corrosion caused by the concentrated chlorine solutions and the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the solution is applied to the pipeline.

6. All fixtures shall be partially opened to allow for a simultaneous trickle of flow. Chlorine application shall not cease until the entire pipeline is filled with heavily chlorinated water, as verified by measurements at the fixtures. The District's Representative will witness the initial concentrations measured by the Contractor and may take disinfection verification samples to confirm compliance. Following verification of chlorination, each outlet and valve shall be closed.

7. The chlorinated water shall be retained in the pipeline for at least 24 hours, but not more than 48 hours, unless approved by the District's Representative. At the end of the retention period, the treated water in all portions of the pipelines shall have residual of not less than 10 mg/L of free chlorine.

M. Final Flushing.

1. Clearing the pipeline of heavily chlorinated water. After the application retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main fittings, valves, and branches until chlorine measurements show that the concentration of the water leaving the pipeline is no higher than that generally prevailing in the distribution system or 0.5 ppm. The District’s Representative shall take samples and determine the chlorine concentration of the flush water.

2. Disposing of heavily chlorinated water. Flushed water shall not be discharged, either directly or indirectly, into storm drainage systems. Flushed water may be discharged into the sanitary sewer system if approved by the District Representative, otherwise Contractor is

responsible to retain the water on site, remove and dispose off-site in accordance with applicable regulations.

3.3 DISINFECTION VERIFICATION

N. Sampling. After final flushing and before the new water pipeline is connected to the distribution system, 2 consecutive sets of samples, taken at least 24-hours apart, shall be collected from the new pipeline. Under normal circumstances, the first set of samples will be collected immediately following final flushing. At a minimum, the District's Representative will take samples every 1,000 feet of pipeline, plus 1 set from the end of the pipeline, and at least 1 set from each branch. The Contractor shall provide dedicated and clean sampling taps at these locations. A corporation cock may be installed in the pipeline with a copper-tube gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use. The number and location of samples from fixtures is at the discretion of the District's Representative and shall be determined on a project specific basis. The source water will also be sampled. The District will test the samples for bacteriological quality, turbidity, and pH in accordance with Standard Methods for the Examination of Water and Wastewater. For approval by the District's Representative, 2 consecutive sets of samples from each location shall show the absence of coliform organisms and turbidity and pH consistent with that of the source water.

O. Special conditions. Under certain circumstances, such as when excessive quantities of dirt or debris are known to have entered the pipeline, the District's Representative may elect to collect bacteriological samples after allowing the water to stand in the new pipeline for at least 16 hours after final flushing has been completed.

3.4 REDISINFECTION

P. If the initial disinfection fails to produce satisfactory bacteriological results, the new pipeline may be reflushed and resampled. If the check samples also fail to produce acceptable results, the pipeline shall be rechlorinated by the continuous-feed method until satisfactory results are obtained. Reflushing, resampling, and rechlorination shall be at no expense to the District.

3.5 APPROVAL

Q. Conditional Approval. After satisfactory completion of the disinfection procedure, the District's Representative may issue a conditional approval for immediate use of the water distribution system pending results of bacteriological analysis of water samples.

B. Final Approval. Upon receipt of laboratory confirmation that all samples are negative for coliform bacteria, the system will be approved for immediate use.

END OF SECTION

SECTION 33 30 00

SANITARY SEWERAGE UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sanitary sewer piping, fittings, and accessories (gravity systems only).

B. Connection of site sanitary sewer system to existing sanitary sewer system.

C. Manholes and Cleanouts.

1.2 RELATED SECTIONS

A. Section 01 32 19 Submittal Procedures.

B. Section 31 23 33 Trenching and Backfilling: Excavating, bedding, and backfilling.

C. Section 31 25 13 Erosion Controls.

D. Section 33 05 13 Manholes and Structures.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) A 746 - Standard Specification for Ductile Iron Gravity Sewer Pipe; 2003.

B. ASTM D 3034 - Standard Specification for Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings; 2004a.

C. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2005.

D. American Water Works Association (AWWA) C111/A21.11 – American National Standard for Rubber Gasket Joints For Cast Iron and Ductile Iron Pressure Pipe and Fittings; 2000.

1.4 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.5 SUBMITTALS

A. See Section 01 32 19 for submittal procedures.

B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents:

1. Record location of pipe runs, connections, cleanouts, manholes and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 1 GENERAL

2.1 SEWER PIPE MATERIALS

A. Plastic Pipe: ASTM D 3034, Type PSM, Poly Vinyl Chloride (PVC) material; inside nominal diameter as indicated on Drawings.

B. Plastic Pipe Joint Seals: ASTM D 3212 PVC elastomeric joints using elastomeric seals complying with ASTM F 477.

C. Ductile Iron Pipe: A 746; inside nominal diameter as indicated on Drawings.

D. Ductile Iron Pipe Joint Seals: AWWA C111/A21.11 rubber gaskets.

E. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.2 PIPE ACCESSORIES

A. Line Marker: Provide warning detectable tape; permanent, bright-colored, continuous-printed plastic tape, intended for direct burial service; not less than 6 inches wide by 4 mils thick. Provide green tape with "CAUTION SEWER LINE BURIED BELOW" in black letters.

2.3 CLEANOUT

A. Cleanouts: As indicated on Drawings

2.4 BEDDING AND COVER MATERIALS

A. Pipe Bedding Material: As specified in Section 31 23 33 Trenching and Backfilling.

B. Pipe Cover Material: As specified in Section 31 23 33 Trenching and Backfilling.

PART 3 EXECUTION

3.1 TRENCHING

A. See Section 31 23 33 Trenching and Backfilling for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.2 INSTALLATION – PIPE

A. Lay piping beginning at low point of system, true to grades and alignment indicated on Drawings, with unbroken continuity of invert. Lay pipe with bell face upstream.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.

1. Plastic Pipe: Also comply with ASTM D 2321.

C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Install continuous line marker 18 inches above top of pipe; coordinate with Section 31 23 33 Trenching and Backfilling.

3.3 PIPE PENETRATIONS

A. For pipe penetrations through existing manholes, core through, install gasket around pipe, grout penetration on both sides and install a minimum of 6 inches around collar outside of the manhole or inlet structure penetration.

3.4 TAP CONNECTIONS

A. Make connections to existing underground structures so that finished Work will conform as nearly as practicable to requirements specified for new Work.

B. Take care while making tap connections to prevent concrete or debris from entering existing pipe or structure. Remove debris, concrete, or other extraneous material, which may accumulate.

3.5 CLEANING

A. Piping greater than 6 inches: clean pipe to be tested by propelling a snug fitting inflated rubber ball through the pipe with water to remove any debris.

B. Piping 6 inches and smaller: flush piping applying full size pipe flushing.

3.6 LEAK TESTING

A. Testing of all portions of the sewer including manholes is required.

B. For either exfiltration or infiltration test, the maximum leakage shall not exceed 250 gallons per inch of pipe diameter per mile per 24 hours as measured over a period of 30 minutes minimum. Should the leakage exceed the maximum allowable rate, the contractor shall repair, overhaul, or rebuild the defective portion of the sewer line. After repairs have been completed by the Contractor, the line shall be retested as specified above.

C. Manholes shall be filled with water to the rim of the frame casting and shall lose no more than 2 inches over a period of 30 minutes.

D. The final test shall be performed after the line has been laid and all backfill placed and compacted. The Contractor, at his option, may test the line at any time during construction. However, the final test for acceptance shall be made only after all backfill is in place and compacted. In the event that the exfiltration test prescribed above is impractical due to wet trench conditions, these portions of the sewer line where such conditions are encountered will be tested for infiltration. The District's Representative shall determine whether the exfiltration or infiltration test will be used.

E. Even though the test for leakage is within the prescribed limits, the Contractor shall repair any obvious leaks.

F. Low pressure air testing may be used in lieu of water testing at the option of the Contractor. Water testing may be required by the District's Representative. The following procedure shall be used for air testing:

1. Plug all pipe outlets with suitable test plugs. Brace each plug securely.

2. If the pipe to be tested is submerged in ground water, insert a pipe probe, by boring or jetting, into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to ground water submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.

3. Add air slowly to the portion of the pipe installation under test until the internal pressure is raised to 5.0 psig.

4. Check exposed pipe and plugs for abnormal leakage by coating with a soap solution. If any leakage is observed, bleed off air and make necessary repairs.

5. After an internal pressure of 5.0 psig. is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

6. After the two minute period, disconnect the air supply and start stopwatch. The pressure of 5.0 psig. shall be maintained for 5 minutes.
7. As an alternate, the contractor may request the air testing procedure as presented in Section 306-1.4.4 of the 1997 edition of the “Greenbook” Standard Specifications.

G. Vacuum testing in accordance with ASTM C1244 may be requested as an alternate testing method.

3.7 Construction Waste Management

A. Comply with the applicable provisions of Section 01 74 00 Cleaning including, but not limited to:

1. Separate packaging materials by type and place in locations designated by the Contractor.

2. Place unused scrap material in locations designated by the Contractor.

END OF SECTION

SECTION 33 40 00

STORM DRAINAGE UTILITIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Storm drainage piping, fittings, and accessories (gravity systems only).

B. Connection of drainage system to existing drainage system.

C. Inlets and Cleanouts.

1.2 RELATED SECTIONS

A. Section 01 32 19 Submittal Procedures.

B. Section 31 23 33 Trenching and Backfilling: Excavating, bedding, and backfilling.

C. Section 31 25 13 Erosion Controls.

D. Section 33 05 13 Manholes and Structures.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) A 746 - Standard Specification for Ductile Iron Gravity Sewer Pipe; 2003.

B. ASTM D 3034 - Standard Specification for Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings; 2004a.

C. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2005.

D. American Water Works Association (AWWA) C111/A21.11 – American National Standard for Rubber Gasket Joints For Cast Iron and Ductile Iron Pressure Pipe and Fittings; 2000.

1.4 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.5 SUBMITTALS

A. See Section 01 32 19 for submittal procedures.

B. Product Data: Provide data acknowledging that products meet requirements of standards referenced.

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Project Record Documents:

1. Record location of pipe runs, connections, inlets, cleanouts, manholes and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

PART 2 PRODUCTS

2.1 DRAINAGE PIPE MATERIALS

A. Plastic Pipe: ASTM D 3034, Type PSM, SDR 35, Poly Vinyl Chloride (PVC) material; inside nominal diameter as indicated on Drawings.

B. Plastic Pipe Joint Seals: ASTM D 3212 PVC elastomeric joints using elastomeric seals complying with ASTM F 477.

C. Ductile Iron Pipe: A 746; inside nominal diameter as indicated on Drawings.

D. Ductile Iron Pipe Joint Seals: AWWA C111/A21.11 rubber gaskets.

E. Corrugated High Density Polyethylene Pipe (CPEP): Pipe shall have a smooth interior and annular exterior corrugations. Pipe and fitting material shall be high density polyethylene meeting ASTM D3350 minimum cell classification 324420C for 4-10 inches diameters or 335420C for 12-60 inches diameters. Pipes 4-10 inches in diameter shall meet American Association of State Transportation Officials (AASHTO) M252, Type S, and 12-48 inches diameter shall meet AASHTO M294, Type S. Pipe material shall be a slow crack resistance material evaluated using the single point notched constant tensile load (SP-NCTL) test. Average SP-NCTL test specimens must exceed 24 hours with no test result less than 17 hours.

F. Corrugated High Density Polyethylene Pipe (CPEP) Joint Device: Bell-and-spigot meeting AASHTO M252, AASHTO M294 or MP7. Joints shall be silt-tight and non-rated watertight. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477 with the addition that the gaskets shall not have any visible cracking when tested according to ASTM D1149 after 72-hour exposure in 50 PPHM ozone at 104 degrees F.

G. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.2 PIPE ACCESSORIES

A. Line Marker: Provide warning detectable tape; permanent, bright-colored, continuous-printed plastic tape, intended for direct burial service; not less than 6 inches wide by 4 mils thick. Provide green tape with "CAUTION STORM LINE BURIED BELOW" in black letters.

2.3 CLEANOUTS AND CATCH BASINS

A. Cleanouts and Catch Basins: As indicated on Drawings.

2.4 BEDDING AND COVER MATERIALS

A. Pipe Bedding Material: As specified in Section 31 23 33 Trenching and Backfilling.

B. Pipe Cover Material: As specified in Section 31 23 33 Trenching and Backfilling.

PART 3 EXECUTION

3.1 TRENCHING

A. See Section 31 23 33 Trenching and Backfilling for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.2 INSTALLATION – PIPE

A. Lay piping beginning at low point of system, true to grades and alignment indicated on Drawings, with unbroken continuity of invert.

B. Install pipe, fittings, and accessories in accordance with manufacturer’s instructions. Seal watertight.

1. Plastic Pipe: Also comply with ASTM D 2321.

C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true

slope of 1/8 inch in 10 feet.

D. Install continuous line marker 18 inches above top of pipe; coordinate with Section 31 23 33 Trenching and Backfilling.

3.3 INSTALLATION - CATCH BASINS

A. Provide as recommended by manufacturer.

3.4 PIPE PENETRATIONS

A. For pipe penetrations through existing manholes, core through, provide gasket around pipe, grout penetration on both sides and provide a minimum of 6 inches around collar outside of the manhole or inlet structure penetration.

3.5 TAP CONNECTIONS

A. Make connections to existing piping and underground structures so that finished Work will conform as nearly as practicable to requirements specified for new Work.

B. Into underground structures or pipes 24 inches and larger: Cut opening into unit sufficiently large to allow 3 inches of concrete to be packed around entering connection. Cut ends of connection passing through pipe or structure wall to conform to shape of and be flush with inside wall. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground. Provide 3000 pounds per square inch concrete. Use epoxy bonding compound as interface between new and existing concrete and piping materials.

C. Take care while making tap connections to prevent concrete or debris from entering existing pipe or structure. Remove debris, concrete, or other extraneous material, which may accumulate.

3.6 CLEANING

A. Piping greater than 6 inches: clean pipe to be tested by propelling a snug fitting inflated rubber ball through the pipe with water to remove any debris.

B. Piping 6 inches and smaller: flush piping applying full size pipe flushing.

3.7 LEAK TESTING

A. Testing of all portions of the sewer including manholes is required.

B. For either exfiltration or infiltration test, the maximum leakage shall not exceed 250 gallons per inch of pipe diameter per mile per 24 hours as measured over a period of 30 minutes minimum. Should the leakage exceed the maximum allowable rate, the contractor shall repair, overhaul, or rebuild the defective portion of the sewer line. After repairs have been completed by the Contractor, the line shall be retested as specified above.

C. Manholes shall be filled with water to the rim of the frame casting and shall lose no more than 2 inches over a period of 30 minutes.

D. The final test shall be performed after the line has been laid and all backfill placed and compacted. The Contractor, at his option, may test the line at any time during construction. However, the final test for acceptance shall be made only after all backfill is in place and compacted. In the event that the exfiltration test prescribed above is impractical due to wet trench conditions, these portions of the sewer line where such conditions are encountered will be tested for infiltration. The District's Representative shall determine whether the exfiltration or infiltration test will be used.

E. Even though the test for leakage is within the prescribed limits, the Contractor shall repair any obvious leaks.

F. Low pressure air testing may be used in lieu of water testing at the option of the Contractor. Water testing may be required by the District's Representative. The following procedure shall be used for air testing:

1. Plug all pipe outlets with suitable test plugs. Brace each plug securely.

2. If the pipe to be tested is submerged in ground water, insert a pipe probe, by boring or jetting, into the backfill material adjacent to the center of the pipe, and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to ground water submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.

3. Add air slowly to the portion of the pipe installation under test until the internal pressure is raised to 5.0 psig.

4. Check exposed pipe and plugs for abnormal leakage by coating with a soap solution. If any leakage is observed, bleed off air and make necessary repairs.

5. After an internal pressure of 5.0 psig. is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

6. After the two minute period, disconnect the air supply and start stopwatch. The pressure of 5.0 psig. shall be maintained for 5 minutes.

7. As an alternate, the contractor may request the air testing procedure as presented in Section 306-1.4.4 of the 1997 edition of the "Greenbook" Standard Specifications.

3.8 Construction Waste Management

A. Comply with the applicable provisions of Section 01 74 00 Cleaning including, but not limited to:

1. Separate packaging materials by type and place in locations designated by the Contractor.

2. Place unused scrap material in locations designated by the Contractor.

END OF SECTION

SECTION 33 43 00

LANDSCAPE DRAINAGE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section includes landscape drainage, complete, as shown and as specified.

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 REFERENCES

A. Standard Specifications - Standard Specifications, State of California, California State Transportation Agency, Department of Transportation (Caltrans), latest edition.

B. ASTM - American Society for Testing and Materials

1.3 SUBMITTALS

A. Conform to the requirements of Division 1, Section 01 32 19 Submittal Procedures.

B. Product Data: Manufacturers' current catalog cuts and specifications for the following:

1. Perforated pipe

2. Area drains

C. Samples:

1. Drain Pipe: One [1] Twelve [12] in. length for each type.

2. Area Drain: One [1] for each type and finish.

3. Filter Fabric: Six [6] in. x six [6] in.

1.4 PROJECT/SITE CONDITIONS

A. Protection of Utilities:

1. Provide temporary support and protection of underground and surface utility structures, drains, services and other improvements to remain.

2. Where grade or alignment of pipe is obstructed by existing utility structures such as conduits, ducts or pipes, permanently support, relocate, remove or reconstruct the obstruction.

3. Restore all damaged improvements to original condition at no additional cost to District.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: All containerized products shall be delivered to the site in manufacturer's original, unopened, legibly labeled containers. All pipe to be delivered bound securely to prevent damage. Supply pallets as required to protect products.

B. Storage: Protect materials from damage, water and rust. Store pipes on beds which are full length of pipe. [Protect plastic materials from direct sunlight.]

C. Pipe: Cap openings to prevent entry of dust, debris and other foreign matter.

1.6 SEQUENCING AND SCHEDULING

A. Concealed Work: Verify locations of existing stub outs to receive landscape area drains. Verify and locate existing pipes and structures to be coordinated with landscape drainage work. Review all available records and make all necessary explorations and excavations.

B. Lines and Levels: Establish for each drainage system and coordinate with other systems to prevent conflicts and maintain proper clearances.

C. Notification: Submit written notification of all discrepancies in the Drawings or existing conditions which preclude successful installation of landscape drainage work as specified.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Perforated and Non-Perforated Polyethylene Tubing:

1. Type: ASTM F405 corrugated tubing and fittings, for less than 10 in. diameter, and ASTM F667 for 10 in., 12 in. and 15 in. diameters.

2. Manufacturer: Advanced Drainage Systems, Inc., [800] 742-1933.

B. Perforated and Non-Perforated Polyvinyl Chloride Pipe [PVC]:

1. Type: ASTM D1785, PVC 1120-1220, Schedule 40, pipes and fittings.

2. Perforations: 3/8 in. diameter, 4 in. apart center to center longitudinally, in two rows 120 degrees apart.

3. Manufacturer: Lasco, [714] 993-1220.

C. Storm Drain Pipe:

1. Type: ASTM D3034, SDR 35, Schedule 40.

D. Area Drains: See Drawings

E. Cleanouts:

1. Planted Areas:
   a. Type: ASTM D1785, PVC 1120, Schedule 40.
   b. Size: 6 in. with PVC black cap.

2.2 ACCESSORIES

A. Drain Rock:

1. Description: Clean, coarse sand and gravel or crushed stone free from injurious materials or soil and all deleterious chemicals.

2. Physical Properties:

Percentage Passing	Sieve Size
100	2 in.
70 -100	3/4 in.
40 -100	3/8 in.
25 - 50	#4
15 - 35	#8
5 - 18	#30
0 - 10	#50
0 - 3	#200

B. Backfill for Sub-Drains: Clean, selected excavated material from the site or from off-site borrow areas.

C. Clean Sand at Retention Basin and Cobble Swale:

1. Physical Properties [by dry weight basis]:

Percent Passing	Sieve Size
100	4.76 mm[#4, 4 mesh]
95 - 100	1.00 mm [#18, 16 mesh]
65 - 100	500 micron [#35, 32 mesh]
0 - 50	250 micron [#60, 60 mesh]
0 - 20	105 micron [#140, 150 mesh]
0 - 5	53 micron [#270, 270 mesh]

D. Sandy Loam Composition at Cobble Swale: All off-site or import soil needed to bring levels of landscape areas up to rough or finish grades, fill planters and tree wells or shall be friable, fertile, & within the following ranges:

1. < 30% Clay

2. < 20% Silt

3. > 70% Sand

E. Decorative River Rock: As indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Verify exact locations and quantity of all drains relative to planting areas and adjacent to paving, prior to beginning of work. Identify required lines, levels, contours, and datum. Immediately report to Landscape Architect all discrepancies found prior to installation of drains.

B. Deviations: Make no deviations from specified line or grade without written acceptance of change by Landscape Architect.

3.2 INSTALLATION

A. Trenching and Backfilling:

1. General: Conform to Section 31 20 00 Earth Moving and as supplemented herein. Hand trim excavations to required elevation. Do not over-excavate.

2. Obstructions and Debris: Remove hardpan, rock, mud, quicksand, debris or other unsuitable bedding material. Further excavate the trench a suitable limit as directed by the Engineer. Backfill with import material approved by the Engineer that will provide adequate pipe bedding.

3. Compaction of Backfill: 95% relative density.

4. Backfill:
   a. Backfill the remaining trench with excavated material to 12 in. above the top of the pipe. If excavated material is unsuitable for compaction, use imported suitable material.
   b. Do not permit sand backfill material to mix with structural backfill within the subdrain area.

B. Sub-Drainage System:

1. Preparation of French Drain: Accurately excavate trench as shown on the Drawings.

2. Filter Fabric: Place fabric in bottom of trench and extend up sides and beyond trench. Overlap 12 in. at ends of roll.

3. Drain Rock and Pipe: Install bedding portion of drain rock and bed pipe in place. Do not damage or displace filter fabric.

4. Review: Prior to installing remaining drain rock backfill, request review by

5. Landscape Architect for progress of the work.

6. Closing: Upon acceptance, add remaining drain rock and lap over the ends of the filter fabric as shown on the Drawings.

7. Soil Backfill: Backfill to a minimum depth of 6 in. above filter fabric as shown on Drawings.

3.3 FIELD QUALITY CONTROL

A. Tests: Field density test for compaction.

B. Tests: Infiltration rates of installed base materials of pervious and porous pavements shall be tested prior to the installation of the surface materials. Test results shall be provided to the District's representative for review and approval prior to surface material installation.

3.4 PROTECTION

A. General: Keep clean and protect sub-drainage system until commencement of work under Division 32.

B. Sediments: Regularly inspect and clean all drain sediment buckets to prevent flooding. Sweep or hose clean all trench drains as necessary.

C. Subdrain: Monitor sub-drainage systems and immediately identify all problems with drainage. Make adjustments as necessary to maintain proper sub-drainage.

3.5 CONSTRUCTION WASTE MANAGEMENT

A. Comply with the applicable provisions of Division 01, section 01 74 00 Cleaning including, but not limited to:

1. Separate packaging materials by type and place in location designated by the Contractor.

2. Place unused scrap materials in location designated by the Contractor.

END OF SECTION