DATE: November 2022
SPECIFICATIONS

JOB: 374-134-20

SAN BERNARDINO COUNTY
RANCHO CUCAMONGA NEW YARD CONSTRUCTION

12158 BASE LINE ROAD
RANCHO CUCAMONGA, CA 91739

PROJECT	#	10.10.1333
CIP	#	23-042
CAFM	#	ETI005

STK ARCHITECTURE, INC.
ARCHITECTURE/PLANNING
42095 ZEVO DRIVE, STE A-15
TEMECULA, CA 92590
951.296.9110

MPE ENGINEER
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SAN BERNARDINO, CA 92408
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Redlands, CA 92373
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DIVISION	SECTION	TITLE
		General Conditions
01		**GENERAL REQUIREMENTS**
	01 2000	CONTRACT CONSIDERATIONS
	01 3000	SUBMITTALS
	01 3100	COORDINATION
	01 4200	REFERENCE STANDARDS AND DEFINITIONS
	01 4500	QUALITY CONTROL
	01 5713	TEMPORARY EROSION CONTROL
	01 6000	PRODUCT REQUIREMENTS
	01 7000	EXECUTION REQUIREMENTS
	01 7419	CONSTRUCTION WASTE MANAGEMENT
	01 7700	CLOSEOUT PROCEDURES
02		**SITE WORK**
	02 4100	DEMOLITION
03		**CONCRETE**
	03 3000	CAST-IN-PLACE CONCRETE
04		**MASONRY**
	04 0511	MORTAR AND MASONRY GROUT
	04 2000	UNIT MASONRY
05		**METAL**
	05 4000	COLD-FORMED METAL FRAMING
	05 5000	METAL FABRICATIONS
06		**WOOD, PLASTICS AND COMPOSITES**
	06 2000	FINISH CARPENTRY
	06 4100	CUSTOM CABINETS
07		**THERMAL AND MOISTURE PROTECTION**
	07 2100	THERMAL INSULATION
	07 2500	WEATHER BARRIERS
	07 9200	JOINT SEALANTS
08		**OPENINGS**
	08 1100	STANDARD STEEL DOORS AND FRAMES
	08 1423	LAMINATE FACED WOOD DOORS
	08 3323	OVERHEAD COILING DOORS
	08 5113	ALUMINUM WINDOWS
	08 7100	DOOR HARDWARE
	08 8000	GLAZING
09		**FINISHES**
	09 2116	GYPSUM BOARD ASSEMBLIES
	09 3000	TILING
	09 5100	SUSPENDED ACOUSTICAL CEILINGS
	09 6519	RESILIENT TILE FLOORING
	09 9000	PAINTING AND COATING

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DIVISION	SECTION	TITLE
10		**SPECIALTIES**
	10 0001	MISCELLANEOUS SPECIALTIES
	10 2800	TOILET AND BATH ACCESSORIES
12		**FURNISHINGS**
	12 2100	LOUVER BLINDS
13		**SPECIAL CONSTRUCTION**
	13 3419	METAL BUILDING SYSTEMS
22		**PLUMBING**
	22 0010	BASIC PLUMBING REQUIREMENTS
	22 0517	SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING
	22 0518	ESCUTCHEONS FOR PLUMBING PIPING
	22 0523	GENERAL-DUTY VALVES FOR PLUMBING PIPING
	22 0529	HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
	22 0719	PLUMBING PIPING INSULATION
	22 1005	PLUMBING PIPING
	22 1006	PLUMBING PIPING SPECIALTIES
	22 4000	PLUMBING FIXTURES
23		**MECHANICAL**
	23 0010	BASIC MECHANICAL REQUIREMENTS
	23 0529	HANGERS AND SUPPORTS
	23 0548	VIBRATION AND SEISMIC CONTROLS FOR HVAC
	23 0553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
	23 0593	TESTING, ADJUSTING, AND BALANCING
	23 0713	DUCT INSULATION
	23 0719	HVAC PIPING INSULATION
	23 0802	INSTALLATION & ACCEPTANCE TESTING OF MECHANICAL SYSTEMS
	23 2300	REFRIGERANT PIPING
	23 3100	HVAC DUCTS AND CASINGS
	23 3300	AIR DUCT ACCESSORIES
	23 3423	POWER VENTILATORS
	23 3700	AIR OUTLETS AND INLETS
	23 8127	SMALL SPLIT-SYSTEM HEATING AND COOLING
26		**ELECTRICAL**
	26 0010	BASIC ELECTRICAL REQUIREMENTS
	26 0519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
	26 0529	HANGERS AND SUPPORTS
	26 0534	CONDUITS
	26 0537	BOXES
	26 0553	IDENTIFICATION FOR ELECTRICAL SYSTEMS
	26 0801	COMMISSIONING OF ELECTRICAL SYSTEMS

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DIVISION	SECTION	TITLE
	26 0802	INSTALLATION & ACCEPTANCE TESTING OF ELECTRICAL SYSTEMS
	26 0923	LIGHTING CONTROL DEVICES
	26 3213	ENGINE GENERATORS
	26 3600	TRANSFER SWITCHES
	26 5100	INTERIOR LIGHTING
	26 5120	AUTOMATIC LIGHTING CONTROL SYSTEM
28		**ELECTRONIC SAFETY AND SECURITY**
	28 2000	VIDEO SURVEILLANCE
31		**EARTHWORK**
	31 1000	SITE CLEARING
	31 2200	GRADING
	31 2316	EXCAVATION
	31 2323	FILL AND BACKFILL
32		**EXTERIOR IMPROVEMENTS**
	32 1216	ASPHALTIC CONCRETE PAVING
	32 1313	PORTLAND CEMENT CONCRETE PAVING
	32 1713	WHEEL STOPS
	32 1726	TACTILE/DETECTABLE WARNING TILE
	32 3113	CHAIN LINK FENCES AND GATES
33		**UTILITIES**
	33 0110.58	DISINFECTION OF WATER UTILITY PIPING SYSTEMS
	33 0505.31	HYDROSTATIC TESTING
	33 1416	WATER UTILITY DISTRIBUTION PIPING
	33 1419	FIRE HYDRANTS

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SECTION 01 2000

CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Schedule of Values.

B. Application for Payment.

C. Defect Assessment.

D. Non-payment for Rejected Work.

E. Change Procedures.

1.02 SCHEDULE OF VALUES

A. Submit Schedule of Values for approval at Pre-Construction Meeting.

B. Format: Submit typed schedule based upon the Schedule of Values Format shown in Paragraph 3.01 (hereinafter).

C. Include in each line item, the amount of Allowances specified in this section.

D. Include within each line item, a directly proportional amount of Contractor's Overhead and Profit.

E. Revise Schedule to list approved Change Orders, on continuation sheet, with each Application for Payment.

1.03 APPLICATION FOR PAYMENT

A. Submit two (2) copies of each Application on AIA Form G702 - "Application and Certificate for Payment".

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

1.04 DEFECT ASSESSMENT

A. Replace the work, or portions of the work, not conforming to specified requirements.

B. If in the opinion of the Architect, it is not practical to remove and replace the work, the Architect will direct one of the following remedies:

1. The defective work may remain, but the listed schedule of value will be adjusted to a new value at the discretion of the Architect.
2. The defective work will be partially repaired to the instructions and satisfaction of the Architect and the listed schedule of value will be adjusted to reflect a new value at the discretion of the Architect.

1.05 NON-PAYMENT FOR REJECTED WORK

A. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined to be unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required work.
5. Products remaining on hand after completion of the work.
6. Loading, hauling and disposing of rejected products.

1.06 CHANGE PROCEDURES

A. The Architect will advise of minor changes in the work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by the General Conditions on AIA Form G710 - "Architect's Supplemental Instructions".

B. The Architect may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications. Contractor will prepare and submit a detailed estimate within 14 days.

C. The Contractor may propose a change by submitting a Change Order Request to the Architect, describing the proposed change and its full effect on the work. Include a statement describing

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the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on work by separate or other contractors.

D. Stipulated Sum Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's Change Order Request as approved by Architect.

E. Construction Change Directive: Architect may issue a directive, signed by the Owner and Architect, instructing the Contractor to proceed with a change in the work, for subsequent inclusion in a Change Order. Document will describe changes in the work, and designate method of determining any change in Contract Sum or Contract Time. Promptly execute the change.

F. Change Order Forms: Of type provided by the Owner.

G. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

H. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item of work affected by the change and resubmit.

I. Promptly revise progress schedules to reflect any changes in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change and resubmit.

J. Promptly enter changes in Project Record Documents.

PART 2 PRODUCTS

-- NOT APPLICABLE --

PART 3 EXECUTION

-- NOT APPLICABLE--

END OF SECTION

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SECTION 01 3000

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
   1. Contractor's Construction Schedule.
   2. Shop Drawings.
   3. Product Data.
   4. Samples.
   5. Daily Construction Reports.

B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for Administrative Submittals. Such submittals include, but are not limited to, the following:
   1. Permits.
   2. Applications for Payment.
   3. Performance and Payment Bonds.
   4. Insurance Certificates.
   5. List of Subcontractors.

C. Related Sections: The following sections contain requirements that relate to this section:
   1. Section 01 3100 - "Coordination" specifies requirements governing preparation and submittal of required coordination drawings.
   2. Section 01 4200 - "Quality Control" specifies requirements for submittal of inspection and test reports.

1.02 DEFINITIONS

A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.
   1. Preparation of coordination drawings is specified in Section 01 3100 - "Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.

B. Field Samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the work will judged.

C. Mockups are full-size assemblies for review of construction, coordination, testing or operation; they are not Samples.

1.03 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.
      a. Allow two (2) weeks for initial review. Allow additional time if the Architect must delay processing to permit coordination with subsequent submittals.
      b. If an intermediate submittal is necessary, process the same as the initial submittal.
      c. Allow two (2) weeks for reprocessing each submittal.
      d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the work to permit processing.

B. Submittal Transmittal: Package each submittal appropriately for handling. Transmit each submittal from the Contractor to the Architect using a transmittal form, including Job Name, Specification Section Number and Required Lead-Time. The Architect will not accept submittals received from sources other than the Contractor.

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1.04 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Submit five (5) copies of the Construction Schedule, broken down by trade or material, to the Architect for approval prior to the first Application for Payment. Schedule shall be by CPM or bar graph type, and shall show proposed starting and completion dates for each trade and activity for the work. Submit five (5) copies of the updated schedule at each Application for Payment review to the Architect.
   1. Within each time bar, indicate estimated completion percentage in 10 percent increments. As work progresses, place a contrasting mark in each bar to indicate Actual Completion.

B. Submit completed Construction Schedule to Architect no later than 20 calendar days after the date established for "Notice to Proceed", and update monthly during construction. Submit current schedule with each Application for Payment.

C. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, Subcontractors and other parties required to comply with scheduled dates. Post copies in the Project Meeting Room and temporary field office.

D. Submit completed material delivery schedule to the Architect no later than 20 calendar days after the "Notice to Proceed". Identify material critical to the progress of the Project and those for which long lead-time in procurement is anticipated. Indicate projected dates for submittal, order and delivery of such material.

1.05 SHOP DRAWING SUBMITTAL SCHEDULE

A. After development and acceptance of the Contractor's Construction Schedule, prepare a complete Schedule of Submittals. Submit the Schedule within 10 days of the date required for submittal of the Contractor's Construction Schedule.

1.06 SHOP DRAWINGS (SUBMITTALS)

A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
   1. Job Name.
   2. Location.
   3. Dimensions.
   4. Notation of dimensions established by field measurements.
   5. If Shop Drawings are rejected twice by the Architect and a third submittal is required, the Trade Contractor will be billed $150/hour for review time.

1.07 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

B. A copy of manufacturer's installation instructions and warranty literature shall be provided for all products at time of Shop Drawing submittal. However, this submission shall not relieve the Contractor's duty to assemble warranty manuals and installation literature at the end of the project. Refer to Section 01 7700 - "Closeout Procedures".

1.08 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
   1. Submit samples for review of size, kind, finish, color, pattern and texture. Submit samples for a final check of these characteristics with other elements and a comparison of these

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characteristics between the final submittal and the actual component as delivered and installed.

a. Where variation in color, pattern, texture or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show approximate limits of the variations.

2. Maintain sets of Samples, as returned, at the project site, for quality comparisons throughout the course of construction.

1.09 ARCHITECT'S ACTION

A. Except for submittals for the record or information, where action and return is required, the Architect will review each submittal, mark to indicate action taken, and return.
   1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Architect will stamp each submittal with a uniform, action stamp. The Architect will review each submittal, mark to indicate action taken, and return.
   1. Final Unrestricted Release: When the Architect marks a submittal "No Exception Taken", the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents.
   2. Final-but-Restricted Release: When the Architect marks a submittal "Make Corrections Noted", the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents.
   3. Returned for Resubmittal: When the Architect marks a submittal "Rejected", "Revise and Resubmit" do not proceed with work covered by the submittal, including purchasing, fabrication, delivery or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
      a. Do not use, or allow others to use, submittals marked "Rejected", "Revise and Resubmit" at the project site or elsewhere where work is in progress.

C. Unsolicited Submittals: The Architect will return unsolicited submittals to the sender without action.

1.10 DAILY CONSTRUCTION REPORTS

A. Prepare a Daily Construction Report recording the following information concerning events at the site, and submit duplicate copies to the Owner by 4:30pm the following day.
   1. List of Subcontractors at the site.
   2. Approximate count of personnel at the site.
   3. High and low temperatures, general weather conditions.
   4. Accidents and unusual events.
   5. Meetings and significant decisions.
   6. Stoppages, delays, shortages and losses.
   7. Emergency procedures.
   8. Orders and requests of governing authorities.
   9. Services connected, disconnected.
   10. Equipment or system tests and startups.

PART 2 PRODUCTS

-- NOT APPLICABLE --

PART 3 EXECUTION

-- NOT APPLICABLE --

END OF SECTION

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SECTION 01 3100
COORDINATION

PART 1 GENERAL

1.01 GENERAL COORDINATION PROVISIONS

A. Carefully study and compare Contract Documents before proceeding with fabrication and installation of work. Promptly advise Architect of any error, inconsistency, omission or apparent discrepancy discovered.

B. Allot time in construction scheduling for liaison with Architect; establish procedures for handling queries and clarifications. Use "Request for Information " (RFI) form for requesting information.

C. If Architect is able to respond to a Request for Information (RFI), by making specific reference to Drawing sheet of Specification section, Contractor shall reimburse Owner for charges of Architect and Architect's Consultants for performing review services for the Contractor.

D. Coordinate work of various specification sections having interdependent responsibilities for installation, connection and operation.

1.02 SUMMARY

A. This section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:
   1. General project coordination procedures.
   2. Administrative and supervisory personnel
   3. Cleaning and protection.

B. Related Sections: The following sections contain requirements that relate to this section:
   1. Section 01 3000 - "Submittals" for preparing and submitting the Project Manager's Construction Schedule.
   2. Section 01 7700 - "Closeout Procedures" for coordinating contract closeout.

1.03 COORDINATION DRAWINGS AND LAYOUTS

A. General:
   1. Coordination Drawings are not Shop Drawings and are not to be submitted to Architect for approval.
   2. Coordination drawings show relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in space provided or to function as intended.

B. Coordinate in field with affected trades for proper relationship to work based on project conditions.

C. Notify Architect of conflicts and other coordination issues requiring resolution prior to commencing construction in each affected area.

D. Make coordination documents available in field office for review by Architect and Owner during entire period of construction.

1.04 COORDINATION

A. Coordinate construction operations included in various sections of these specifications to assure efficient and orderly installation of each part of the work.
   1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
   3. Make provisions to accommodate items scheduled for later installation.

B. The Contractor shall review the entire construction document set for dimensional coordination. Special attention should be placed on architectural/structural dimension coordination.

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1. If discrepancies occur, the Contractor is directed to place a written request to the Project Architect for clarification. This request must occur prior to any work occurring.
2. Proceeding into an area of work without checking the documents for dimensional coordination and resolving the condition in a timely manner will in no way release the Contractor from correction procedures.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project closeout activities.

PART 2 PRODUCTS

-- NOT APPLICABLE --

PART 3 EXECUTION

3.01 GENERAL COORDINATION PROVISIONS

A. Inspection of Conditions: Require the installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

3.02 CLEANING AND PROTECTION

A. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration at Substantial Completion.

B. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

C. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
1. Excessively high or low temperatures.
2. Excessively high or low humidity.
3. Air contamination or pollution.
4. Water or ice.
5. Solvents.
6. Chemicals.
7. Light.
8. Radiation.
9. Puncture.
10. Heavy traffic.
11. Soiling, staining and corrosion.
12. Combustion.
13. Electrical current.
14. Improper lubrication.
15. Unusual wear or other misuse.
16. Contact between incompatible materials.

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17. Misalignment.
18. Excessive weathering.
19. Unprotected storage.
20. Improper shipping or handling.
21. Theft.
22. Vandalism.

END OF SECTION

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SECTION 01 4200

REFERENCE STANDARDS AND DEFINITIONS

PART 1 GENERAL

1.01 REFERENCES

A. The Contract Documents contain references to various standard specifications, codes, practices and requirements for materials, work quality, installation, inspections and tests, which references are published and issued by the organizations listed hereinafter by abbreviation and name. Such references are hereby made a part of these Contract Documents to the extent indicated or required.

1.02 DEFINITIONS

A. General: Basic contract definitions are included in the General and Special Conditions of the Contract.

B. "Indicated": The term "indicated" refers to graphic representations, notes or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown", "noted", "scheduled" and "specified" are used to help the user locate the reference. Location is not limited.

C. "Directed": Terms such as "directed", "requested", "authorized", "selected", "approved", "required" and "permitted" mean directed by the Architect, requested by the Architect, and similar phrases.

D. "Approved": The term "approved", when used in conjunction with the Architect's action on the Contractor's submittals, applications and requests, is limited to the Architect's duties and responsibilities as stated in the General and Supplementary Conditions of the Contract.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.

G. "Install": The term "install" describes operations at the project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor or contractor of lower tier, who performs a particular construction activity including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced", when used with the term "installer", means having successfully completed a minimum of 5 previous projects similar in size and scope to this project, being familiar with the specified requirements indicated; and having complied with requirements of authorities having jurisdiction.
2. Trades: Using terms such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter". It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
3. Assigning Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.

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a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.

J. "Project Site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing work as part of the Project. The extent of the project site is shown on the drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 2004 "Masterformat" numbering system.

B. Specification Content: These Specifications use certain conventions for the style of language and the intended meaning of certain terms, words and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate words implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
   a. The words "shall", "shall be" or "shall comply with", depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.04 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such Standards are made a part of the Contract Documents by reference.

B. When the effective date of a Reference Standard is not given, it shall be understood that the current edition or latest revision thereof and any amendments or supplements thereto in effect on the date of issue of these Contact Documents, as indicated by the date on the cover sheet or in the Invitation to Bid, shall govern the work.

C. Conflicting Requirements: Where compliance with 2 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 uncertainties and requirements that are different but apparently equal to the Architect for a decision before proceeding.

1. 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 the requirements. Refer uncertainties to the Architect for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

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1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following list of general reference standards is common to the construction industry. This list is not all-inclusive nor does the presence of a reference standard imply necessarily that it is referenced in the Specifications or other Contract Documents.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute International
ADC	American Diffusion Council
AGA	American Gas Association
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ALSC	American Lumber Standards Committee
AMCA	Air Movement and Control Association International
ANSI	American National Standards Institute
APA	Engineered Wood Association (Formerly American Plywood Ass'n)
ARI	Air Conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engrs
ASME	The American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASSE	The American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWS	American Welding Society
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CRSI	Concrete Reinforcing Steel Institute
DHI	Door and Hardware Institute (Formerly Ntl. Builders Hardware Assoc)
EIMAEIFS	Industry Manufacturers Association
FGMA	Flat Glass Marketing Association
FM	Factory Mutual Research Corporation
GA	Gypsum Association
GANA	Glass Association of North America

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IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
IGCC	Insulating Glass Certification Council
MBMA	Metal Building Manufacturers Association
NAAMM	The National Association of Architectural Metal Manufacturers
NCMA	National Concrete Masonry Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NETA	National Electrical Contractors Association
NFPA	National Fire Protection Association
NRCA	National Roofing Contractors Association
NSFNSF	International (National Sanitation Foundation)
PCA	Portland Cement Association
PDI	Plumbing and Drainage Institute
SDI	Steel Door Institute
SGCC	Safety Glazing Certification Council
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
TCA	Tile Council of America
UBC	Uniform Building Code (International Conference of Building Officials)
UL	Underwriters Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WDMA	Window and Door Manufacturers Association (Formerly NWWDA)
WIC	Woodwork Institute of California

F. Federal Government Agencies and Acronyms: Names and titles of Federal Government standards - or specification-producing agencies are often abbreviated. The following abbreviations and acronyms which may be referenced in the Contract Documents indicate names of standards - or specification-producing agencies of the Federal Government. This list is not all-inclusive nor does presence on the list imply necessarily that the abbreviation is referenced in the Specifications or other Contract Documents.

ADA	Americans with Disabilities Act
CFR	Code of Federal Regulations
COE	Corps of Engineers, U S Army
CPSC	Consumer Product Safety Commission
DOC	Department of Commerce
DOT	Department of Transportation
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration

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FCC	Federal Communications Commission
FDA	Food and Drug Administration
FHA	Federal Housing Administration
FS	Federal Specifications and Standards (General Services Admin)
GSA	General Services Administration
MIL	Military Specifications and Standards (U S Dept of Defense)
NIST	National Institute of Standards and Technology
OSHA	Occupational Safety and Health Administration (U S Dept of Labor)
PS	Product Standards (U S Dept of Commerce)
USDA	United States Department of Agriculture
USPS	United States Postal Service

PART 2 PRODUCTS

-- NOT APPLICABLE --

PART 3 EXECUTION

-- NOT APPLICABLE --

END OF SECTION

NOT FOR BID

SECTION 01 4500
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. This section includes administrative and procedural requirements for quality-control services.

B. Quality-Control services include inspections, tests and related actions, including reports performed and/or directed by the Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Architect.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated in the Construction Documents. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.

1.02 RESPONSIBILITIES

A. Owner will employ and pay for services of an Independent Testing Laboratory to perform specified inspections and testing.

B. Contractor Responsibilities:
   1. Deliver to laboratory at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the work, and to manufacturer's facilities.
   3. Provide incidental labor and facilities to provide access to work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
   4. Notify Architect/Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.
      a. Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide inspections, tests and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction. Costs for these services are included in the Contract Sum.
         1) Where individual sections specifically indicate that certain inspections, tests, and other quality-control services are the Contractor's responsibility, the Contractor shall employ and pay a qualified independent testing agency to perform quality-control services. Costs for these services are included in the Contract Sum.

C. Retesting: The Contractor is responsible for retesting where results of inspections, tests or other quality-control services prove unsatisfactory and indicate noncompliance with Contract Document requirements.
   1. The cost of retesting construction, revised or replaced by the Contractor or Trade Subcontractor, is the Trade Subcontractor's responsibility where required tests performed on original construction indicated noncompliance with Contract Document requirements.
   2. Associated Services: Cooperate with agencies performing required inspections, tests and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
      a. Provide security and protection of samples and test equipment a the project site.

D. Duties of the Testing Agency: The Independent Agency engaged to perform inspections, sampling and testing of materials and construction specified in individual sections shall cooperate with the Architect and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.
   1. The agency shall notify the Architect and the Contractor promptly of irregularities or deficiencies observed in the work during performance of its services.
   2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents or approve or accept any portion of the work.

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E. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
   1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

1.03 SUBMITTALS

A. The Independent Testing Agency shall submit a certified written report, in duplicate, of each inspection, test or similar service to the Architect and Structural Engineer. If the Contractor is responsible for the service, submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.
   1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
   2. Report Data: Written reports of each inspection, test or similar service include, but are not limited to, the following:
      a. Date of issue.
      b. Project title and number.
      c. Name, address and telephone number of testing agency.
      d. Dates and locations of samples and tests or inspections.
      e. Names of individuals making the inspection or test.
      f. Designation of the work and test method.
      g. Identification of product and Specification Section.
      h. Complete inspection or test data.
      i. Test results and an interpretation of test results.
      j. Ambient conditions at the time of sample taking and testing.
      k. Comments or professional opinion on whether inspected or tested work complies with Contract Document requirements.
      l. Name and signature of laboratory inspector.
      m. Recommendations on retesting.

1.04 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to a Reference Standards, comply with requirements of the Standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to Reference Standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of Standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties or responsibilities of the parties in contract nor those of Architect shall be altered from the Contract Documents by mention or inference in any reference document.

1.05 QUALITY ASSURANCE

A. Qualifications of Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, that are prequalified as complying with the American Council of Independent Laboratories' "Recommended Requirements for Independent Laboratory Qualification" and that specialize in the types of inspections and tests to be performed.
   1. Each Independent Inspection and Testing Agency engaged on the project shall be authorized by authorities having jurisdiction to operate in the state where the project is located.

NOT FOR BID

PART 2 PRODUCTS

-- NOT APPLICABLE --

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Section 01 7000 - "Execution Requirements".

B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.

C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

D. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect before proceeding.

E. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes or specified requirements indicate higher standards or more precise workmanship.

F. Have work performed by persons qualified to produce required and specified quality.

G. Verify that field measurements are as indicated on Shop Drawings or and instructed by the manufacturer.

H. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion and disfigurement.

3.02 MANUFACTURER'S FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

END OF SECTION

NOT FOR BID

SECTION 01 5713
TEMPORARY EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Performance bond.

E. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

A. Section 31 1000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.

B. Section 31 2200 - Grading: Temporary and permanent grade changes for erosion control.

1.03 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus; 2014.

B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a (Reapproved 2014).

C. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a (Reapproved 2014).

D. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2011.

E. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.

F. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 2012.

1.04 PERFORMANCE REQUIREMENTS

A. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.

B. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.

C. Provide to Owner a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.

D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

E. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
   1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
   2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.

F. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
   1. Control movement of sediment and soil from temporary stockpiles of soil.

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2. Prevent development of ruts due to equipment and vehicular traffic.
3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

G. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
1. Prevent windblown soil from leaving the project site.
2. Prevent tracking of mud onto public roads outside site.
3. Prevent mud and sediment from flowing onto sidewalks and pavements.
4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

H. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.

I. Open Water: Prevent standing water that could become stagnant.

J. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Erosion and Sedimentation Control Plan:
1. Include:
a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
e. Other information required by law.
f. Format required by law is acceptable, provided any additional information specified is also included.
2. Obtain the approval of the Plan by authorities having jurisdiction.
3. Obtain the approval of the Plan by Owner.

C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.

D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

PART 2 PRODUCTS

2.01 MATERIALS

A. Mulch: Use one of the following:
1. Straw or hay.
2. Wood waste, chips, or bark.
3. Erosion control matting or netting.
4. Polyethylene film, where specifically indicated only.

B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

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C. Bales: Air dry, rectangular straw bales.
   1. Cross Section: 14 by 18 inches, minimum.
   2. Bindings: Wire or string, around long dimension.

D. Bale Stakes: One of the following, minimum 3 feet long:
   1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
   2. Wood, 2 by 2 inches in cross section.

E. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
   1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
   2. Permittivity: 0.05 sec^-1, minimum, when tested in accordance with ASTM D4491/D4491M.
   3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
   4. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
   5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
   6. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533.
   7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

B. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
   1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
   2. Straw bale row blocking entire inlet face area; anchor into pavement.

C. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.

D. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.

E. Soil Stockpiles: Protect using one of the following measures:
   1. Cover with polyethylene film, secured by placing soil on outer edges.

F. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
   1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.

G. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

A. Straw Bale Rows:
   1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
   2. Install bales so that bindings are not in contact with the ground.

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3. Embed bales at least 4 inches in the ground.
4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
5. Fill gaps between ends of bales with loose straw wedged tightly.
6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

B. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
4. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
5. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.

B. Repair deficiencies immediately.

C. Straw Bale Rows:
1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
2. Remove silt deposits that exceed one-half of the height of the bales.
3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.

D. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION

NOT FOR BID

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Products.

B. Transportation and handling.

C. Storage and protection.

D. Product options.

E. Substitutions.

1.02 PRODUCTS

A. Products: Means 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. Provide interchangeable components of the same manufacturer, for similar components.

1.03 TRANSPORTATION AND HANDLING

A. Transport and handle 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.

C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

A. 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.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.

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. Prevent mixing with foreign matter.

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

1.05 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

C. Products specified by naming only one Manufacturer is intended to establish the standard required. It is not intended to limit the selection of equal products of other manufacturers.

NOT FOR BID

1.06 SUBSTITUTIONS

A. Owner, Architect/Engineer will consider requests for Equal / Substitutions at any time up to 35 days after the date of Owner Contractor Agreement.

B. Equal / Substitutions will be approved only if the Owner, Architect/Engineer deems the product is of equal quality.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that the Contractor:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the Substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner
   4. Waives claims for additional costs or time extension which may subsequently become apparent.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
   1. Submit six copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
   2. Submit shop drawings, Product data, and certified test results attesting to the proposed product equivalence.
   3. The Architect/Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 PRODUCTS

-- NOT APPLICABLE --

PART 3 EXECUTION

-- NOT APPLICABLE --

END OF SECTION

NOT FOR BID

SECTION 01 7000
EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Pre-installation meetings.

C. Cutting and patching.

D. Surveying for laying out the work.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Submittals: Submittal procedures.

B. Section 01 4500 - Quality Control: Testing and inspection procedures.

C. Individual Product Specification Sections:
   1. Advance notification to other sections of openings required in work of those sections.
   2. Limitations on cutting structural members.

1.03 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.

1.04 QUALIFICATIONS

A. For survey work, employ a land surveyor registered in the State of California and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.05 PROJECT CONDITIONS

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and requirements of Section 01 31 00 - "Coordination" to ensure efficient and orderly sequence of installation of interdependent construction elements.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

NOT FOR BID

PART 2 PRODUCTS

-- NOT APPLICABLE --

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

NOT FOR BID

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

C. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

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F. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect and Owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

3.10 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.11 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

NOT FOR BID

SECTION 01 7419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

E. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

NOT FOR BID

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
   1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
   2. Submit Report on a form acceptable to Owner.
   3. Landfill Disposal: Include the following information:
      a. Identification of material.
      b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
      c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   4. Recycled and Salvaged Materials: Include the following information for each:
      a. Identification of material, including those retrieved by installer for use on other projects.
      b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
      c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
      e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
   5. Material Reused on Project: Include the following information for each:
      a. Identification of material and how it was used in the project.
      b. Amount, in tons or cubic yards.
      c. Include weight tickets as evidence of quantity.
   6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

2.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.

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E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

NOT FOR BID

SECTION 01 7700

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
   1. Inspection procedures for Completion Reviews.
   2. Final adjustments of accounts and payment.
   3. As-built drawings.
   4. Project record document submittal.
   5. Operation and maintenance manual submittal.
   6. Submittals and warranties.
   7. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate individual sections.

1.02 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspections for certification of Substantial Completion, complete the following:
   1. Conduct inspection to substantiate basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or non-conforming work, reason for being incomplete, and date of anticipated completion for each item.
   2. Advise the Owner of pending insurance changeover requirements.
   3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
   4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates and similar releases.
   5. Submit record drawings, maintenance manuals, damage or settlement surveys, property surveys and similar final record information.
   6. Deliver tools, spare parts, extra stock and similar items.
   7. Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
   8. Complete startup testing of systems and instructions of the Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the site, along with mockups, construction tools and similar elements.
   9. Complete final cleanup requirements, including touchup painting.
   10. Touch up and otherwise repair and restore marred, exposed finishes.

1.03 FINAL COMPLETION REVIEW

A. Within 7 days after receipt of request for final review, Architect will make site review to determine whether Work is complete following procedures indicated in Conditions of the Contract.

B. Should Architect consider Work to be incomplete or defective:
   1. Architect will promptly notify Contractor listing incomplete or defective work.

C. Contractor shall take immediate steps to remedy stated deficiencies and send second written request to Architect the Work is complete.
   1. Architect will reinspect the Work.
   2. Revisits for Site Reviews:
      a. Should Architect have to re-perform site reviews due to failure of work to comply with claims of completion made by Contractor, Owner will reimburse Architect for such

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additional services and will deduct amount of compensation from final payment to Contractor.

1.04 EVIDENCE OF PAYMENTS AND RELEASE OF LIENS

A. Submit Contractor's affidavit of Payment of Debts and Claims on AIA Document G706.

B. Submit Contractor's affidavit of Release of Liens on AIA Document G706A with:
   1. Consent of Surety to Final Payment: AIA G707.
   2. Contractor's Release of Waiver of Liens.
   3. Separate releases or waivers of liens from subcontractors, suppliers and others with lien rights against property of Owner, together with list of those parties.

C. Execute Submittals before delivery to Owner.

1.05 FINAL ADJUSTMENTS OF ACCOUNTS

A. Submit final statement of accounting to Architect.

B. Show adjustments to Contract Sum:
   1. Original Contract Sum.
   2. Additions and deductions resulting from:
      a. Previous Change Orders.
      b. Allowances.
      c. Unit prices.
      d. Deductions for uncorrected work.
      e. Deductions for inspection payments.
      f. Other adjustments.
   3. Total Contract Sum.
   4. Previous Payments.
   5. Retainage.
   6. Sum remaining due.

C. Architect will prepare final Change Order reflecting approved adjustments to Contract Sum which are not included in Change Orders previously processed.

1.06 FINAL APPLICATION FOR PAYMENT

A. Submit final Application for Payment in accordance with procedures and requirements stated in Conditions of the Contract.

1.07 RECORD DOCUMENT SUBMITTALS (AS-BUILTS)

A. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings. Mark the set to show the actual installation where installation varies substantially from the work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
   1. Mark record sets with red ink. Use other colors to distinguish between variations in separate categories of the work.
   2. Mark new information that is important to the Owner but was not shown on Contract Drawings.

B. Maintenance Manuals: Organize operation and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual, heavy-duty, 2-inch, 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Furnish Architect with five (5) complete sets within 30 calendar days of initial Certificate of Occupancy. Mark appropriate identification on front and spine of each binder. Include the following types of information:
   1. Emergency instructions.
   2. Spare parts list.

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3. Copies of warranties.
4. Wiring diagrams.
5. Recommended "turn-around" cycles.
6. Inspection procedures.
7. Product data.
8. Fixture lamping schedule.

C. Spare Parts and Extra Stock Inventory: Transmit spare parts and extra stock to the Owner with an inventory checklist for review by the Owner. Checklist shall include an itemized listing of each type of item and quantity, a method for the Owner to check off each item accepted, and a receipt for the Owner to sign and return to the Contractor accepting the entire inventory.

PART 2 PRODUCTS

-- NOT APPLICABLE --

PART 3 EXECUTION

3.01 CLOSEOUT PROCEDURES

A. Operation and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instructions by manufacturer's representatives if installers are not experienced in operation and maintenance procedures.

1. Include a detailed review of the following items:
   a. Maintenance manuals.
   b. Record documents.
   c. Spare parts and manuals.
   d. Tools.
   e. Lubricants.
   f. Fuels.
   g. Identification systems.
   h. Control sequences.
   i. Hazards.
   j. Cleaning.
   k. Warranties and bonds.
   l. Maintenance agreements and similar continuing commitments.
2. As part of the instructions for operating equipment, demonstrate the following procedures:
   a. Startup.
   b. Shutdown.
   c. Emergency operations.
   d. Noise and vibration adjustments.
   e. Safety procedures.
   f. Economy and efficiency adjustments.
   g. Effective energy utilization.

B. Delivery of Spare Parts and Extra Stock: Deliver spare parts and extra stock to storage location designated by the Owner.

3.02 FINAL CLEANING

A. General: The General Conditions require general cleaning during construction. Regular site cleaning is included in Section 01 7000 - "Execution Requirements".

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

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C. Removal of Protection: Remove temporary protection and facilities installed for protection of the work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site as directed by the Owner.
   1. Where extra materials of value remain after completion of associated work, they become the Owner's property. Dispose of these materials as directed by the Owner.

END OF SECTION

NOT FOR BID

SECTION 02 4100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alteration purposes.

C. Disposal of materials.

1.02 RELATED REQUIREMENTS

A. Section 01 5713 - Temporary Erosion Control.

B. Section 01 6000 - PRODUCT REQUIREMENTS: Handling and storage of items removed for salvage and relocation.

C. Section 01 7000 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

D. Section 31 2200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

E. Section 31 2323 - Fill and Backfill: Filling holes, pits, and excavations generated as a result of removal operations.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permit.
   6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

3.02 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

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B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.03 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

NOT FOR BID

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Formwork, shoring, bracing, and anchorage
B. Concrete reinforcement and accessories
C. Floors and slabs on grade.
D. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants.
B. Section 32 1313 - Concrete Paving: Sidewalks, curbs and gutters.

1.03 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete for Buildings; ACI International/American Concrete Institute; 1989.
B. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
C. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
D. ASTM C33 - Concrete Aggregates.
E. ASTM C94 - Ready-Mixed Concrete.
F. ASTM C150 - Portland Cement.
G. ASTM C260 - Air Entraining Admixtures for Concrete
H. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
I. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
J. ASTM D2103 - Polyethylene Film and Sheeting.
K. CBC - California Building Code, 2019, based on 2018 IBC with California Amendments; International Conference of Building Officials (ICBO).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
   3. Indicate proposed mix design complies with fiber reinforcing manufacturer's written recommendations.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

PART 2 PRODUCTS

2.01 FORM FORMWORK

A. Conform to ACI 301.
B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.

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2.03 CONCRETE MATERIALS

A. Cement: Cement: ASTM C150/C150M, Type II - Moderate Portland type.
   1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.

C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

D. Admixtures: Fly ash, calcium chloride or other admixtures are Not Allowed.

E. Structural Fiber Reinforcement: ASTM C1116/C1116M.
   1. Fiber Type: Alkali-resistant synthetic.
   2. Fiber Length: 1.5 inch, nominal.

2.04 ACCESSORIES MATERIALS

A. Underslab Vapor Barrier shall have all of the following qualities:
   1. Maintain permeance of less than 0.01 Perms as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
   2. Other performance criteria:
      a. Strength: ASTM E1745 Class A.
      b. Thickness: 15 mils minimum.

B. Vapor barrier products:
   1. Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC. or equal, (877) 464-7834 www.stegoindustries.com <http://www.stegoindustries.com>.
   2. Substitutions: See Section 01 6000 - Product Requirements.

C. Accessory products:
   1. Seam Tape.
   2. Perimeter/terminated edge seal.
   3. Penetration Prevention.
   4. Vapor Barrier-Safe Screed System.

D. Form Release Agent: Material which will not stain concrete or absorb moisture.

E. Sealer:
   1. Westcoat Specialty Coating Systems, 770 Gateway Center Drive - San Diego, CA 92102. (800) 250-4519 / www.westcoat.com.
      a. EC-95 Polyurethane Topcoat (use as sealer).
         1) Two (2) coats.
   2. Apply in strict conformance with manufacturer's instructions.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.05 CONCRETE MIX DESIGN

A. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
   2. Water-Cement Ratio: Maximum 40 percent by weight.
   3. Maximum Slump: 3 inches.
   4. Maximum Aggregate Size: 5/8 inch.

2.06 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
   1. Fiber Reinforcement: Batch and mix as recommended by manufacturer for specific project conditions.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

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PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
   1. Install vapor barrier in accordance ASTM E1643.
   2. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Notify Architect not less than 24 hours prior to commencement of placement operations.

C. Prepare base directly under concrete slabs smooth and compacted. No sharp gravel or protrusions permitted. Compacted sand over base is acceptable to smooth base prior to installation of vapor barrier. Sand or granular fill over vapor barrier is prohibited.

D. No penetration of vapor barrier permitted.

E. Prior to pouring, remove standing water by powered blower or other suitable means.

3.05 CONCRETE FINISHING

A. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Broom finish (medium) at exterior flatwork.
   2. Light broom finish at Garage Area.
   3. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

B. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.

3.06 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.07 FLOOR SLABS

A. Saw cut control joints within four (4) to eight (8) hours after finishing. Cut slabs with 3/16-inch thick blade, cutting 1/4 of depth of slab thickness.

3.08 DEFECTIVE CONCRETE

A. Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

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B. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

3.09 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

NOT FOR BID

SECTION 04 0511
MORTAR AND MASONRY GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.02 RELATED REQUIREMENTS

A. Section 01 4500 - Quality Control.

B. Section 04 2000 - Unit Masonry System: Installation of mortar and grout.

C. Section 08 1100 - Standard Steel Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

1.03 REFERENCE STANDARDS

A. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2010.

B. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

C. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.

D. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

E. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).

F. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.

G. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.

H. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

I. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.

J. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2013.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used. Also include required environmental conditions and admixture limitations.

C. Samples: Submit two samples of mortar, illustrating mortar color and color range.

D. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.

E. Reports: Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C 1019.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.06 FIELD CONDITIONS

A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion of masonry work.

1.07 MIX TEST

A. Testing of Mortar Mix: In accordance with ASTM C780.

B. Test mortar mix for compressive strength.

C. Testing of Grout Mix: In accordance with ASTM C1019.

NOT FOR BID

D. Test grout mix for compressive strength.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

A. Mortar Mix Designs: ASTM C270, Property Specification.

2.02 MATERIALS

A. Portland Cement: ASTM C150, Type II - Moderate; standard gray color.

B. Hydrated Lime: ASTM C207, Type S.

C. Quicklime: ASTM C5, non-hydraulic type.

D. Mortar Aggregate: ASTM C144.

E. Grout Aggregate: ASTM C404.

F. Water: Clean and potable.

2.03 MORTAR MIXES

A. Mortar for Reinforced Masonry: ASTM C270, utilizing the Proportion Method to achieve 1800 psi strength.

2.04 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. If water is lost by evaporation, re-temper only within two hours of mixing.

E. Use mortar within two hours after mixing at temperatures of 80 degrees F, or 2-1/2 hours at temperatures under 50 degrees F.

2.05 GROUT MIXES

A. Grout: 2000 psi strength at 28 days; 10 inches slump.

2.06 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C 94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

PART 3 EXECUTION

3.01 EXAMINATION

A. Request inspection of spaces to be grouted.

3.02 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Work grout into masonry cores and cavities to eliminate voids.

C. Do not displace reinforcement while placing grout.

D. Remove excess mortar from grout spaces.

3.03 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of Contract Documents.

B. Low-Lift Grouting:
   1. Limit height of pours to 12 inches.
   2. Limit height of masonry to 16 inches above each pour.

NOT FOR BID

3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

C. High-Lift Grouting:
1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
2. Place grout for spanning elements in single, continuous pour.

END OF SECTION

NOT FOR BID

SECTION 04 2000

UNIT MASONRY SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete masonry units.

B. Reinforcement, anchorage and accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 4500 - Quality Control.

B. Section 04 0511 - Mortar and Masonry Grout: Mortar and grout.

1.03 REFERENCE STANDARDS

A. ASTM A615/615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; '09.

B. ASTM C90 - Hollow Load Bearing Concrete Masonry Units; '09.

C. CBC - 2019 California Building Code, based on 2018 International Building Code (IBC), with California Amendments.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Submit product data for masonry units.

C. Samples: Provide sample.

1.05 QUALITY ASSURANCE

A. Installer: Company specializing in performing the work of this section with minimum 3 years of experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to California Building Code (CBC), current edition, requirements for masonry construction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products under provisions of Section 01 6000 - "Product Requirements".

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Orco Block Co.

1. Products: Precision and Split-Face CMU, as indicated in plans.
   a. Color: To be selected by Architect from standard color range.

B. Or approved equal.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CONCRETE MASONRY UNITS

A. Hollow Load Bearing Block Units: ASTM C90, Grade N, Type I - Moisture Controlled; medium weight.

B. Masonry Units: Nominal size of 8 x 8 x 16, 8 x 6 x 16, 8 x 4 x 16, 16 x 8 x 16, or as indicated in plans. Provide special units for 45 and 90 degree corners, bond beams and lintels where required.

C. Wall Caps: 8 x 2 x 16 Precision to match CMU at Admin. Building's Control A24 only.

NOT FOR BID

2.03 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615, deformed billet bars of yield strength indicated on the Structural Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify items provided by other Sections of work are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied to other Sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

A. Establish lines, levels and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Lay concrete masonry units in running bond. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints.

3.04 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

D. Remove excess mortar as work progresses.

E. Interlock intersections and external corners.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.05 CONTROL JOINT

A. Install preformed control joint device every 20' - 0", in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

B. Size control joint in accordance with Section 07 92 00 - "Joint Sealers" for sealant performance.

3.06 BUILT-IN WORK

A. As work progresses, build-in metal door frames and other items furnished by other Sections.

B. Build-in items plumb and level.

C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.

3.07 ERECTION TOLERANCES

A. Maximum variation from unit to adjacent unit: 1/32-inch.

B. Maximum variation from plane of wall: 1/4-inch in 10 feet and 1/2-inch in 20 feet or more.

C. Maximum variation from plumb: 1/4-inch per story non-cumulative.

D. Maximum variation from level coursing: 1/8-inch in 3 feet; 1/4-inch in 10 feet and 1/2-inch in 30 feet.

NOT FOR BID

E. Maximum variation of joint thickness: 1/8-inch in 3 feet.

F. Maximum variation from cross sectional thickness of walls: 1/4-inch.

3.08 CUTTING AND FITTING

A. Cut and fit for pipes, conduit and sleeves. Coordinate with other sections of work to provide correct size, shape and location.

B. Obtain Architect/Engineer approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.09 CLEANING

A. Clean work under provisions of the General Conditions.

B. Remove excess mortar and mortar smears.

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with cleaning solution.

E. Use non-metallic tools in cleaning operations.

3.10 PROTECTION OF FINISHED WORK

A. Protect finished installation.

B. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

END OF SECTION

NOT FOR BID

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formed steel stud interior wall framing.

B. Exterior wall sheathing.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Roof and wall sheathing.

B. Section 07 2100 - Thermal Insulation: Insulation within framing members.

C. Section 09 2116 - Gypsum Board Assemblies: Lightweight, non-load bearing metal stud framing.

D. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2011c.

D. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.

C. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention, and _____.

PART 2 PRODUCTS

2.01 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

2.02 FRAMING MATERIALS

A. Studs and Track: ASTM C955; studs formed to channel, C- or Sigma-shaped with punched web; U-shaped track in matching nominal width and compatible height.

2.03 WALL SHEATHING

A. Gypsum Board Wall Sheathing: See Section 09 2116.

B. Board Insulation Wall Sheathing: See Section 07 2100.

2.04 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

B. Plates, Gussets, Clips: Formed Sheet Steel, thickness determined for conditions encountered; finish to match framing components.

NOT FOR BID

2.05 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.

B. Anchorage Devices: Powder actuated.

PART 3 EXECUTION

3.01 INSTALLATION OF STUDS

A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.

B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.

C. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using clip and tie method.

D. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.

E. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.

F. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

3.02 INSTALLATION OF WALL SHEATHING

A. Install wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.

1. Provide steel diagonal bracing at corners with foam insulation or gypsum board wall sheathing.

END OF SECTION

NOT FOR BID

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated ferrous metal items, galvanized and prime painted.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 09 9000 - Painting and Coating: Paint finish.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; '08.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless; '07.

C. ASTM A123A123M - Standard Specification for Zinc (Hot-Galvanized) Coatings on Iron and Steel Products; '09.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; '09.

E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; '03 (2007).

F. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; '07b.

G. AWS A2.0 - Standard Welding Symbols.

H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

C. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.05 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

A. Steel Sections: ASTM A36.

B. Plates: ASTM A283.

C. Pipe: ASTM A53, Grade B Schedule 40.

D. Bolts, Nuts, and Washers: ASTM A307 galvanized to ASTM A153 for galvanized components.

E. Welding Materials: AWS D1.1; type required for materials being welded.

F. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

NOT FOR BID

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FINISHES

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime paint items with one coat.

D. Galvanize in accordance with ASTM A123, structural steel members.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components as indicated on drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain Architect/Engineer approval prior to site cutting or making adjustments not scheduled.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4-inch per story, non-cumulative.

B. Maximum Offset From Plumb: 1/4-inch.

END OF SECTION

NOT FOR BID

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items other than shop prefabricated casework.

B. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 06 4100 - Custom Cabinets: Shop fabricated custom cabinet work.

C. Section 08 1400 - Wood Doors.

D. Section 08 7100 - Door Hardware.

E. Section 10 2800 - Toilet, Bath and Laundry Accessories.

1.03 REFERENCE STANDARDS

A. ANSI/HPHA HP - American Standard for Hardwood and Decorative Plywood.

B. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.

C. FS MM-L-736 - Lumber; Hardwood.

D. FS MMM-A-130 - Adhesive, Contact.

E. WI (MAN) - Manual of Millwork; Woodwork Institute; 2003.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals" for submittal procedures.

B. Product Data:
   1. Provide instructions for attachment hardware and finish hardware.

C. Samples: Submit two samples of finish plywood, 4x4 inch in size illustrating wood grain and specified finish.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products under provisions of Section 01 6000 - "Product Requirements".

B. Store materials in ventilated, interior locations under constant minimum temperatures of 60 degrees F and maximum relative humidity of 55 percent.

C. Protect from moisture damage.

PART 2 PRODUCTS

2.01 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.02 LUMBER MATERIALS

A. Softwood Lumber: PS 20; Custom Grade in accordance with WI (MAN). Douglas Fir Species, with flat grain, of quality capable of transparent finish.

B. Hardwood Lumber: FS MM-L-736; Premium Grade in accordance with WI (MAN). Birch species, with flat grain, of quality capable of transparent finish.

2.03 SHEET MATERIALS

A. Softwood Plywood: PS 1; Standard Sheathing Grade, Group 1, CD Appearance Quality; Douglas Fir species, with face veneer of rotary cut grain.

B. Hardwood Plywood: ANSI/HPHA HP; Premium Grade in accordance with WI (MAN); veneer core material. Birch species, with face veneer of plain sliced grain.

NOT FOR BID

2.04 PLASTIC LAMINATE MATERIALS

A. Plastic Laminate: 0.050-inch General Purpose, manufactured by Formica, WilsonArt, or Nevamar.

2.05 ADHESIVE

A. Adhesive: Type recommended by laminate manufacturer to suit application .

B. Contact Adhesives: FS MMM-A-130; water base solvent release type.

C. Wall Adhesive: Solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.

2.06 ACCESSORIES

A. Nails: Size and type to suit application, plain finish.

B. Bolts, Nuts, Washers, Blind Fasteners, Lags and Screws: Size and type to suit application; plain finish.

C. Lumber for Shimming and Blocking: Softwood lumber of Western White Pine species.

D. Wood Filler: Solvent base, tinted to match surface finish color.

2.07 HARDWARE

A. Hardware: Comply with BHMA A156.9.

B. #255 shelf standards and #229 rests as manufactured by Knape & Vogt Manufacturing Company.

2.08 FABRICATION

A. Fabricate to WI (MAN) Custom Standards.

B. Shop prepare and identify components for book match grain matching during site erection.

2.09 SHOP FINISHING

A. Shop finish work in accordance with WI (MAN) 'Factory Finishing', Section 5.

B. Transparent Finish: WI (MAN) System Number 1; Premium.

C. Opaque Finish: WI (MAN) System Number 7; Premium.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify that surfaces and openings are ready to receive work and field measurements are as shown on Shop Drawings and/or as instructed by the fabricator.

C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

D. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

A. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.03 INSTALLATION

A. Install work in accordance with WI (MAN) Custom Quality Standard.

B. Set and secure materials and components in place, plumb and level.

C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

D. Install hardware supplied by Section 08 7100 - "Door Hardware" in accordance with manufacturer's instructions.

NOT FOR BID

E. Install Toilet and Bath accessories in accordance with manufacturer's instructions and as indicated on drawings.

3.04 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09 9000 - "Painting and Coating".

3.05 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

NOT FOR BID

SECTION 06 4100
CUSTOM CABINETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Special fabricated cabinet units.

B. Countertops.

C. Prefinished surfaces.

D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

B. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

C. Section 01 7000 - Execution Requirements: Examination, preparation, and general installation procedures; preinstallation meetings; cutting and patching; cleaning and protection; starting of systems; demonstration and instruction; closeout procedures except payment procedures; requirements for alterations work.

D. Section 06 2000 - Finish Carpentry.

1.03 REFERENCE STANDARDS

A. ANSI/BHMA Standards - Builders Hardware Manufacturers Association.

B. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2000 (ANSI/HPVA HP-1).

C. NEMA LD3 - High Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

D. WI (MAN) - Woodwork Institute, Manual of Millwork; 11th Edition, May 1, 2003.

1.04 QUALITY ASSURANCE

A. Perform work to Custom Quality in accordance with WI (MAN) - Manual of Millwork of the Woodwork Institute.

1.05 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Submit Shop Drawings in conformance with Woodwork Institute, Section 1.8, "Guidelines for Architectural Millwork Shop Drawings".

PART 2 PRODUCTS

2.01 STYLE OF CONSTRUCTION

A. Casework: Flush overlay type (Style A;, Frameless) with reveal, laminated plastic covered, WI (MAN), Section 15, Custom Grade.

2.02 WOOD MATERIALS

A. Softwood Lumber: Graded in accordance with WI (MAN); maximum moisture content of 6 percent, species and grade as follows:
   1. Cabinet frame - Species: Douglas Fir. Cut: Vertical.

B. Hardwood Lumber: Graded in accordance with WI (MAN); Custom; average moisture content of 6 percent; species and grade as follows:
   1. Species - Birch. Grade: Custom, suitable for transparent finish.

2.03 SHEET MATERIALS

A. Birch Plywood, WI (MAN) Grade B.

NOT FOR BID

1. Drawer Construction.
2. Gables and Backs.
3. Shelving.
4. Drawer Bottoms.

B. No Particleboard, MDF or Hardboard Allowed.

2.04 ACCEPTABLE LAMINATE MANUFACTURERS

A. Wilsonart.

B. Formica.

C. Nevamar.

D. Substitutions and Product Options: Under provisions of Section 01 6000 - "Product Requirements".

2.05 LAMINATE MATERIALS

A. Plastic Laminate: NEMA LD 3, general purpose type; color as selected.

B. Laminate Backing Sheet: NEMA LD 3 BK20 backing grade, undecorated plastic laminate.

2.06 COMMERCIAL SOLID SURFACE MATERIAL

A. Where indicated in plans, countertops are to be fabricated with Commercial Solid Surface Material.

B. Acceptable Manufacturers:
1. Avonite
2. Corian
3. Formica
4. Meganite
5. Staron

C. Substitutions and Product Options: Under provisions of Section 01 6000 - Product Requirements".

2.07 ACCESSORIES

A. Adhesives:
1. Plastic Laminate: Type recommended by laminate manufacturer to suit application.
2. Commercial Surface Material: Joint adhesive recommended by commercial surface material manufacturer.

B. Fasteners: Size and type to suit application.

C. Bolts, Nuts, Washers, Lags, Pins and Screws: Of size and type to suit application.

D. Sealant: Silicone Sealant (for Commercial Surface Material) as recommended by the solid surface manufacturer.

2.08 HARDWARE

A. Shelf Standards and Rests: Knape and Vogt #255 and #256. Shelf Standards to be flush mounted (recessed).

B. Drawer and Door Pulls: EPCO 4" solid brass cabinet wire pull, Brushed Chrome finish.

C. Sliding Door Pulls: Grant #426.

D. Cabinet Locks: National 8123.

E. Catches: Magnetic, 2 on doors over 42-inches high.

F. Drawer Slides: ANSI/BHMA Standards, Grade 2. Acceptable Manufacturers: Stanley, Grant.

G. Hinges (concealed): Grass 1200, Blum 91.650 or Mepla.

H. Provide soft-closing dampers on all drawers and doors (Hafele or equal).

I. Substitutions and Product Options: Under provisions of Section 01 60 00 - "Product Requirements".

NOT FOR BID

2.09 FABRICATION

A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

B. Fabricate to Woodwork Institute Standards, Custom Quality.

C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

D. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline. Slightly bevel arises. Locate counter butt joints minimum 2-feet from sink cut-outs.

E. All base cabinet interior corners to be utilized and provided with "lazy susan", etc.

F. Apply cabinet liner at all cabinet interiors, shelving and drawersides. Color to be white.

G. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal cut edges.

2.10 COMMERCIAL SURFACE FABRICATION

A. Fabrication to be performed by manufacturer's recommended fabrication source.

B. Fabricate components in shop to greatest extent practical to sizes and shapes indicated.

C. Form joints between components using manufacturer's standard joint adhesive. Joints shall be inconspicuous in appearance and without voids. Attach a 2-inch wide reinforcing strip of Commercial Surface Material under each joint.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Set and secure casework in place; rigid, plumb and level.

C. Use purpose-designed fixture attachments in concealed locations for wall mounted components.

D. Use threaded steel concealed joint fasteners to align and secure adjoining cabinet units and countertops.

E. Carefully scribe casework abutting other components, with maximum gaps of 1/32-inch. Do not use additional overlay trim for this purpose.

F. Secure cabinet and counter bases to floor using appropriate angles and anchorages.

G. Counter-sink anchorage devices at exposed locations used to wall mount components, and concealed with solid plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

H. Installation of Commercial Surface Material countertops shall be in a workmanlike manner, in accordance with the manufacturer's instructions.

3.03 ADJUSTING AND CLEANING

A. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly.

B. Clean casework, counters, shelves, hardware, fittings and fixtures.

END OF SECTION

NOT FOR BID

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt insulation in exterior wall.

B. Batt insulation for filling perimeter window and door shim spaces, and crevices in exterior wall.

C. Batt sound insulation where indicated on plans.

D. Fasteners and sealants.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Submittals: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

B. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

C. Section 09 2116 - Gypsum Board Assemblies.

1.03 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria and limitations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Owens/Corning Fiberglas.

B. Certainteed.

C. Manville.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Batt Insulation: Preformed glass fiber (thermal and sound) batt friction fit at walls, mechanically adhered to underside of roof sheathing and lay on channels between trusses where indicated. Conform to the following:

1. Thermal Resistance.
   a. R of 38: Roof and Attic.
   b. R of 21: Exterior Walls, as indicated in plans.
   c. R of 13: Interior Walls.
2. Facing:
   a. Roof - Foil Faced.
   b. Walls - Unfaced.
3. Sound Insulation: As indicated on plans.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials and insulation are dry and ready to receive insulation.

B. Verify that building structure and building systems such as electrical conduit to be concealed are completed and approved.

C. Correct any unsatisfactory conditions before proceeding.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in exterior walls and roof spaces without gaps or voids.

C. Trim insulation neatly to fit spaces.

NOT FOR BID

D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.

E. Staple or nail in place at maximum 6-inches o.c. For wired installation, utilize 80 gauge line wire, run perpendicular to insulation, spaced at 24-inches o.c.

F. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

G. Extend vapor and air barrier tight to full perimeter of adjacent window and door frames and other items interrupting the plane of membrane. Tape and seal in place.

END OF SECTION

NOT FOR BID

SECTION 07 2500
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Weather barrier membrane.

B. Seam Tape.

C. Flashing.

D. Fasteners.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.

B. Section 07 2100 - Thermal Insulation: Vapor retarder installed in conjunction with batt insulation.

C. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

D. Section 07 9200 - Joint Sealants: Sealing building expansion joints.

1.03 REFERENCE STANDARDS

A. AATCC Test Method 30 - Antifungal Activity, Assessment on Textile Materials: Mildew and Rot Resistance of Textile Materials; 2013.

B. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test; 2014.

C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2006a (Reapproved 2013).

D. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.

E. ASTM D5590 - Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay; 2000 (Reapproved 2010).

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

H. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

I. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc; 2013.

J. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials; ICC Evaluation Service, Inc; 2011.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on material characteristics.

C. Samples: Weather Barrier Membrane, minimum 8-1/2" x 11".

D. Quality Assurance Submittals:

1. Design Data, Test Reports: Provide Manufacturer's test reports indicating product compliance with indicated requirements.
2. Manufacturer's Instructions: Provide manufacturer's written installation instructions.
3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.

NOT FOR BID

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

A. Water-Resistive Barrier: Provide on exterior walls under exterior cladding.
   1. Use building paper unless otherwise indicated.

2.02 WATER-RESISTIVE BARRIER MATERIALS (NEITHER AIR BARRIER OR VAPOR RETARDER)

A. Building Paper: Asphalt-saturated Kraft building paper complying with requirements of ICC-ES AC38 Grade D.

2.03 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

B. Fasteners:
   1. Wood Frame Construction.
      a. Nail Caps: #4 nails with large 1-inch plastic cap fasteners.

C. Primers:
   1. Provide manufacturer reccommended primer to assist in adhesion between substrate and flashing.

D. Flashing:
   1. Flexible membrane flashing materials for widow openings and penetrations as recommended by material manufacturer

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Water-Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

C. Mechanically Fastened Sheets - On Exterior:
   1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
   2. Overlap seams as recommended by manufacturer but at least 6 inches.
   3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
   4. Install water-resistive barrier over jamb flashings.
   5. Install air barrier and vapor retarder underneath the jamb flashings.
   6. Install head flashings under weather barrier.
   7. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.

D. Openings and Penetrations in Exterior Weather Barriers:
   1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
   2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
   3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.

NOT FOR BID

4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Coordination of ABAA Tests and Inspections:
1. Provide testing and inspection required by ABAA QAP.
2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
3. Cooperate with ABAA testing agency.
4. Allow access to air barrier work areas and staging.
5. Do not cover air barrier work until tested, inspected, and accepted.

C. Do not cover installed weather barriers until required inspections have been completed.

D. Notify manufacturer's designated representative to obtain periodic observations of weather barrier assembly installation.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

B. Protect installed weather barrier from damage. []

END OF SECTION

NOT FOR BID

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete floor slab and building foundation.

1.03 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2014.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

D. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).

E. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.

F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
   1. Adhesives Technology Corporation; _____: www.atcepoxy.com/#sle.
   2. QUIKRETE Companies; _____: www.quikrete.com/#sle.
   3. Sherwin-Williams Company; _____: www.sherwin-williams.com/#sle.
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
   1. Adhesives Technology Corporation; _____: www.atcepoxy.com/#sle.
   2. QUIKRETE Companies; _____: www.quikrete.com/#sle.
   3. Sherwin-Williams Company; _____: www.sherwin-williams.com/#sle.
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

B. Silicone Sealant: FS TT-S-01543, Class A, low modulus type; color as selected; manufactured by Dow Corning, General Electric, Sonneborn or approved equal.

NOT FOR BID

2.03 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

NOT FOR BID

SECTION 08 1100
STANDARD STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rated and non-rated rolled steel doors and frames.

1.02 RELATED REQUIREMENTS

A. Section 08 1423 - Laminate Faced Wood Doors.

B. Section 08 7100 - Door Hardware.

C. Section 08 8000 - Glazing: Glass for doors.

D. Section 09 9000 - Painting and Coating: Field painting of doors and frames.

1.03 REFERENCE STANDARDS

A. ANSI A250.11 - Recommended Erection Instructions for Steel Frames; '01.

B. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builders' Hardware.

C. NFPA 80 - Standard for Fire Doors and Windows; '95.

D. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; '95.

E. SDI 100 - Recommended Specifications for Standard Steel Doors and Frames; Steel Door Institute; '91.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Provide door configurations, location of cut-outs or hardware reinforcement.

C. Shop Drawings: Indicate door elevations, internal reinforcement, closure method, cut-outs for glazing, and finishes.

D. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.05 QUALITY ASSURANCE

A. Conform to SDI-100.

B. Fire rated frame construction to conform to NFPA 252.

C. Installed frame and door assembly to conform to NFPA 80 for fire rated class indicated on drawings.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated frames.

B. Fire Rated Door Construction: Conform to NFPA 252.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect products under provisions of Section 01 6000 - "Product Requirements".

B. Protect frames with resilient packaging sealed with heat shrunk plastic.

C. Break seal on site to permit ventilation.

PART 2 PRODUCTS

2.01 DOORS AND FRAMES

A. Doors: SDI-100 Grade I.

B. Frames:

1. Exterior: Amweld, Steelcraft, Republic or approved equal, 16-gauge thick material, core thickness. To suit grade and model of door.
2. Interior: Timely Industries, Inc., "S" Series, 20-gauge thick material, core thickness. To suit grade and model of door.

NOT FOR BID

3. Interior: Timely Industries Inc., "CK" Series, 18 gauge thick, with kerf for door seal/gasket. To be used at interior fire rated openings as designated on plans.
4. Interior (Doors separating Garage Bay and Storage Areas): Amweld, Steelcraft, Republic or approved equal, 18-gauge thick material, core thickness. To suit grade and model of door.

2.02 DOOR CORE

A. Core: Impregnated cardboard honeycomb.

2.03 ACCESSORIES

A. Rubber Silencers: Resilient rubber.

B. Louvers: Manufacturer's standard with filter.

2.04 FABRICATION

A. Fabricate frames as welded unit type.

B. Fabricate frames and doors with hardware reinforcement plates welded in place.

C. Reinforce frames wider than 48-inches with roll formed steel channels fitted tightly into frame head, flush with top.

D. Prepare frame for silencers. Provide three single rubber silencers for single doors on strike side, and two single silencers on frame head at double doors without mullions.

E. Attach fire rated label to each frame unit.

F. Close top edge of exterior doors flush with inverted steel channel closure. Seal joints watertight.

2.05 FINISH

A. Primer: Air dried.

B. Finish: Paint of color selected.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install frames in accordance with ANSI 250.11.

C. Install doors in accordance with DHI.

D. Coordinate with wallboard wall construction for anchor placement.

3.02 ERECTION TOLERANCES

A. Maximum Diagonal Distortion: 1/16-inch measured with straight edge, corner to corner.

3.03 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

END OF SECTION

NOT FOR BID

SECTION 08 1423
LAMINATE FACED WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. High pressure decorative laminate faced doors, flush configuration; non-rated.

1.02 RELATED REQUIREMENTS

A. Section 06 2000 - Finish Carpentry.

B. Section 08 1100 - Standard Steel Doors and Frames: Steel frames.

C. Section 08 7100 - Door Hardware.

D. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

A. ANSI A208.1 - Standards for Particleboard.

B. AWI - Architectural Woodwork Institute.

C. NEMA LD3 - High Pressure Decorative Laminates (National Electrical Manufacturers Association).

D. WDMA I.S. 1A - Standards for Architectural Wood Flush Doors (Window and Door Manufacturers Association).

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Submit complete schedule indicating dimensions, cutouts, hardware sets, high pressure decorative laminate selection, and other pertinent data which references the individual architectural door mark number as shown on the drawings.

C. Submit Manufacturer's data sheets, completely describing door construction, WDMA I.S. 1-A (formerly NWWDA) and AWI Classifications.

D. Warranty statement shall accompany the submittal.

1.05 QUALITY ASSURANCE

A. High pressure decorative laminate doors shall conform to the latest edition of the following standard: WDMA I.S. 1-A requirements for "Premium" Grade.

B. Tolerance for warp, telegraphing, squareness, and prefitting dimensions as per the latest edition of WDMA I.S. 1-A.

C. Each door shall bear an identifying label indicating the manufacturer, door number and other number, as well as fire rating where applicable.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Doors shall be individually poly-bagged.

B. Deliver the doors to project site in Manufacturer's original unopened poly-bags.

C. Deliver doors after the building is enclosed, dry, heated and adequately ventilated. Do not receive or store doors in damp areas. Do not drag doors on ground, floor or across one another.

D. Store doors flat on a level surface under cover and elevated above grade.

1.07 FIELD CONDITIONS

A. Do not subject doors to extreme conditions or changes in heat, dryness or humidity in accordance with the latest edition of WDMA I.S. 1-A.

1.08 GUARANTEE

A. Provide Manufacturer's written guarantee against warpage, delamination and defects in materials and workmanship for the following time period:

NOT FOR BID

1. Interior Doors: Life of installation for solid core doors, interior use.

B. Any defects noted during the warranty period shall be corrected at no cost to the Owner. Such corrective work shall include all labor and material for repair, replacement, refinishing and rehanging as required.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. VT Industries, Inc. Model #303-3.

B. Or approved equal.

C. Substitutions: Under provisions of Section 01 6000 - "Product Requirements".

2.02 GENERAL

A. All wood doors are to meet criteria of the latest edition of WDMA I.S. 1-A "Premium" Grade.

B. Laminate doors shall be faced with high pressure decorative laminates meeting the minimum requirements of NEMA LD3. Faces and vertical edges are to be a minimum thickness of nominal 0.050".

C. Acceptable Laminate Manufacturers:
1. Formica.
2. Nevamar.
3. Wilsonart.
4. Substitutions and Product Options: Under provisions of Section 01 60 00 - "Product Requirements"

D. The laminate shall have manufacturer's standard finish, unless otherwise specified, for general grade use.

E. Stile edge of doors shall have the laminate edges applied prior to the application of the face laminates.

F. Top and bottom rails shall be factory-sealed with an approved wood sealer.

G. Doors shall be prefit and beveled at the factory to fit the openings. Prefit tolerances shall be in accordance with the requirements of WDMA I.S. 1-A, latest edition.

H. Doors shall be machined in the factory for mortised hardware items, including pilot holes for hinge screws and lock fronts.

I. Vision panels shall be VT steel vision frame style #110, beige prime finish, standard.

2.03 FLUSH SOLID CORE HIGH PRESSURE DECORATIVE LAMINATE DOORS, INTERIOR

A. WDMA I.S. 1-A Quality Grade: Premium, Type PC HPDL-3. Non-bonded core constructions are not acceptable substitutions.

B. Stiles to be 1-3/8" wide, structural composite lumber (SCL), edged with high pressure decorative laminate prior to face lamination. The door manufacturer shall drill 5/32" diameter pilot holes for all hinges.

C. Rails are to be structural composite lumber (SCL), minimum 1-3/8" wide before prefitting.

D. The core shall be particleboard, 28-32 pounds per cubic foot average density. Comply with particleboard standard ANSI A208.1, Grade 1-LD-2.

E. Stiles and rails are to be securely GLUED to the core, and the entire assembly sanded flat as a unit to ensure minimal telegraphing of core components through face veneers.

F. Laminates are to be applied to the core in a HOT PRESS using Type I exterior water-resistant adhesive. Three-ply construction.

NOT FOR BID

PART 3 EXECUTION

3.01 PREPARATION

A. Carefully inspect the locations where doors are to be installed. Notify the Architect of any conditions which would adversely affect the installation, or the subsequent operation of the door. Do not proceed until unsatisfactory conditions are corrected.

B. Allow doors to become acclimated to building temperatures and humidity before installation.

C. Within four (4) days of fitting each door, seal exposed surfaces with at least two coats of polyurethane.

D. After the doors have been adjusted and cleaned, place the poly bags over the doors to provide protection while the remainder of construction proceeds.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

END OF SECTION

NOT FOR BID

SECTION 08 3323
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rapid Response overhead coiling doors, operating hardware, and electric operation.

B. Wiring from electric circuit disconnect to operator to control station.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

B. Section 26 0533.13 - Conduit for Electrical Systems: Conduit from electric circuit to operator and from operator to control station.

C. Section 26 2726 - Wiring Devices: Power to disconnect.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

C. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.

D. NEMA MG 1 - Motors and Generators; 2014.

1.04 SYSTEM DESCRIPTION

A. Electric motor operated unit with manual override in case of power failure.

B. Within a framed opening. Surface mounted.

1.05 DESIGN REQUIREMENTS

A. Design door assembly to satisfy non-operational wind load of 20 PSF without undue deflection or damage to door or assembly components.

1. Design for model 422 Curved/Flat Slat (14'x14') to satisfy non-operational wind load of 30 PSF without undue deflection or damage to door or assembly components. In the event of high sustained wind load, use auxiliary chain hoist to open door

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide general construction, electrical equipment, and component connections and details.

C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

D. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Overhead Coiling Doors:

1. Porvene Doors, Inc.: www.porvenedoors.com.
   a. Model 422-RRS / Rapid Response System with chain override.
2. Or approved equal.
3. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

NOT FOR BID

2.02 MATERIALS AND COMPONENTS

A. Curtain: conform to the following:
   1. Slats: Interlocking, minimum 22-gauge of ANSI/ASTM A653 steel, galvanized to minimum 1.25 oz/sq ft coating in accordance with ASTM A924. Cold roll formed in continuous lengths of 22 ga..
   2. Slat Ends: Each slat fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
   3. Vision Lites: Two (2) rows of vision cutouts through curtain covered with clear Lexan polycarbonate. Mount as indicated on drawings.
   4. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
   5. Wear Straps: Polyester bands fitted vertically 1 per every 5 foot of curtain width.

B. Guide Construction: Two angles form a curtain guide and are bolted to a continuous wall angle. Sizes of structural steel angles are determined as required to retain curtain in guides under wind load and provide adequate mounting to jambs.
   1. Provide structural 3-Pc. guides with malleable windlocks.

C. Hood Enclosure: 24-gauge galvanized steel; Internally reinforced to maintain rigidity and shape.

D. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.03 FINISHES

A. Curtain Slats: Baked enamel prime coat factory finish (color as selected by Architect). No field painting allowed.

B. Steel Guides and Hood Enclosure: Baked enamel prime coat factory finish. No field painting allowed.

2.04 FABRICATION

A. Endlocks: Each end of alternate slats shall be fitted with endlocks to provide a wearing surface in the guides and to maintain slat alignment. Fastened with 1/4 inch rivets.
   1. Malleable Iron End-Locks: Malleable or “cast” iron end-locks shall be fitted onto every other slat.

B. Bottom Bar: Curtain shall be reinforced with a bottom bar consisting of two 2 inch by 2 inch by 1/8 inch (50.8mm by 50.8mm by 3.21mm) structural steel angle with P.V.C. bulb astragal.

C. Barrel: Shall be a steel pipe of diameter and wall thickness to restrict maximum deflection to 0.03 inch per foot (2.5mm/m) of door width. End bearings shall be self-lubricating ball bearings.

D. D. Springs: Shall be oil tempered, grease packed helical torsion type designed with an overload factor of 25 percent. Springs mounted on a cold rolled steel inner shaft.
   1. High Cycle Springs: spring design is to last at least 50,000 cycles.

E. E. Bracket Plates: 1/4 inch (6mm) minimum thickness steel plates to sustain and enclose ends of the door assembly.

F. Drive end bracket plate: Fitted with a self-aligning sealed ball bearing.

G. Guides: Shall be structural steel angles 3/16 inch (4.76mm) minimum thickness with removable head stops.
   1. Provide weather seal clip-on vinyl or weather stripping to seal against slat.

H. Guide Wall Angles: 3/16 inch (4.76mm) minimum thickness structural steel angles.

I. Hoods: Shall be 24 gauge galvanized still with baked epoxy primer. No field painting allowed.

2.05 ELECTRIC OPERATION

A. Electric Operators:
   1. Mounting: Side mounted.
   2. Motor Enclosure:

NOT FOR BID

a. Exterior Coiling Doors: NEMA MG 1, Type 4; open drip proof.

3. Motor Voltage: 120 volts, single phase, 60 Hz.
4. Gear Hoist Door Operator, Model Pro-GH VFD with Red/Green warning light modification as manufactured by Micanan (or approved equal); 1.5 HP, 110 volt, single phase, mounted in accordance with manufacturer's specifications. Provide push button stations (interior) with radio control option.
5. Provide two (2) transmitters per door.
6. Brake: Manufacturer's standard type, activated by motor controller.
7. Manual override in case of power failure.
8. Refer to Section 26 0583 for electrical connections.

B. Interior Control Station: Recessed, standard three button (open-close-stop) control for each operator; 24 volt circuit. (NEMA 250, Type 4).

C. Commercial Protector System (CPS):
1. Provide "non-contact" photo safety sensors designed to sense an obstruction between jambs and signals for the door operator to reverse to open. (NEMA 250, Type 4).

D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Complete wiring from disconnect to unit components.

3.03 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet straight edge.

3.04 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean installed components / under provisions of Division 1.

B. Remove labels and visible markings.

END OF SECTION

NOT FOR BID

SECTION 08 5113
ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum windows with fixed sash, operating sash, and infill panels.

B. Operating hardware.

C. Insect screens.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Steel lintels.

B. Section 07 9200 - Joint Sealants: Sealing joints between window frames and adjacent construction.

C. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.

B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

E. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of AAMA CW-10.

B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.08 WARRANTY

A. See Section 01 7700 - Closeout Procedures, for additional warranty requirements.

B. Correct defective Work within a 10 year period after the Date of Substantial Completion.

C. Provide 10 year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

NOT FOR BID

D. Provide 10 year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer (or approved equal):
Milgard Windows & Doors
26879 Diaz Rd, Temecula, CA 92590
Phone:(951) 296-1400

B. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 ALUMINUM WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
   1. Frame Depth: 2-1/4 inches.
   2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
   3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
   5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

B. Performance Requirements: Provide products that comply with the following:
   1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
      a. Performance Class (PC): R.

C. Horizontal Sliding Type:
   1. Construction: Thermally broken.
   2. Provide screens.
   3. Glazing: Double; clear; low-e.
   4. Exterior Finish: Class I natural anodized.
   5. Interior Finish: Class I natural anodized.

D. Single-Hung Type:
   1. Construction: Thermally broken.
   2. Provide screens.
   3. Glazing: Double; clear; low-e.
   4. Exterior Finish: Class I natural anodized.
   5. Interior Finish: Class I natural anodized.

2.03 COMPONENTS

A. Glazing: As specified in Section 08 8000.

B. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.
   1. Hardware: Spring loaded steel pins; four per screen unit.
   2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
   3. Frame Finish: Same as frame and sash.

C. Fasteners: Stainless steel.

D. Glazing Materials: As specified in Section 08 8000.

E. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

NOT FOR BID

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

2.05 HARDWARE

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

A. Install windows in accordance with manufacturer's instructions.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install sill and sill end angles.

E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

F. Install operating hardware not pre-installed by manufacturer.

G. Install glass and infill panels in accordance with requirements specified in Section 08 8000.

3.03 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

A. Test installed windows for compliance with performance requirements for water penetration, in accordance with ASTM E1105 using uniform pressure and the same pressure difference as specified for laboratory testing.

1. If any window fails, test additional windows at Contractor's expense.

B. Replace windows that have failed field testing and retest until performance is satisfactory.

3.05 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

END OF SECTION

NOT FOR BID

SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood and hollow metal doors.

B. Hardware for fire-rated doors.

1.02 RELATED REQUIREMENTS

A. Section 08 1100 - Standard Steel Doors and Frames.

B. Section 08 1423 - Laminate Faced Wood Doors.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. CBC - 2019 California Building Code, based on 2018 International Building Code (IBC), with California Amendments.

C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

D. SDI - Steel Door Institute.

E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 COORDINATION

A. Coordinate the manufacture, fabrication, and installation of products that door hardware will be installed upon.

B. Coordinate work of this section with other directly affected sections involving manufacturer of any internal reinforcement for door hardware.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements to fire rated doors and frames.

B. Accessibility Requirements.

1. Conform to CBC:

a. Section 1132A.6, Closer-Effort to Operate Doors.

1) Maximum effort to operate doors shall not exceed 8-1/2 pounds for exterior doors and 5 pounds for interior doors, such pull or push effort being applied at right angles to hinged doors and at the center plane of sliding or folding doors. Compensating devices or automatic door operators may be utilized to meet these standards. When fire doors are required, the maximum effort to operate the door may be increased to the minimum allowable by the appropriate enforcement agency, not to exceed 15 pounds.

b. Section 1132A.8, Hand-Activated Door Hardware.

1) Hand-activated door latching, locking and opening hardware shall be centered between 30 inches and 44 inches above the floor. Latching and locking doors that are hand-activated and on an accessible route shall be operable with a single effort by lever-type hardware, panic bars, push-pull activating bars or other hardware designed to provide passage without requiring the ability to grasp the opening hardware. Locked exit doors shall operate consistent with Section 1132A.6 in direction of egress.

c. Section 1126A.4.1, Door Closer.

1) If the door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

1.06 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

NOT FOR BID

B. Indicate locations and mounting heights of each type of hardware.

C. Submit Schedule of Hardware.

D. Provide product data on specified hardware.

E. Submit manufacturer's parts lists, templates and installation instructions.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include data on operating hardware, lubrication requirements, and inspection procedures related to preventive maintenance.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products under provisions of Section 01 6000 - "Product Requirements"

B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

C. Deliver keys to Owner by security shipment direct from hardware supplier.

D. Protect hardware from theft by cataloging and storing in secure area.

1.09 MAINTENANCE PRODUCTS

A. Provide special wrenches and tools applicable to each different or special hardware component.

B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.10 WARRANTY

A. Provide five year warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. As specified in this section for products under SCHEDULE.

B. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 DOOR HARDWARE - GENERAL

A. Provide hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.

B. Provide items of a single type of the same model by the same manufacturer.

C. Provide products that comply with the following:
   1. Applicable provisions of federal, state, and local codes.
   2. Fire-Rated Doors: NFPA 80.
   3. Hardware on Fire-Rated Doors, Except Hinges: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.
   4. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide hardware that enables door assembly to comply with air leakage requirements of the applicable code.

2.03 LOCKS AND LATCHES

A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
   1. If no hardware set is indicated for a swinging door provide an office lockset.
   2. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
   3. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.

B. Lock Cylinders: Manufacturer’s standard tumbler type, six-pin standard core.
   1. Provide cams and/or tailpieces as required for locking devices required.

C. Keying: Grand master keyed.

NOT FOR BID

D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.04 HINGES

A. Refer to Hardware Sets at end of section.

B. Hinges: Provide hinges on every swinging door.
   1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
   2. Provide ball-bearing hinges at all doors having closers.
   3. Provide hinges in the quantities indicated.
   4. Provide non-removable pins on exterior outswinging doors.
   5. Where electrified hardware is mounted in door leaf, provide power transfer hinges.

2.05 LOCKS AND LATCHES

A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
   1. Hardware Sets indicate locking functions required for each door.
   2. If no hardware set is indicated for a swinging door provide an office lockset.
   3. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
   4. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.

B. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
   1. Provide cams and/or tailpieces as required for locking devices required.

C. Keying: Grand master keyed.

D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.06 KEYING

A. Door Locks: Construction keying only. The Owner to provide key system compatible with the 5 pin system after acceptance of the building.

B. Supply two (2) keys for each lock.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.

B. Verify that electric power is available to power operated devices and of the correct characteristics.

C. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions, requirements of SDI and applicable codes.

B. Use templates provided by hardware item manufacturer.

C. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.

D. Conform to ANSI A117.1 for positioning requirements for the handicapped.

3.03 SCHEDULE

A. Numbers have been taken from the following:

HAG -	Hager Hinge	SCH -	Schlage
PMK -	Pemko	LCN -	LCN
VD -	Von Duprin	YALE -	Yale
TRM -	Trimco	NOR -	Norton
SIM -	Simplex	IVE -	Ives

NOT FOR BID

HDG #1

DR #1
EACH DOOR TO HAVE:

3 Ea	Hinge	BB1279 4-1/2 x 4-1/2		652	HAG
1 Ea	Lockset	5418 LN-AU		626	YALE
1 Ea	Exit Device	99L·996L		626	VD
1 Ea	Cylinder	20·057		626	SCH
1 Ea	Kick Plate	8400	10 x 34	630	IVE
1 Ea	Closer	8501		689	NOR
1 Ea	Stop	FS 444		626	IVE
1 Ea	Threshold	171 A			PMK
1 Ea	Dr Sweep	345 AV			PMK
1 Set	Seal	S88D			PMK
1 Set	Weather Strip		S88W		PEM
1 Ea	Signage		"This Door to Remain..."		By Others

HDG #2

DRS #2, 3, 4
EACH DOOR TO HAVE:

3 Ea	Hinge	BB1279 4-1/2 x 4-1/2		652	HAG
Lock set	ND 70 PD	RHO		626	SCH
1 Ea	Closer	8501		689	NOR
1 Set	Weather Strip		S88W		PEM
1 Ea	Kick Plate	8400	10 x 34	630	IVE
1 Ea	Stop	FS 444		626	IVE
1 Ea	Threshold	171 A			PMK
1 Ea	Dr Sweep	3452 ANB		628	PMK
1 Set	Seal	S88D			PMK

HDG #3

DRS #16, 17
EACH DOOR TO HAVE:

3 Ea	Hinge	BB1279 4-1/2 x 4-1/2		652	HAG
1 Ea	Privacy	5402LN-AU		626	YALE
1 Ea	Kick Plate	K0050	10 x 34	630	TRM
1 Ea	Stop	1211-ES		626	TRM
1 Set	Signage	As Required.			

NOT FOR BID

HDG #4

DRS #5, 8

EACH DOOR TO HAVE:

3 Ea	Hinge	BB1279	4-1/2 x 4-1/2	652	HAG
1 Ea	Lockset	5407LN-AU		626	YALE
1 Ea	Closer	8501		689	NOR
1 Ea	Stop	1211-ES		626	TRM
1 Ea	Kick Plate	K0050	10 x 34	630	TRM
1 Ea	Threshold	171 A			PMK
1 Ea	Dr Sweep	345 AV			PMK
1 Ea	Cylinder	20·057		626	SCH
1 Set	Seal	S88D			PMK

HDG #5

DRS #11, 18, 19

EACH DOOR TO HAVE:

3 Ea	Hinge	BB1279	4-1/2 x 4-1/2	652	HAG
1 Ea	Lock set	ND 70 PD	RHO	626	SCH
1 Ea	Stop	FS 438		626	IVE
1 Ea	Kick Plate	8400	10 x 34	630	IVE
1 Ea	Threshold	171A			PEM
1 Set	Seal	S88D			PMK

**Provide Seal only at Door #11

HDG #6

DRS #13, 14, 15

EACH DOOR TO HAVE:

3 Ea	Hinge	BB1279	4-1/2 x 4-1/2	652	HAG
1 Ea	Lock set	ND 80 PD	RHO	626	SCH
1 Ea	Stop	FS 438		626	IVE
1 Ea	Threshold	271 A			PMK
1 Ea	Kick Plate	8400	10 x 34	630	IVE
3 Ea	Silencer	SR 64			IVE

HDG #7

DR #12

EACH DOOR TO HAVE:

3 Ea	Hinge	5BB1	4-1/2 x 4-1/2	652	IVE
1 Ea	Lockset	ND 80 PD	RHO	626	SCH
1 Ea	Stop	FS 438		626	IVE

NOT FOR BID

1 Ea	Closer	4040 XP·TB		689	LCN
1 Ea	Kick Plate	8400	10 x 34	630	IVE
3 Ea	Silencer	SR 64			IVE
1 Set	Seal	S88D			PEM

END OF SECTION

NOT FOR BID

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass and glazing for hollow metal work, windows and doors.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealants for other than glazing purposes.

B. Section 08 1100 - Standard Steel Doors and Frames: Glazed metal doors.

C. Section 08 1400 - Wood Doors: Glazed wood doors.

D. Section 10 2800 - Toilet and Bath Accessories: Mirrors.

1.03 REFERENCE STANDARDS

A. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1036 - Standard Specification for Flat Glass; 2011.

D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

G. ASTM E 773 - Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units; 2001.

H. ASTM E 774 - Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units; 1997.

I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

J. FS DD-G-451 - Glass, Float or Plate, Sheet, Figured (Flat, for Glazing, Mirrors and Other Uses).

K. GANA (GM) - GANA Glazing Manual; 2009.

L. GANA (SM) - GANA Sealant Manual; 2008.

1.04 QUALITY ASSURANCE

A. Conform to Glass Association of North America (GANA) Glazing Manual for glazing installation methods.

1.05 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Manufacturer's Installation Instructions: Indicate special precautions required.

PART 2 PRODUCTS

2.01 ACCEPTABLE GLASS MANUFACTURERS

A. Pittsburgh Plate Glass Co.

B. Libby Owens Ford Glass Co.

C. Guardian Industries Corp.

NOT FOR BID

D. Substitutions and Product Options: Under provisions of Section 01 60 00 - "Product Requirements".

2.02 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
   3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
   4. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.

B. Safety Glass: Type B, Clear, fully tempered.

C. Insulating Glass Units: Solar Control Low-E Insulating Glass.

2.03 SEALED INSULATING GLASS UNITS

A. Sealed Insulating Glass Units: Type SG-S
   1. Application: Exterior, except as otherwise indicated.
   2. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   3. Edge Spacers: Aluminum, bent and soldered corners.
   4. Edge Seal: Glass to elastomer with supplementary silicone sealant.
   5. Purge interpane space with dry hermetic air.

2.04 GLAZING COMPOUNDS

A. Silicone Sealant: Single component; chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A and G; cured Shore A hardness of 15 to 25; black color.

2.05 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.

D. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealants in accordance with manufacturer's instructions.

3.03 CLEANING

A. Remove glazing materials from finish surfaces.

NOT FOR BID

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.04 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

NOT FOR BID

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass and glazing for hollow metal work, windows and doors.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Sealants for other than glazing purposes.

B. Section 08 1100 - Standard Steel Doors and Frames: Glazed metal doors.

C. Section 08 1400 - Wood Doors: Glazed wood doors.

D. Section 10 2800 - Toilet and Bath Accessories: Mirrors.

1.03 REFERENCE STANDARDS

A. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1036 - Standard Specification for Flat Glass; 2011.

D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

E. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

G. ASTM E 773 - Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units; 2001.

H. ASTM E 774 - Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units; 1997.

I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

J. FS DD-G-451 - Glass, Float or Plate, Sheet, Figured (Flat, for Glazing, Mirrors and Other Uses).

K. GANA (GM) - GANA Glazing Manual; 2009.

L. GANA (SM) - GANA Sealant Manual; 2008.

1.04 QUALITY ASSURANCE

A. Conform to Glass Association of North America (GANA) Glazing Manual for glazing installation methods.

1.05 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Manufacturer's Installation Instructions: Indicate special precautions required.

PART 2 PRODUCTS

2.01 ACCEPTABLE GLASS MANUFACTURERS

A. Pittsburgh Plate Glass Co.

B. Libby Owens Ford Glass Co.

C. Guardian Industries Corp.

NOT FOR BID

D. Substitutions and Product Options: Under provisions of Section 01 60 00 - "Product Requirements".

2.02 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
   3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
   4. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.

B. Safety Glass: Type B, Clear, fully tempered.

C. Insulating Glass Units: Solar Control Low-E Insulating Glass.

2.03 SEALED INSULATING GLASS UNITS

A. Sealed Insulating Glass Units: Type SG-S
   1. Application: Exterior, except as otherwise indicated.
   2. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   3. Edge Spacers: Aluminum, bent and soldered corners.
   4. Edge Seal: Glass to elastomer with supplementary silicone sealant.
   5. Purge interpane space with dry hermetic air.

2.04 GLAZING COMPOUNDS

A. Silicone Sealant: Single component; chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A and G; cured Shore A hardness of 15 to 25; black color.

2.05 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.

D. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

E. Install sealants in accordance with manufacturer's instructions.

3.03 CLEANING

A. Remove glazing materials from finish surfaces.

NOT FOR BID

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

3.04 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

NOT FOR BID

SECTION 09 3000
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.
B. Tile for wall applications.
C. Cementitious backer board as tile substrate.
D. Setting materials.
E. Grout materials.
F. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Substrate for mortar bed.
B. Section 07 9200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2010 (Reaffirmed 2016).
B. ANSI A118.1 - American National Standard Specifications for Dry-Set Cement Mortar; 2012 (Revised).
C. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).
D. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2010 (Revised).
E. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2016).
F. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installation; 2014.
G. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2013.1.
H. ASTM C373 - Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products, Ceramic Tiles, and Glass Tiles; 2014a.
I. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
   1. Mortar and grout manufacturer's technical data sheets indicating suitability for the installation specified and compliance standards.
C. Samples: Submit the following for each type, color, size and finish included in the work.
   1. Full size tile and trim shapes.
   2. Grout color samples.
   3. Sealant color samples and Prefabricated Joint/Transition Strip samples.
D. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

NOT FOR BID

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

C. Illuminate the work area during installation providing the same level and angle of illumination as will be available for final inspection.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: All products by the same manufacturer.
   1. Dal-Tile Corporation: www.daltile.com/#sle.
   2. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Ceramic Mosaic Tile: ANSI A137.1, standard grade.
   1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
   2. Size: 2 by 2 inch, nominal.
   3. Shape: Square.
   4. Surface Finish: Unglazed.
   5. Color(s): To be selected from manufacturer's standard range (Price Group 1 & 2).
   6. Products:
      a. Dal-Tile Keystones, Colorbody Porcelain.
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Glazed Wall Tile: ANSI A137.1, standard grade.
   1. Dal Tile- Elevare
   2. Size: 4" by 16" inch, nominal.
   3. Surface Finish: High gloss.
   4. Color(s): To be selected by Architect from manufacturer's standard range.
   5. Trim Units: Matching bullnose shapes in sizes coordinated with field tile.

2.02 TRIM AND ACCESSORIES

A. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
   1. Applications:
      a. Transition between floor finishes of different heights.
      b. Thresholds at door openings.
   2. Manufacturers:
      a. Schluter-Systems: www.schluter.com/#sle.
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.03 SETTING MATERIALS

A. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.

B. Dry-Set Portland Cement Mortar Bond Coat: ANSI A118.1.

C. Mortar Bed Materials: Pre-packaged mix of Portland cement, sand, latex additive, and water.

NOT FOR BID

2.04 GROUTS

A. Grout: Tile Council of America (TCA) formula AARII HT, Epoxy resin. (Sand grout will not be accepted).

2.05 MORTAR MIX AND GROUT MIX

A. Mix and proportion pre-mix setting bed and grout materials in accordance with manufacturer's instructions and TCA Handbook for Ceramic Tile Installation.

2.06 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
   1. Type: Fluid-applied.
   2. Thickness: 20 mils, maximum.
   3. Crack Resistance: No failure at 1/8 inch gap, minimum.
   4. Products:
      a. Custom Building Products:Red Gard.
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 INSTALLATION - GENERAL

A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

C. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

D. Form internal angles square and external angles bullnosed.

E. Install non-ceramic trim in accordance with manufacturer's instructions.

F. Sound tile after setting. Replace hollow sounding units.

NOT FOR BID

G. Keep control and expansion joints free of mortar, grout, and adhesive.

H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

I. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

J. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Use uncoupling membrane under all tile unless other underlayment is indicated.
   2. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.

3.05 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

3.06 CLEANING

A. Clean tile and grout surfaces.

3.07 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

B. Protect finished installation.

END OF SECTION

NOT FOR BID

SECTION 09 5100
SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

C. Perimeter trim.

1.02 RELATED REQUIREMENTS

A. Section 07 2100 - Thermal Insulation: Acoustical insulation.

B. Division 23 - HVAC: Air diffusion devices in ceiling.

C. Division 26 - Electrical: Light fixtures in ceiling system.

1.03 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Samples: Submit two full size samples illustrating material and finish of acoustical units.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer: Company approved by manufacturer.

1.07 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.08 EXTRA MATERIALS

A. Provide one (1) unopened carton of each type of acoustical unit for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Armstrong World Industries, Inc; ____: www.armstrongceilings.com/#sle.
   2. CertainTeed Corporation; ____: www.certainteed.com/#sle.
   3. USG Corporation; ____: www.usg.com/ceilings/#sle.
   4. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Suspension Systems:

NOT FOR BID

1. Same as for acoustical units.
2. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 ACOUSTICAL UNITS

A. Acoustical Tile Type 1: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
   1. Size: 24 by 24 inches.
   2. Thickness: 3/4 inches.
   3. Composition: Cast mineral fiber.
   4. Ceiling Attenuation Class (CAC): 38/40, determined in accordance with ASTM E1264.
   5. Edge: Beveled tegular.
   6. Surface Color: To be selected by Architect from manufacturer's standard line.
   7. Products:
      a. USG Frost. Item 418
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

B. Acoustical Panels Type 2: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
   1. Size: 24 by 24 inches.
   2. Thickness: 5/8 inches.
   3. Composition: Wet felted.
   4. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
   5. Edge: Tegular.
   6. Surface Color: White.
   7. Products:
      a. USG; Olympia Micro Acoustical Panels. Item 4231
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.03 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.

B. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 9/16 inch wide face.
   2. Finish: White painted(field color). Taupe 107 at Council Chambers
   3. Products:
      a. USG: Donn Brand Centrictee DXT/DXLT.
      b. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Perimeter Moldings: Same material and finish as grid with 2"x2" size.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
   2. In each orthogonal direction, one end of the ceiling grid shall be attached to the perimeter molding while the opposite side shall be unattached with 3/4" clearance to the wall.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

NOT FOR BID

3.02 INSTALLATION - GENERAL

A. Install system in accordance with manufacturer's instructions and as supplemented in this section.

B. Install system capable of supporting imposed loads to a deflection of 1/360.

C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

D. Hang system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels, to span the extra distance.

F. Center system on room axis leaving equal border units according to reflected ceiling plan.

G. Do not support components of main runners or cross runners if weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6-inches of each corner; or support components independently.

H. Do not eccentrically load system, or produce rotation of runners.

I. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners. Provide edge moldings at junctions with other interruptions.

J. Fit acoustic units in place, free from damaged edes or other defects detrimental to appearance and function.

K. Install acoustic units level, in uniform plane, and free from twist, warp and dents.

L. Install light fixture boxes (where required) constructed of gypsum board above light fixtures in accordance with UL assembly requirements.

3.03 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees (Maximum).

END OF SECTION

NOT FOR BID

SECTION 09 6519
RESILIENT TILE FLOORING - METROFLOR

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient Tile Flooring.

B. Installation accessories:
   1. Adhesives.
   2. Wall base materials.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 07 9200 - Joint Sealants.

1.03 REFERENCE STANDARDS

A. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine; 2011.

B. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser; 2014.

C. ASTM F386 - Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces; 2011.

D. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

E. ASTM F970 - Standard Test Method for Static Load Limit; 2007 (Reapproved 2011).

F. ASTM F1700 - Standard Specification for Solid Vinyl Tile; 2013a.

G. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.

H. ASTM F1914 - Standard Test Method for Short-Term Indentation and Residual Indentation of Resilient Floor Covering; 2007 (Reapproved 2011).

I. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.

J. UL 2824 - GREENGUARD Certification Program Method for Measuring Microbial Resistance From Various Sources Using Static Environmental Chambers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Manufacturer's documentation for flooring and accessories:
   1. Technical Data.
   2. Installation and Maintenance.

C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

D. Verification Samples: Submit two samples, 4 by 4 inch in size illustrating color and pattern for each resilient flooring product specified.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and that the material is of the correct style, color, quantity and run number(s).

B. Store all materials flat and off of the floor in an acclimatized, weather-tight space between 65 to 85 degrees F.

NOT FOR BID

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

B. Installer Qualifications: This product should only be installed by professional flooring mechanics that have demonstrated successful installations of jobs in similar size and scope.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Patcraft - www.patcraft.com.

B. Or approved equal.

C. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 RESILIENT TILE FLOORING

A. Luxury Vinyl Tile:
   1. Pattern: LETTERPRESS.
   2. Color: _____As selected from manufacturer's full range.
   3. Physical Properties:
      a. Construction: LVT.
      b. Tile Size: 24" x 24", nominal.
      c. Wear Layer Thickness: 20 mil.
      d. Total Thickness (Gauge): 098 (2.5mm).
      e. Finish: ExoGuard Quartz Enhanced Urethane.
      f. Installation: Glue Down.
   4. Manufacturing, Performance, and Safety Standards:
      a. ASTM F386, Thickness: Passes requirements.
      b. ASTM F1914, Residual Indentation: Surpasses requirements.
      c. ASTM F1514, Resistance to Heat: Surpasses requirements.
      d. ASTM F1515, Resistance to Light: Surpasses requirements.
      e. ASTM E662, Smoke Density (Flaming and Non-Flaming): Passes requirements.
      f. ASTM D6329 and UL 2824, Mold and Microbial Resistance: Highly resistant.
      g. ASTM D2047, Coefficient of Friction (Dry): Greater than or equal to 0.6.
      h. ASTM F970, Static Load Limit: Greater than or equal to 1,000 pounds (surpasses requirements).
      i. ASTM D4060, Abrasion Resistance: Average of 30,000 cycles (results vary with emboss).

2.03 ACCESSORIES

A. Moldings, Transition and Edge Strips: Same material as flooring.
   1. Product: As recommended by Tile Flooring manufacturer.

B. Adhesives:
   1. Products:
      a. Shaw 4100 or S150
      b. Or approved equal.
      c. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

C. Wall Base Materials:
   1. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set style B, Cove and as follows:
      a. Height: 4-inch.
      b. Thickness: 0.125 inch.
      c. Finish: Satin.
      d. Color: As selected from manufacturer's standard range.
      e. Accessories: Premolded external corners and end stops.

NOT FOR BID

PART 3 EXECUTION

3.01 EXAMINATION - SEE ALSO SECTION 01 7000.

A. Install flooring and accessories after other operations (including painting) have been completed.

B. Acceptance of Conditions: Carefully examine all installation areas with installer/applicator present, for compliance with requirements affecting work performance.
   1. Verify that field measurements, product, adhesives, substrates, surfaces, structural support, tolerances, levelness, temperature, humidity, moisture content level, pH, cleanliness and other conditions are as required by the manufacturer, and ready to receive work.

C. Verify that substrate is contaminant-free, including old adhesives and abatement chemicals.

D. Test substrates as required by manufacturer to verify proper conditions exist.
   1. Concrete:
      a. Check for concrete additives such as fly ash, curing compounds, hardeners, or other surface treatments that may prevent proper bonding of floor coverings.
      b. Moisture testing: Perform either the In-Situ Relative Humidity (RH) test (ASTM F2170) or Moisture Vapor Emission Rate (MVER) test (ASTM F1869). Refer to the Manufacturer's Installation Guide/Manual for the maximum allowable substrate moisture content. Substrates above the maximum allowable moisture content will require a moisture mitigation system.
      c. Perform alkalinity testing per ASTM F710 to verify pH level is between 7 to 10.
      d. Check substrate for absorbency per manufacturer's recommendations.
      e. Perform bond testing per ASTM F710 to determine compatibility of adhesive to concrete substrate.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Flooring installation should not begin until all site conditions have been assessed, testing has been completed and subfloor conditions have been approved.

B. Prepare per manufacturer's written instructions, Section 01 7000, and as follows:
   1. Prepare substrates to ensure proper adhesion of Luxury Vinyl Plank & Tile.
   2. Concrete Substrates: Prepare substrate per ASTM F710.
      a. Verify that subfloor is clean, flat, smooth, free of dirt, rust, paint, oil, wax or any contaminant that will interfere with adhesive bonding.
      b. Mechanically remove substrate coatings that are not compatible with adhesives, such as sealers, curing, hardening or parting compounds, soap, wax, oil, etc.
         1) Do not use solvents or adhesive removers.
      c. Expansion joints, isolation joints, or other moving joints must be honored and must not be filled with underlayment products or other materials, and floor coverings must not be laid over them. Expansion joint covering systems should be detailed by the architect or engineer, and based upon intended usage and aesthetic considerations.
      d. Surface cracks, grooves, depressions, control joints or other non-moving joints, and other irregularities shall be filled or smoothed with high-quality Portland cement or calcium aluminate based patching or underlayment compound for filling or smoothing, or both.
         1) Do not skim-coat large areas with patching compound, especially slick power-troweled surfaces.
         2) Sand smooth per manufacturer's instructions.
      e. Slick surfaces such as power-troweled concrete shall be profiled as needed to allow for a mechanical bond between the adhesive and subfloor.
      f. Do not use gypsum-based underlayment products and do not skim coat concrete subfloors.
      g. Self-Leveling Underlayments: Provide a dry and smoothly-sanded underlayment substrate ready for installation of Luxury Vinyl Plank & Tile. Underlayment compound

NOT FOR BID

shall be moisture-resistant, mildew-resistant, and alkali-resistant and must have a minimum of 3,000 psi compressive strength per ASTM C109/C109M.

h. Lightweight concrete shall have a compressive strength greater than 90 pounds per cubic foot with minimum compression strength of 2,500 psi or greater.

3.03 INSTALLATION

A. Installation per manufacturer's written instructions, Section 01 7000, and as follows:
   1. Layout shall be specified by Architect, Designer or End User.
   2. Follow layout and ensure installation reference lines are square.
   3. Field tiles shall be installed with directional arrows on back aligned in the same direction, or may be installed in quarter-turned fashion.
   4. Check cartons for and do not mix dye lots.
   5. Expansion Joints: Locate expansion, isolation, and other moving joints prior to installation.
      a. Do not fill expansion, isolation, and other moving joints with patching compound nor cover with resilient flooring.
      b. Install movement joint systems per manufacturer's instructions and per Section 07 9200.
   6. Adhesives: Adhere flooring to substrate using the full spread method resulting in a completed installation without gaps, voids, raised edges, bubbles or any other surface imperfections.
      a. Select appropriate adhesive, trowel and follow manufacturer's instructions.
      b. Periodically spot-check transfer of adhesive to back of tile during installation.
      c. Roll floor with a 100 pound roller to ensure proper transfer of adhesive and bonding.
      d. Protect floor from traffic per manufacturer's instructions.
      e. Do not wet mop floor until the adhesive has properly set per written instructions.

3.04 FIELD QUALTITY CONTROL

A. Site tests and inspections[]per Section 01 4500 and as follows:
   1. Inspect flooring installation for non-conforming work including (but not limited to) the following:
      a. Lack of adhesion.
      b. Bubbles, loose tiles or raised edges.
      c. Dirt and debris underneath flooring.
      d. Excessive gaps.
      e. Improper substrate preparation (as indicated by telegraphing).
      f. Damage to tiles, including: dents/indentations, cuts, cracks, burns or punctures.

B. Non-conforming work per General Conditions and as follows:
   1. Repair or replace damaged material if not acceptable to the Architect.

3.05 CLEANING

A. Provide progress cleaning per manufacturer's written instructions, Section 01 7000, and as follows:
   1. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the work.
      a. Clean and protect completed construction until Date of Substantial Completion.
      b. During installation, remove wet adhesive from surface of flooring per manufacturer's instructions.
   2. Site: Maintain project site free of waste materials and debris.

B. Provide final cleaning immediately prior to Date of Substantial Completion inspection per manufacturer's written instructions and Section 01 7000.
   1. Protection: Remove manufacturer's and other installed protection immediately prior to Date of Substantial Completion inspection, unless required otherwise.
   2. Clean floor with a neutral 6-8 pH cleaner.

NOT FOR BID

3.06 MAINTENANCE

A. Initial maintenance per flooring manufacturer's written instructions and as follows:
   1. Allow the adhesive to cure for at least 48 hours prior to wet cleaning the floor.
   2. Sweep, dust mop or vacuum the floor thoroughly to remove all loose dirt, dust, grit and debris. Do not use vacuums with a beater bar assembly.
   3. Remove any dried adhesive residue from the surface with mineral spirits applied to a clean, lint-free cloth.
   4. Damp mop the floor using a cleaner recommended by the flooring manufacturer.
   5. If necessary, scrub the floor using an auto scrubber or rotary machine (300 rpm or less) with a cleaner recommended by the flooring manufacturer. Maintain the proper dilution ratio and use the appropriate scrubbing brush or pad.
   6. Thoroughly rinse the entire floor with fresh, clean water. Remove the dirty residue with a wet-vacuum or clean mop and allow the floor to dry completely.

3.07 PROTECTION

A. Protect materials from construction operations until Date of Substantial Completion or Owner occupancy, whichever occurs first.
   1. Protect finished floor from abuse and damage by using heavy non-staining kraft paper, drop cloths or equivalent. Use additional, non-damaging protective materials as needed.
   2. Light foot traffic on a newly installed floor can be permitted after 24 hours.
   3. Keep heavy traffic and rolling loads off the newly installed LVT flooring for 48 hours.
   4. Protect the floor from rolling loads by covering with protective boards.

END OF SECTION

NOT FOR BID

SECTION 09 9000
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, varnishes, and other coatings.

C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Floors, unless specifically so indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

E. See Surface Finish Schedule.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Shop-primed items.

B. Section 26 0553 - Electrical Identification: Painted identification.

C. Section 32 1313 - Portland Cement Concrete Paving: Pavement markings.

1.03 DEFINITIONS

A. Conform to ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. ASTM D2016 - Test Method for Moisture Content of Wood.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of all products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

C. Samples: Submit two samples, 8 x 10 inch in size, illustrating range of colors and textures available for each surface finishing product scheduled.

D. Submit manufacturer's application instructions.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in commercial painting and finishing approved by product manufacturer.

NOT FOR BID

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

1.09 EXTRA MATERIALS

A. Supply 1 gallon (4L) of each color, texture, and type; store where directed.

B. Label each container with color, texture and room locations, in addition to the manufacturer's label.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
   1. In the event that a single manufacturer cannot provide all specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
   2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
   3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

C. Paints:
   1. Vista Paint: www.vistapaint.com.
   2. Benjamin Moore & Co: www.benjaminmoore.com/#sle.
   3. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

D. Transparent Finishes:
   1. Behr Process Corporation: www.behr.com/#sle.
   2. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

E. Stains:
   1. Behr Process Corporation: www.behr.com/#sle.
   2. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

F. Primer Sealers: Same manufacturer as top coats.

G. Block Fillers: Same manufacturer as top coats.

H. Elastomeric Paint: Vista Paint or approved equal.

I. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.

NOT FOR BID

1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Supply each coating material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finished coatings until completion of project.

NOT FOR BID

B. Touch-up damaged coatings after Substantial Completion.

3.06 SCHEDULE - EXTERIOR SURFACES

A. Wood - Transparent:
   1. One coat stain - Olympic Stain, Semi-Transparent.
   2. One coat sealer - As directed.

B. Concrete, Concrete Block:
   1. One coat block primer - Vista Paint 018, 100% Acrylic Block Filler.
   2. One coat primer sealer latex - Vista Paint 4600 Uniprime II.
   3. One coat latex paint - Vista Paint 3000 Acribond.

C. Steel - Unprimed:
   1. One coat zinc chromate primer - Vista Paint 4800 Metal Pro or Carbomastic 90.
   2. Two coats acrylic enamel, semi-gloss - Vista Paint 8400 Semi-Gloss or 7900 Premogloss or Carboline 133 VOC.

D. Steel - Shop Primed:
   1. Touch-up with zinc chromate primer - Vista Paint 4800 Metal Pro or Carbomastic 90.
   2. Two coats alkyd enamel, semi-gloss - Vista Paint 8400 Semi-Gloss or 7900 Premogloss or Carboline 133 VOC.

E. Steel - Galvanized (where indicated).
   1. Pretreatment - Jasco Prep N Prime.
   2. One coat zinc chromate primer - Vista Paint 4800 Metal Pro or Carbomastic 90.
   3. Two coats acrylic enamel, semi-gloss - Vista Paint 8400 Semi-Gloss or 7900 Premogloss or Carboline 133 VOC.

F. Pavement Markings:
   1. "Laycold Line Paint" or Vista Paint 6900 On-Line Traffic Marking Paint.

3.07 SCHEDULE - INTERIOR SURFACES

A. Wood - Painted:
   1. One coat alkyd prime sealer - Vista Paint 6600 Aqua Lac.
   2. Two coats latex, eggshell - Vista Paint 8300 Carefree Eggshell.

B. Wood - Transparent:
   1. Filler coat (for open grained wood only).
   2. One coat stain - VWS Series.
   3. One coat sealer - Valspar NAS 1820.
   4. One coat varnish satin - Valspar NAS 1822.

C. Steel - Unprimed:
   1. One coat zinc chromate primer - Vista Paint 4800 Metal Pro.
   2. Two coats semi-gloss - Vista Paint 8400 Carefree Semi-Gloss or Rust-Oleum Sierra S70 or S71 Primer and Rust-Oleum Sierra S22 Finish.

D. Steel - Primed:
   1. Touch-up with original primer - Vista Paint 4800 Metal Pro.
   2. Two coats semi-gloss - Vista Paint 8400 Carefree Semi-Gloss or Rust-Oleum Sierra S70 or S71 Primer and Rust-Oleum Sierra S22 Finish.

E. Steel - Galvanized:
   1. Pretreatment - Jasco Prep N Prime.
   2. One coat zinc chromate primer - Vista Paint 4800 Metal Pro.
   3. Two coats semi-gloss - Vista Paint 8400 Carefree Semi-Gloss or Rust-Oleum Sierra S70 or S71 Primer and Rust-Oleum Sierra S22 Finish.

F. Plaster, Gypsum Board:
   1. One coat alkyd primer sealer - Vista Paint 1100 High Build PVA.

NOT FOR BID

2. Two coats alkyd enamel, eggshell - Vista Paint 8300 Carefree Eggshell.

END OF SECTION

NOT FOR BID

SECTION 10 0001

MISCELLANEOUS SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers, cabinets and accessories.

B. ADA International Symbol of Accessibility (ISA) Signs.

C. Restroom Signs.

D. Hot Pressure Washer & Cleaning Compounds.

E. Modular Steel Catwalk.

F. Air Compressor.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

B. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

C. Section 01 7000 - Execution Requirements: Examination, preparation, and general installation procedures; preinstallation meetings; cutting and patching; cleaning and protection; starting of systems; demonstration and instruction; closeout procedures except payment procedures; requirements for alterations work.

1.03 REFERENCE STANDARDS

A. 2010 ADA Standards for Accessible Design, DOJ.

B. CBC - 2019 California Building Code, based on 2018 International Building Code (IBC), with California Amendments.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Provide product data, accessories, configurations and installation instructions..

C. Provide Shop Drawings for signage (cast metal) indicating layout and mounting methods.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products under provisions of Section 01 6000 - "Product Requirements".

PART 2 PRODUCTS

2.01 MANUFACTURERS (OR APPROVED EQUAL)

A. Fire Extinguishers (Interior): J.L. Industries Cosmic 5E, 5# capacity, U.L. rated for 2A:10BC type fires.
   1. Fire Extinguisher Cabinets: J.L. Industries Clear Vu Series #1525, F26.

B. ADA International Symbol of Accessibility (ISA) Signs by STOPSignsAndMore.com (or approved equal), 2101 Las Palmas Dr. Suite A, Carlsbad, CA 92011:
   (888)931-1793 / sales@stopsignsandmore.com.
   1. Model: ADA-1157, 6x6 - Brushed Aluminum.

C. Restroom Signs:
   1. Door Mounted Signs (ASI Sign Systems or approved equal).

NOT FOR BID

a. Public Restroom – Gender Neutral: 12-inch diameter circle with 1/4" thick triangle superimposed within circle, white on blue plexiglass, with International symbols, screw mount.
b. All signs to be ADA compliant, including required Braille (Grade 2).
c. Mount as indicated.

2. Wall Mounted Signs (ASI Sign Systems or approved equal).
a. Character type to be raised 1/32-inch minimum and be sans serif uppercase characters accompanied by Grade 2 Braille (2016 CBC 11B).
1) Finish to be non-glare.
2) Characters shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I"." and "Stroke thickness of the uppercase letter "I" shall be 10 percent minimum and 15 percent maximum of the height of the character.
b. Public Restroom - Single-User: With the International symbol of accessibility. Border dimensions of pictogram to be 6" minimum. Description ("Restroom") to be placed directly below the pictogram symbol of accessibility.

D. Hot Pressure Washer: Steam Jenny by GRP Enterprises, Inc. or approved equal. Phone: (804) 798-4900 / www.jennyproducts.com.
1. Model # HPW 3040 OEP - 4,000 PSI, 4.0 GPM, 12,000 CUP, 7.5 HP.
a. Quick Connect (4 total): Model # JK52G, female-female, stainless steel.
b. Hose (3 total) : Model # JD7790A.

E. Modular Steel Catwalk by Tri Arc (or approved equal), (800) 565-2165 / www.tri-arc.com.
1. System: U-Design Crossover Platforms.
a. Incline: 50 degree, 60" platform height.
b. Stair Height: 60", Model # UCL5006246, typ. of 2.
c. Bridge Span: Length = 30", Width = 24", Model # UCB30246, typ. of 4.
d. Configuration: Straight, with Leg Kit Model # ULK0624.

F. Air Compressor by Champion Pneumatic, distributed by Wilcox Supply Inc. (or approved equal), (909) 667-7007 / www.wilcoxsupply.com or ChampionPneumatic.com.
1. Model: Champion VR5-8. Fully packaged to include Auto Tank Drain, Air Cooled Aftercooler, Low Oil Monitor, and Vibration Pads.

G. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Beginning of installation means acceptance of existing conditions.

3.02 ANCHORAGE

A. Furnish and install all anchorage devices required to install the item and its appurtenances, complete. Provide anchorage in ample time, when required to be built-in by other trades.

3.03 INSTALLATION

A. Install all items not called for to be installed by manufacturer or supplier. Install per details on drawings, manufacturer's printed installation instructions and any additional requirements specified. All wall-mounted items shall be securely fastened to solid backing or blocking.

3.04 ADJUSTING AND CLEANING

A. Adjust operating devices to ensure that equipment functions smoothly.

B. Clean all exposed surfaces.

END OF SECTION

NOT FOR BID

SECTION 10 2800
TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Attachment hardware.

1.02 RELATED REQUIREMENTS

A. Section 06 1053 - Wood Blocking and Curbing: In-wall framing and plates.

B. Section 08 8000 - Glazing: Wall mirrors.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; '09.

B. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip; '99 (2009).

C. ASTM A269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; '08.

D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy with Improved Formability, Solution Hardened and Bake Hardenable; '09.

E. ASTM B456/ASTM B456M - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; '03.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Submit manufacturer's installation instructions.

1.05 KEYING

A. Supply 4 keys for each accessory to Owner.

B. Master key all accessories.

1.06 SEQUENCING AND SCHEDULING

A. Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. WAXIE Sanitary Supply.

B. Bobrick.

C. American Specialties, Inc (ASI).

D. Substitutions: Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 MATERIALS

A. Sheet Steel: ASTM A1008/A1008M.

B. Stainless Steel Sheet: ASTM A167, Type 304.

C. Tubing: ASTM A269, stainless steel.

D. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

NOT FOR BID

E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FABRICATION

A. Weld and grind smooth joints of fabricated components.

B. Form exposed surfaces from single sheet of stock, free of joints.

C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

D. Back paint components where contact is made with building finishes to prevent electrolysis.

E. Shop assemble components and package complete with anchors and fittings.

F. Provide steel anchor plates, adapters, and anchor components for installation.

G. Hot dip galvanize exposed and painted ferrous metal and fastening devices.

2.04 FACTORY FINISHING

A. Galvanizing: ASTM A123.

B. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

C. Chrome/Nickel Plating: ASTM B456, Type SC 2 satin finish.

D. Stainless Steel: No. 4 satin luster finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings.

B. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

C. Verify exact location of accessories for installation.

3.03 INSTALLATION

A. Install fixtures, accessories and items in accordance with manufacturers' instructions.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 SCHEDULE

A. Toilet Paper Dispenser: Georgia-Pacific #1LYJ6 / 56782 (or equal) - Compact Vertical Tissue Dispenser, stainless steel.

B. Surface Mounted Paper Towel Dispenser: WAXIE Sanitary Supply #850554 (or equal) - CLEAN & SOFT Automated No-Touch System Towel Dispenser.

C. Grab Bars: ASI or Bobrick, or as approved by Architect, 1-1/4-inch round section, forged brass, concealed fastenings, polished chrome finish. ASI #3100, Series B-5806, 36-inches and 48-inches.

D. Soap Dispenser: WAXIE Sanitary Supply (or equal) #380109, surface mounted No-Touch soap dispenser. Vertical tank is Brushed Metallic/Black. Capacity - 1200ml.

1. Provide WAXIE Select No-Touch Clear & Mild Foam Handwash #380076 or equal.

E. Mirror:

1. 30-inches W x 44-inches H mirror with D645, CRL Polished Finish 1/4" deep nose, "J" channel trim as distributed by CR Laurence, Co., Inc. or equal.

NOT FOR BID

F. Toilet Seat Cover Dispenser: Bobrick #B-4221 ConturaSeries Surface Mounted or approved equal.

END OF SECTION

NOT FOR BID

SECTION 12 2100
LOUVER BLINDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Horizontal 1" louver blinds.

B. Vertical louver blinds.

C. Operating hardware.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Wall opening head support blocking.

1.03 REFERENCE STANDARDS

A. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; National Fire Protection Association; '04.

B. WCMA A100.1 - Safety of Corded Window Covering Products; Window Covering Manufacturers Association; '07.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Submit data indicating physical and dimensional characteristics.

C. Submit manufacturer's installation instructions. Indicate special procedures.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and protect products to project site under provisions of Section 10 6000 - "Product Requirements".

B. Deliver blinds wrapped and crated in a manner to prevent damage to components or marring of surfaces.

C. Store in a clean, dry area, laid flat and blocked off ground to prevent sagging, twisting or warping.

1.07 EXTRA MATERIALS

A. Furnish ten (10) additional slats of each type and color installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Levolor: Riviera Contract 1" Blind (Horizontal) - at Sleeping Quarters.

B. Levolor: 3-1/2 inch PVC Vertical Blind.

C. Or approved equal.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 BLINDS AND BLIND COMPONENTS - HORIZONTAL

A. Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; manual control of raising and lowering by cord with full range locking; blade angle adjustable by control wand; complying with WCMA A100.1.

B. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed.

1. Width: One-inch.
2. Color: As selected by Architect from manufacturer's full range of colors.

NOT FOR BID

C. Slat Support: Woven polypropylene cord, ladder configuration.

D. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.

E. Bottom Rail: Pre-finished, formed steel with top side shaped to match slat curvature; with end caps. Color: Same as slats.

F. Lift Cord: Braided nylon; continuous loop.

G. Control Wand: Extruded solid plastic, hexagonal shape.
   1. Non-removable type.
   2. Length of window opening height less 3 inches.

H. Headrail Attachment: Wall brackets.

I. Accessory Hardware: Type recommended by blind manufacturer.

2.03 BLINDS AND BLIND COMPONENTS - VERTICAL

A. Vertical Louver Blinds: Horizontal travel, vertical louver units complete with tracks, pivot and traversing mechanisms, and accessories, as follows:
   1. Louvers: PVC louver blades of the size indicated.
   2. Operation: Manual.
   3. Mounting: Outside (face of jambs).
   4. Cord and Chain Operation: Comply with WCMA A100.1.

B. Tracks: Channel tracks as required for type of operation, extruded aluminum with clear anodized finish, with end caps.
   1. Louver Rotation: Chain driven direct rotation by activating tilt gear within end cap assembly in turn actuating tilt rod and worm-and-spur gears in carrier trucks.
   2. Operating Components: Internally mounted heavy-duty extruded aluminum tilt rod, louver carriers, and other components required for proper performance and designed for smooth, quiet, trouble-free operation.
   3. Pivot Mechanism: Geared for synchronous 180-degree rotation of louver blades and type of operation indicated.
   4. Louver Carriers: Metal carriers with ball-bearing wheels or thermoplastic trucks, equipped with linkages or other devices to ensure positive spacing of louver blades.
   5. Tilt Chain: Nickel plated brass beaded ball chain, minimum 1/8-inch diameter; locate at drawback side of units as indicated.

C. PVC Vanes: Integrally colored, extruded PVC; flat, 3-1/2 inches wide.
   1. Flammability: Comply with NFPA 701.
   2. Color: As selected by Architect from manufacturer's full range of colors.
   3. Texture: Smooth.

D. Brackets and Mounting Hardware: As recommended by manufacturer for the mounting configuration and span indicated; provide manufacturer's standard L-bracket with clip for outside mounting and clip only for inside mounting.

2.04 ACCESSORIES

A. Provide manufacturer's standard valance.

2.05 FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Fabricate blinds to fit openings within specified tolerances.

C. Dimensional Tolerances: Fabricate blinds to within plus/minus 1/8 inch of intended dimensions.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

NOT FOR BID

B. Do not commence fabrication until field measurements are confirmed.
C. Ensure structural supports are correctly placed.
D. Beginning of installation means installer accepts existing surfaces.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.03 TOLERANCES

A. Maximum Variation of Gap at Window Opening Perimeter: 1/4-inch.
B. Maximum Offset From Level: 1/8-inch.

3.04 ADJUSTING

A. Adjust blinds for smooth operation.

3.05 SCHEDULE

A. Surface Mount:
   1. All exterior windows.
   2. Field measure before fabrication.

END OF SECTION

NOT FOR BID

SECTION 13 3419
METAL BUILDING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufacturer-engineered, shop-fabricated structural steel building frame.

B. Insulated Metal wall and standing seam metal roof panels including soffits and gutters and downspouts.

C. Exterior doors, windows, skylights, and overhead doors.

D. Mezzanine Storage and components.

E. Lean-to Patio and shade canopy system.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications.

B. Section 07 9200 - Joint Sealants: Sealing joints between accessory components and wall system.

C. Section 08 1100 - Standard Steel Doors and Frames

D. Section 08 3323 - Overhead Coiling Doors

E. Section 08 5113 - Aluminum Windows.

F. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

A. AISC 360 - Specification for Structural Steel Buildings; 2010.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.

E. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2014.

F. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength; 2014a.

G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.

H. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

1.04 DESIGN REQUIREMENTS

A. Comply with currently adopted 2019 CBC (California Building Code) based on 2018 IBC (International Building Code), with California Amendments.

B. Building Type: Clear span gabled rigid frame with uniform depth column and straight rafter sections of shop welded steel plates. Building sizes as indicated on drawings

C. Building Sizes and Column Spacing at Exterior Walls: As shown on drawings and compatible with placement of openings and other requirements.

D. Design mezzanine storage and components as indicated in plans.

NOT FOR BID

E. Design Lean-to Patio and shade canopy system as indicated in plans.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on profiles, component dimensions, fasteners.

C. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections; wall and roof system dimensions, panel layout, general construction details, anchors and methods of anchorage, and installation; framing anchor bolt settings, sizes, locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

D. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

1.07 QUALITY ASSURANCE

A. Designer Qualifications: Design structural components, develop shop drawings, and perform shop and site work under direct supervision of a Professional Structural Engineer experienced in design of this type of work.
   1. Design Engineer Qualifications: Licensed in the State in which the Project is located.
   2. Comply with applicable code for submission of design calculations as required for acquiring permits.
   3. Cooperate with regulatory agency or authorities having jurisdiction (AHJ), and provide data as requested.

B. Perform work in accordance with AISC 360 and MBMA (MBSM).
   1. Maintain one copy on site.

C. Perform welding in accordance with AWS D1.1/D1.1M.

D. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.

E. Erector Qualifications: Company specializing in performing the work of this section approved by manufacturer.

1.08 PRODUCT HANDLING, DELIVERY AND STORAGE

A. Delivery and store prefabricated components, sheets, panels and other manufactured items so they will not be damaged or deformed.

B. Stack materials on platforms or pallets above grade or on concrete slab, covered with opaque tarpaulins or other approved weather-resistant ventilated covering.

C. Store metal sheets and panels in such manner so they will drain freely if subjected to water accumulation. Do not store sheets and panels in contact with other materials, which might cause staining.

D. Damaged material must be reported to determine if replacement is required.

E. Inspect panels to prevent moisture between panels and secure as required.

F. Delivery to job site within Five (5) weeks of Release order with signed off redlined drawings.

1.09 WARRANTY

A. Correct defective Work within a one year period after Date of Substantial Completion for all components.

B. Provide five year manufacturer warranty.
   1. Include coverage for exterior pre-finished surfaces to cover pre-finished color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading. Include coverage for weather tightness of building enclosure elements after installation.

NOT FOR BID

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Buildings Systems:
   1. CBC Steel Buildings, a Nucor Company: www.cbcsteelbuildings.com or approved equal.
      Heaven Lansdell, District Sales Manager
      (714) 401-2567 / Heaven.lansdell@cbcsteelbuildings.com
   2. Substitutions: See Section 01 6000 - PRODUCT REQUIREMENTS.

2.02 STRUCTURAL STEEL

A. Materials:
   1. Structural Plate or Bar Stock: Minimum yield strength (Fy) of 55,000.
   2. Cold Formed Structural Steel: Minimum yield strength (Fy) of 55,000.
   3. Primary Framing Structural Bolts and Nuts: ASTM A325; size and quantity required by metal building system manufacturer.
   4. Prime Coat Paint: Manufacturer's standard equal to Fed. Spec. TT-P-636D.

B. Fabrication:
   1. Primary Framing: Rigid Frames of shop-welded steel plate columns and rafters, as per drawings and uniform depth sections as required by drawings. Complete with all necessary stiffeners, connection plates, and holes for field bolted assembly.
      a. Columns end Rafters: Fabricated with holes in web and/or flanges for attachment of secondary members.
      b. Splice Plates: Factory fabricate for precision for all rafter-to-rafter and/or column-to rafter connections, complete with connection boltholes.
      c. Base Plates, Cap Plates, Splice Plates, and Stiffeners: Fabricate to sizes required. Complete with all holes for connection of primary and secondary structural members. Factory weld into place.
      d. Join flanges and webs of structural members fabricated of plate or bar stock together by continuous submerged automatic arc welding process with all welding performed under the supervision of certified welders in accordance with standard practices of AWSD1.1.
      e. All shop welding is to be continuously inspected by a designated qualified inspection agency unless the fabricator is approved by the International Conference of Building Officials Evaluation Service, (ICBO-ES).
      f. Make all primary rigid frame field-bolted connections with A325 high-strength bolts of size required by building system manufacturer.
      g. Clean all components of oil, dirt, loose scale and foreign matters. Factory paint with Manufacturer's standard primer coat(s).
   2. End wall framing: Precision cold-formed and/or shop-welded steel plate members consisting of rafters and columns fabricated for field-bolted assembly.
      a. Columns, Rafters, Splice Plates, Clips, Angles and Channels: Factory fabricate to size required.
      b. Plate Stock End wall Framing Members: Join flanges and webs by continuous automatic submerged arc welding process, under the supervision of welders certified in accordance with standard practice AWSD1.1.
      c. All shop welding is to be continuously inspected by a designated qualified inspection agency unless the fabricator is approved by the International Conference of Building Officials – Evaluation Service, (ICBO-ES). Verification required.
      d. Clean all components of oil, dirt, loose scale and foreign matters. Factory paint with Manufacturer's standard primer coat(s).
   3. Secondary Framing:
      a. Purlins: Manufacturer's standard 8" & 9½" Z sections roll formed from minimum yield (Fy) 55,000 steel, punched for attachment.
      b. Girts: 8" & 9½" Z or channel sections of roll formed minimum yield (Fy) 55,000 steel, punched for attachment with ½" diameter bolts.

NOT FOR BID

c. Eave Struts: 8” & 9½” deep sections of cold-formed minimum yield (Fy) 55,000 steel, with vertical web to receive sidewall panels and two (2) ½” diameter bolt attachments to rigid frame in factory-punched holes in column or bracket.
d. Flange Braces: Steel angles attached to purlin or girt, to support rigid frame flanges as required. Indicated by design and noted on final shop drawings.
e. Clean secondary framing components to be free from oil, dirt, loose scale, and foreign matter and coated with a G-90 galvanized covering.

4. Wind bracing: approved-type extra high-strength cable, A36 steel rod bracing, and/or portal frames as shown on final shop drawings.

2.03 ASSEMBLIES

A. Single span rigid frame with Lean-to patio components.

B. Bay Spacing: As indicated on drawings.

C. Primary Framing: Rigid frame of rafter beams and columns, canopy beams, and wind bracing.

D. Secondary Framing: Purlins, and other items detailed.

E. Wall System: Cold Rolled Metal Framing. Specified in Section 05 4000.

F. Roof System: Standing seam metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, insulation, and liner panels, and accessory components.

G. Roof System: Secondary framing to support 5/8" LDX plywood sheathing. Insulation and Linder panels specified in Section 07 2100.

H. Roof Slope: 3 inches in 12 inches.

2.04 PERFORMANCE REQUIREMENTS

A. Installed Thermal Resistance of Wall System: R-value of 21.

B. Installed Thermal Resistance of Roof System: R-value of 38.

C. Design structural members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.

D. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

E. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of ____ degrees F.

F. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

2.05 ROOF AND WALL PANELS

A. Roof Panels:
1. MS-24 Standing Seam Metal Roof System.
a. 24 gauge metallic coated Steel.
b. KYNAR 5000® PDVF or HYLAR 5000® Finish.
c. Color: To be selected from manuf.'s standard range.
2. Standing Seam Translucent Roof Panels.
a. As indicated in plans (Skylights).

B. Wall Panels:
1. HE40-A Adobe Texture Insulated Wall Panel, 2" thick.
a. Exterior Gauge: 26.
b. Interior Gauge: 26.
c. Color: To be selected from manuf.'s standard range.

C. Joint Seal Gaskets: Manufacturer's standard type.

D. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A153/A153M, finish to match adjacent surfaces when exterior exposed.

E. Bituminous Paint: Asphaltic type.

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F. Sealant: Manufacturer's standard type.

G. Trim, Closure Pieces, Caps, Flashings, Gutters, Downspouts, Rain Water Diverter, Fascias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

2.06 COMPONENTS

A. Doors and Frames: Specified in Section 08 1100.

B. Overhead Doors: Specified in Section 08 3323.

C. Overhead Door Frame: Formed steel sections braced to building frame required by door manufacturer.

D. Windows: Specified in Section 08 5113.

2.07 FABRICATION - FRAMING

A. Fabricate members in accordance with AISC 360 for plate, bar, tube, or rolled structural shapes.

B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.

C. Provide wall opening framing for doors, windows, and other accessory components.

2.08 FINISHES

A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

3.02 ERECTION - FRAMING

A. Erect framing in accordance with AISC 360.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

D. Do not field cut or alter structural members without approval.

E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.03 ERECTION - WALL AND ROOF PANELS

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

3.04 ERECTION - GUTTERS AND DOWNSPOUTS

A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.

B. Apply bituminous paint on surfaces in contact with cementitious materials.

C. Install splash pans under each downspout.

3.05 INSTALLATION - ACCESSORY COMPONENTS IN WALL SYSTEM

A. Install door frames, doors, overhead doors, and windows and glass in accordance with manufacturer's instructions.

3.06 TOLERANCES

A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

END OF SECTION

NOT FOR BID

SECTION 22 00 10
BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Plumbing Requirements specifically applicable to Division 22 Sections, in addition to Division 01 - General Requirements.

1.02 DESCRIPTION

A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as required to complete the work of this section, except as otherwise herein specifically excluded.

1.03 REFERENCES

A. Section 23 08 01 - Commissioning of Building Systems

1.04 WORK INCLUDED

A. The complete Plumbing systems (including Fire Protection systems), including but not limited to these major items.
   1. Coordinate work of this Section with related trades.
   2. Verify applicable dimensions and location of existing utilities at the jobsite.
   3. Furnishing and installation of miscellaneous hangers, supports, sleeves, inserts, anchors and other auxiliary equipment for systems under this Division.
   4. Soil waste and vent system inside and outside the building including connections to fixtures, equipment, sewer connections, clean-outs.
   5. Water piping systems inside and outside the building, including connections to fixtures, equipment, water meters and vaults; pressure regulating stations, backflow preventers.
   6. Interruptible and non-interruptible fuel gas systems inside and outside the building, including connections, gas meters, earthquake valves, and pressure regulating stations.
   7. Plumbing fixtures, carriers, fittings, trim, hose bibs, wall hydrants, and accessories.
   8. Installation and connection of Owner furnished equipment.
   9. Water heating systems, including water heating equipment, circulating pumps, connections.
   10. Shop drawings.
   11. Equipment identification.
   12. Equipment and systems adjustments and balancing.
   13. Written operating and maintenance instructions.
   14. Record drawings.
   15. Guarantee

NOT FOR BID

1.05 WORK SPECIFIED ELSEWHERE

A. Concrete, Rough Carpentry, Joint Sealants, Sheet Metal, Flashing and Trim, access doors and Frames, Door Hardware, Paints and Coatings, Mechanical and Electrical.

1.06 SITE INSPECTION

A. Contractor shall familiarize himself with the conditions at the site. No allowance will be made subsequently for any error through negligence in observing the site conditions. Contractor shall observe and make cost allowance for any mechanical and/or electrical items that must be relocated to accommodate the installation or servicing of any item covered under this contract.

1.07 ORDINANCES, REGULATIONS AND CODES

A. References to Technical Societies, Trade Organizations, Governmental Agencies is made in Division 15 in accordance with the following abbreviations.

16. AFI - Air Filter Institute
17. AMCA - Air Moving & Conditioning Association
18. ARI - Air Conditioning & Refrigeration Institute
19. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
20. ASME - American Society of Mechanical Engineers
21. ASTM - American Society of Testing Materials
22. AWSC - American Welding Society Code
23. ANSI - American National Standards Institute
24. CBC - California Building Code
25. CCR - California Code of Regulations
26. CEC - California Electrical Code
27. CFC - California Fire Codes
28. CMC - California Mechanical Code
29. CPC - California Plumbing Code
30. FIA - Factory Insurance Association
31. NAFM - National Association of Fan Manufacturers
32. NEMA - National Electrical Manufacturer's Association
33. NFPA - National Fire Protection Association
34. ORS - Office of Regulatory Services
35. SCAQMD - South Coast Air Quality Management District
36. SMACNA - Sheet Metal and Air Conditioning Contractors National Association

NOT FOR BID

37. UFC - Uniform Fire Code

38. UL - Underwriter's Laboratories

39. UPC - Uniform Plumbing Code

B. Requirements of Regulatory Agencies: Materials and installation shall comply with applicable local, state, and national codes and ordinances. Rulings and interpretations of the enforcing agencies shall be considered as part of the local codes. No extras will be permitted for furnishing items required by the local codes but not specified or shown on the drawings.

C. Codes and Standards:
40. IBC and California Amendments (California Building Code - Part 2, Title 24, CCR).

41. UMC and California Amendments (California Mechanical Code - Part 4, Title 24 CCR).

42. UPC and California Amendments (California Plumbing Code - Part 5, Title 24 CCR).

43. Uniform Fire Code with State Amendments (California Fire Code - Part 9, Title 24 CCR).

44. National Fire Protection Associations - National Fire Code.

D. Nothing in these drawings and specifications is to be construed to permit work in violation thereof. Ordinances, regulations and codes are to be construed as minimum requirements.

E. The responsibility of the Architect to conduct construction reviews of the Contractor's performance is not intended to include the adequacy of the Contractor's safety measures in, on, or near the construction site.

F. Ventilating, refrigeration and electrical equipment and appliances are required to be approved by the Underwriters' Laboratories, Inc., or other nationally recognized testing agency and installed per the testing agency's specifications.

1.08 PERMITS, FEES AND INSPECTIONS

A. Obtain and pay for all necessary permits, fees, assessments, complimentary drawings, required by any legally constituted public authorities having jurisdiction.

1.09 DRAWINGS AND SPECIFICATIONS

A. The Architect's decision will be final on interpretation of the Drawings and Specifications.

B. The Drawings and Specifications are complimentary. Any work called for on the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.

C. Piping, ductwork and other equipment shown as existing has been taken from the Owner's drawings. Contractor shall verify exact location in field before proceeding with the work.

D. Where codes, standards, drawings or specifications conflict, the most stringent shall prevail, unless prior approval for variance is obtained. Specific details on the drawings shall supersede the specification in the event of a conflict.

E. Alternate support or seismic detail proposed by contractor shall have prior approval by the Architect; and the Contractor shall obtain agency approval without any additional cost or time to the contract and without any time penalty on the work schedule.

1.10 SUBMITTALS

A. Before starting work, the Contractor shall furnish for the review of the Architect and Engineer. Provide Shop Drawings and Submittals with Itemized Equipment Lists, complete in all details that they proposes to install. All items shall be submitted at the same time.

B. Submittals must be specific to this project with respect to model number, capacities, performance, etc., generic submittals will not be accepted.

NOT FOR BID

A. Variations or deviations on submitted items from that specified must be clearly tagged and / or identified.

C. Submittals shall include, but not necessarily be limited to the following which are mandatory:
   1. Draw Equipment Layouts to ¼" scale, including equipment, piping accessories, and showing clearances for operating and servicing.
   2. Schedule of pipe, fittings, valves, with manufacturer and catalog number.
   3. Specialties, valves, gauges and thermometers of all types.
   4. Foundations, supports, hangers, inserts.
   5. Earthquake supports and calculations.
   6. Insulation.
   7. Shop fabrication drawings and installation drawings of ductwork and piping layouts. Submit for approval prior to fabrication. Drawings shall indicate dimensions from bottom of piping and ductwork to finish floor level.
   8. Wiring diagrams, control panel board, motor starters and controls for electrically operated equipment furnished by mechanical trades.
   9. Automatic control system diagrams.
   10. Access panels.
   11. Clean-outs
   12. Fixture carriers.
   13. Hangers, inserts, supports, anchors.
   14. Hose bibs.
   15. Hot water circulators.
   16. Pipe, fittings and specialties.
   17. Pipe isolators.
   18. Plumbing fixtures, fittings, trim, drains and receptors.
   19. Pressure regulators.
   20. Roof flashing.
   21. Sleeves, escutcheons, caulking, waterproofing, fireproofing.
   22. Strainers
   23. Water hammer arrestors.
   24. Water heating equipment.

NOT FOR BID

25. Expansion joints, guides and anchors.

26. Shop fabrications drawings and calculations.

27. Special and miscellaneous products furnished under this section and not listed herein.

1.11 RECORD DRAWINGS AND MANUALS

A. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.

B. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.

C. Final Record Drawings: Conform to Division 1 requirements.

D. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.

E. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.

F. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.

G. Contents: Each manual shall have an index listing the contents. Information in the manuals shall include not less than:

28. General introductions and overall equipment description, purpose, functions and simplified theory of operation.

29. Specifications

30. Installation instructions, procedures, sequences, and precautions, including tolerances for level, horizontal and vertical alignment.

31. Grouting requirements.

32. List showing lubricants for each item of mechanical equipment and recommended lubrication intervals.

33. Start-up and beginning operation procedures.

34. Operational procedures.

35. Shutdown procedures.

36. Maintenance and calibration procedures

37. Parts lists

38. Name, address and telephone number of each manufacturer's local representative.

H. Manual Submittals: Unless otherwise specified, each submittal shall include two copies of each manual, one of which will be returned to the Contractor, marked to show the required review. When approved, deliver four copies to Architect unless otherwise specified.

NOT FOR BID

I. "As-Built" drawings of ductwork and piping, including all elbows, transitions, damper and valve locations shall be provided prior to commencement of air and water balance.

1.12 QUALITY OF EQUIPMENT, MATERIALS AND WORKMANSHIP

A. Unless otherwise specified, equipment and materials used in the installation shall be new and in perfect condition when installed. Articles provided for the same general purpose or use shall be of the same make. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. Furnish the services of an experienced superintendent, who shall be constantly in charge of the work, together with all necessary journeymen, helpers and laborers required.

1.13 SEISMIC DESIGN

A. Contractor shall be responsible for anchors and connections of mechanical work to the building structure including calculations for approval by structural engineer or for approval by inspector of record, as applies, for items or work, where approval is deferred or where alternate support or anchorage detail is proposed to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. The anchorage of all pipes, ducts, conduits, fixtures, equipment, etc. shall withstand the lateral forces and shall accommodate calculated building displacement as required by the California Building Code, and local city/county codes. (Building equipment and connections therefore shall be designed to resist lateral seismic forces equal to 1.0 of equipment weight to working allowable stress. Cantilever posts supporting equipment shall be designed to resist lateral seismic forces equal to 0.5 of equipment weight to allowable working stress. Conform to the following:

39. In accordance with Title 24, 2016 CBC Chapter 16A, details shall be provided for the seismic anchorage of all mechanical and electrical equipment, anchorage details shall be based upon appropriate design calculations.

40. For equipment weighing 400 pounds or more anchorage details and appropriate design calculations shall be submitted as part of the mechanical and electrical drawings. "Deferred Approval" items will not be permitted unless specifically approved by the plan check supervisor.

    a. Exception: Attachments of equipment weighting less than 400 pounds and supported directly on the floor or roof structure, furniture, or temporary or movable equipment and equipment weighing less than 20 pounds that is supported by vibration isolation devices suspended from the roof, wall or floor, need not be detailed on the plans provided the following notes are included on the mechanical and electrical plans.

41. The seismic anchorage of mechanical and electrical equipment shall conform to C.C.R. Title 24, 2016 CBC Chapter 16A. Anchorage details for roof/floor-mounted equipment shall be shown on plans.

1.14 SUBSTITUTIONS AND CHANGES

A. The design has been based on data from certain manufacturers, suitable for each application. Recommendations for alternative manufacturers are made for each product, except when "no substitutions permitted" is indicated.

B. It is the intent of the Owner to have this project constructed with materials, products and system originally designed and specified into the project.

C. Alternatives that may require the modification, realignment and/or adjustment of other associated components, including impact on other trades, shall be accomplished at no additional cost or time to the contract and shall have the approval of the Architect.

NOT FOR BID

D. Substitutions shall be submitted addressing all features listed in the specifications. Features that deviate from the plans and specifications shall be clearly identified including justification for deviations. Design West Engineers will review initial submittal on substitutes only. Subsequent submittals made to correct deficiencies in original submittals will be reviewed at Contractor's expense based on Design West Engineer's hourly rate for engineering services.

E. Should the Contractor elect to propose substitutions for the Owner's interest, the substitutions shall be in compliance with Division 01.

1.15 SUBMITTAL REVIEWS

A. The Architect will have the right to accept or reject equipment, materials, workmanship, tests and determine when the Contractor has complied with the requirements herein specified.

1.16 SELECTION AND ORDERING OF EQUIPMENT AND MATERIALS

A. Immediately after award of the Contract and after the final review of submittals by the Architect and / or Engineer, the Contractor shall arrange for the purchase and delivery of equipment and materials required, in ample quantities and at the proper time to meet construction schedule. The contractor shall deliver to the Architect and Owner a complete list of equipment and materials ordered, giving descriptions, plate numbers, brochures, name of the wholesalers, date of the orders and approximate delivery dates.

1.17 LOCATIONS AND ACCESSIBILITY

A. Drawings show pipe and ductwork diagrammatically. Conform to Drawings as closely as possible in layout work. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences as reviewed by Architect and / or Engineer. Install piping and ductwork to best suit field conditions after coordinating with other trades. Run exposed piping and ductwork parallel to, or at right angle to, building walls. Keep horizontal lines as close to bottom of structures as possible. Conform to ceiling heights established on Drawings.

F. Install equipment in such a manner as to be readily accessible for maintenance and repairs. Install piping, ducts and conduit in such a manner as to preserve headroom, avoid obstructions and keep openings and passageways clear.

G. Installation at valves, thermometers, gauges, cleanouts, dampers, controls, steam and water specialties, duct access doors or any other indicating equipment or specialties requiring reading, adjustment, inspection, maintenance shall be conveniently and accessible located with reference to the finished building.

H. Where wall and ceiling access doors are required but not shown, such doors shall be furnished under other sections and as directed by the Architect. Coordinate this requirement with appropriate trade.

I. If changes in the indicated locations or arrangements are required, they shall be made without additional charges.

J. In an existing area, where required, remove, reinstall, reconnect or replace, etc., any existing work to accommodate new work without any additional cost to the Owner. Material shall match existing, unless otherwise specified or approved in writing by the Architect.

K. Provide sheaves and belts if required, to Test, Adjust and Balance Agency, to allow air moving equipment to meet flow requirements specified at no additional cost to the Owner.

1.18 COORDINATION OF TRADES

A. Contractor shall coordinate all trades in the interest of obtaining the most practical overall arrangement of equipment, piping, conduit, and ducts and to maintain maximum headroom and accessibility.

L. No extras will be allowed for changes made necessary by interference or coordination between trades.

NOT FOR BID

M. Submit Composite Coordination Drawings in accordance with Special Conditions. Include dimensioned plans, elevations, sections and details and give complete information particularly as to the kinds and types of materials and equipment, size and location of sleeves, inserts, attachments, chases, openings, conduits, ducts, boxes, lighting, structural interferences. Coordinate these Composite Coordination Drawings and field layouts in the field for proper relationship to work of applicable trades based on field conditions. Contractor shall have competent personnel readily available for coordinating, checking, and supervision of field layouts. The procedures for submittals and resubmittals, and final distribution shall be as specified in Division 01. Do not start installation of work involved under Composite Coordination Drawings until the Architect and Engineer reviews applicable submittal. Discrepancies between the Drawings and Composite Coordination Drawings shall be specifically noted and identified on the Composite Coordination Drawings. Drawings for the various trades involved shall be submitted as required and reviewed prior to preparation of Composite Coordination Drawings.

42. Equipment Foundations and Bases: Furnish certified details and drawings for approval before fabrication. Furnish parts necessary for each foundation sub base and support.

43. Pipe Sleeves and Inserts: Furnish and install pipe sleeves and pipe support inserts before concrete is poured.

44. Roof, Wall and Floor Openings: Furnish Shop Drawings showing exact locations and sizes of openings through roofs, walls and floors.

45. Concrete: Conform to Concrete Section of the Specifications.

1.19 GUARANTEES

A. Contractor shall guarantee workmanship, equipment and materials installed under his contract for a period of not less than one (1) year from the date of Substantial Completion. Should any defects occur during this period, the Contractor shall promptly repair or replace the defective item and any other damage caused to the building free of charge to the Owner, including cost of labor and materials.

N. Guarantee included in this section to cover:

46. Faulty or inadequate design of equipment or material installed

47. Improper assembly or erection

48. Defective workmanship or material

49. Incorrect or inadequate operation or other failure

O. The Contractor shall guarantee the complete and perfect operation of the entire system and that equipment will be supported in such a way as to be free of objectionable vibration and noise

P. Furnish the parts and labor to replace any items found to be defective in the refrigeration equipment with the guarantee period

Q. In addition to other guarantees, furnish free maintenance for the refrigeration equipment, including replacement of refrigerant and oil, for a period of one (1) year. This shall include regular monthly maintenance and "On Call" service if required.

R. For equipment bearing a manufacturer's warranty in excess of one year, furnish a copy of the warranty and proof of chipment date or purchase date per terms of warranity to the Owner, who shall be named as beneficiary.

NOT FOR BID

1.20 PROTECTION OF EQUIPMENT AND MATERIALS

A. Provide adequate storage facilities for equipment and materials on the site and shall make provisions to protect such materials and equipment from damage.

1.21 CLOSING-IN OF UNINSPECTED WORK

A. Contractor shall not allow or cause any of the work, specifically ductwork and piping, to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Should any of work be covered up or enclosed before such inspection and test, shall at their own expense, uncover the work and after it has been inspected, tested, and approved, make repairs with such materials as may be necessary to restore work to its original and proper condition.

1.22 BUILDING FOOTING CLEARANCES

A. Under no circumstances shall pipes, ducts, or conduits penetrate footings. They shall cross below footings or through sleeves above footings. Those running parallel to footings shall have the minimum clearance from the cone of influence indicated on the Drawings or as required by Code.

1.23 DAMAGE BY LEAKS

A. Contractor shall be responsible for all damage to any part of the premises caused by rain leaks through or around ducts or pipes, leaks or breaks in piping, equipment or fixtures furnished or installed by him for a period of one (1) year from the date of Substantial Completion.

1.24 EQUIPMENT LABELS

A. Equipment provided under this Section shall be provided with the manufacturer's metal identification labels attached to each individual piece of equipment showing complete performance characteristics, size, model and serial number.

1.25 EXCAVATION, TRENCHING AND BACKFILLING

A. Excavating, trenching and backfilling for utilities within the building area shall be done in conformity with Division 31 - Sitework. Piping shall be installed promptly after excavation in order to keep the trenches open as short a time as possible.

B. Excavating, trenching and backfilling for utilities outside the building area shall be done in conformity with Division 31 - Earth work.

C. Any existing underground piping and conduit that is encountered shall be properly shored and protected from damage. Active piping shall be left intact and undamaged.

1.26 PRELIMINARY OPERATION

A. Should the Owner request that any portion of the plant, apparatus, or equipment be operated for the Owner's beneficial use prior to the final completion and acceptance of the work, the Contractor shall conform to Beneficial Occupancy Provisions of the General Conditions. Such operation shall be under the supervision and direction of the Contractor. Such preliminary operation shall not be construed as an acceptance of any of the work.

1.27 MAINTAINING EXISTING SERVICES

B. The premises and existing building at the site will be in use at the time the work of this Section is in progress. Contractor shall conduct his work so as to cause no inconvenience or danger to the personnel on the premises.

D. He shall maintain continuity of service to the existing mechanical systems, except for designated intervals during which connections can be made. The scheduling of the shut down period shall be at a time directed by the Architect.

NOT FOR BID

E. In some instances, it may be necessary to defer work in certain areas and locations until such time as existing facilities can be relocated or rearranged by the Owner. Therefore, whenever it becomes necessary for the Contractor to perform work under this contract in areas in which the Owner's work is being performed. This contractor shall advise the Architect relative to this requirement and shall follow closely the directive issued by the Architect insofar as time and procedure are concerned. Allow Owner 72 hours prior notice.

F. This contractor shall include in his bid all premium time to which he may be subjected for performing work in such procedure and at such time as may be necessary to cause the least interference with the function of the Owner.

1.28 ELECTRICAL WORK

A. Coordinate with Division 26 in making the line and low voltage electrical connections and be responsible for the operation of the equipment furnished under this section.

G. Voltage for electrical work will be included in Division 26. However, any control wiring which is required that is not shown on the control diagram shall be as described under this Section. In the event that the Contractor chooses to provide equipment that requires extra expense in the power or control wiring, he shall pay additional electrical costs.

H. Safety switches, starters, circuit breakers, unless provided as a portion of package equipment, and the electrical connections of mechanical equipment to the electrical power service shall be provided under Division 26.

I. Interconnecting wiring, safety switches, relays, controllers and motor starters which are integral components of packaged equipment shall be provided as an integral part of that equipment.

J. All interconnecting power wiring and conduits shall be provided by Division 26.

K. Control wiring shall be provided by Division 22, unless otherwise indicated on the drawings.

L. Conduit for control wiring shall be provided by Division 26.

*****END OF SECTION*****

NOT FOR BID

SECTION 22 05 18
ESCUTCHEONS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Escutcheons.
   2. Floor plates.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 PRODUCTS

2.01 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

2.02 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
   1. Escutcheons for New Piping:
      a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
      b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
      c. Insulated Piping: One-piece, stamped-steel type.
      d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
      e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
      f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
      g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
      h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
      i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
      j. Bare Piping in Equipment Rooms: One-piece, cast-brass type with rough-brass finish.
      k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

NOT FOR BID

1. New Piping: One-piece, floor-plate type.

3.02 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION

NOT FOR BID

SECTION 22 05 29
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other plumbing work.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

D. MFMA-4 - Metal Framing Standards Publication 2004.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of [_____]. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems:
   1. Comply with MFMA-4.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

D. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

END OF SECTION

NOT FOR BID

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.
B. Tags.
C. Stencils.
D. Ceiling tacks.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Piping: Pipe markers.
B. Pumps: Nameplates.
C. Small-sized Equipment: Tags.
D. Valves: Tags and ceiling tacks where located above lay-in ceiling.
E. Water Treatment Devices: Nameplates.

2.02 MANUFACTURERS

A. Brady Corporation: www.bradycorp.com.
B. Champion America, Inc: www.Champion-America.com.
C. Seton Identification Products: www.seton.com/aec.

2.03 NAMEPLATES

A. Manufacturers:
   1. Brimar Industries, Inc: www.pipemarker.com/#sle.
   2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
   3. Seton Identification Products: www.seton.com/#sle.
B. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch (6 mm).
   3. Background Color: Black.

2.04 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving: www.advancedgraphicengraving.com/#sle.
   2. Brady Corporation: www.bradycorp.com/#sle.
   3. Brimar Industries, Inc: www.pipemarker.com/#sle.
   4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com/#sle.
   5. Seton Identification Products: www.seton.com/#sle.
B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.

2.05 STENCILS

A. Manufacturers:

NOT FOR BID

1. Brady Corporation: www.bradycorp.com/#sle.
2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com/#sle.
3. Seton Identification Products: www.seton.com/#sle.

B. Stencils: With clean cut symbols and letters of following size:
1. 3/4 to 1-1/4 inch (20-30 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 1/2 inch (15 mm) high letters.
2. 1-1/2 to 2 inch (40-50 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 3/4 inch (20 mm) high letters.
3. 2-1/2 to 6 inch (65-150 mm) Outside Diameter of Insulation or Pipe: 12 inch (300 mm) long color field, 1-1/4 inch (30 mm) high letters.

C. Stencils shall be identified as indicated below including direction of flow
1. Gravity Condensate - G.C.
2. Domestic Cold Water - D.C.W.
3. Domestic Hot Water - D.H.W.
4. Domestic Hot Water Return - D.H.W.R.
5. Compressed Air - C.A.

D. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

2.06 CEILING TACKS

A. Manufacturers:
1. Craftmark: www.craftmarkid.com/#sle.

B. Description: Steel with 3/4 inch (20 mm) diameter color coded head.

C. Color code as follows:
1. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install tags with corrosion resistant chain.

B. Apply stencil painting in accordance with Section 09 91 23.

C. Use tags on piping 3/4 inch (20 mm) diameter and smaller.
1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.
3. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

D. Identify valves in main and branch piping with tags.

E. Identify piping, concealed or exposed, with stencilled painting. Use tags on piping 3/4 inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

NOT FOR BID

SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.

D. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation 2017.

E. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2020.

F. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2019.

G. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation 2017, with Editorial Revision (2018).

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or ASTM E84.

2.02 GLASS FIBER

A. Manufacturers:
   1. CertainTeed Corporation: www.certainteed.com.
   2. Johns Manville Corporation: www.jm.com.
   3. Knauf Insulation: www.knaufusa.com.

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4. Owens Corning Corporation; Fiberglas Pipe Insulation
   ASJ: www.ocbuildingspec.com/#sle.

B. Insulation: ASTM C547and ASTM C795; rigid molded, noncombustible.
   1. K (Ksi) Value: ASTM C177, 0.24 at 75 degrees F (0.035 at 24 degrees C).
   2. Maximum Service Temperature: 850 degrees F (454 degrees C).
   3. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches (0.029 ng/Pa s m).

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Aeroflex USA, Inc: www.aeroflexusa.com.
   2. Armacell LLC: www.armacell.us.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F (Minus 40 degrees C).
   2. Maximum Service Temperature: 220 degrees F (104 degrees C).
   3. Connection: Waterproof vapor barrier adhesive.

2.04 JACKETS

A. PVC Plastic.
   1. Manufacturers:
      a. Johns Manville Corporation: www.jm.com.

   2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F (Minus 18 degrees C).
      b. Maximum Service Temperature: 150 degrees F (66 degrees C).
      c. Moisture Vapor Permeability: 0.002 perm inch (0.0029 ng/Pa s m), maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil (0.25 mm).
      e. Connections: Brush on welding adhesive.

B. ABS Plastic:
   1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: Minus 40 degrees F (Minus 40 degrees C).
      b. Maximum Service Temperature: 180 degrees F (82 degrees C).
      c. Moisture Vapor Permeability: 0.012 perm inch (0.018 ng/Pa s m), when tested in accordance with ASTM E96/E96M.
      d. Thickness: 30 mil (0.76 mm).
      e. Connections: Brush on welding adhesive.

C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
   1. Thickness: 0.016 inch (0.40 mm) sheet.
   2. Finish: Smooth.
   3. Joining: Longitudinal slip joints and 2 inch (50 mm) laps.
   4. Fittings: 0.016 inch (0.4 mm) thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch (10 mm) wide; 0.015 inch (0.38 mm) thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

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B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance witqh North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections,pump bodies, and expansion joints.

E. Install insulation on piping accessories requiring future re-occurring access and service with factory fabricated insulation covers that are easily removed and reapplied.

F. Glass fiber insulated pipes conveying fluids below ambient temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

G. Glass fiber insulated pipes conveying fluids above ambient temperature:
   1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.

H. Inserts and Shields:
   1. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   2. Insert Location: Between support shield and piping and under the finish jacket.
   3. Insert Configuration: Minimum 6 inches (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.

I. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.

J. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

K. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil (0.025 mm) thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

3.03 SCHEDULES - SEE SHEETS P-0.1 AND M-0.1

END OF SECTION

NOT FOR BID

SECTION 22 10 05
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer and vent.
   2. Domestic water.
   3. Flanges, unions, and couplings.
   4. Pipe hangers and supports.
   5. Valves.

1.02 REFERENCE STANDARDS

A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems 2015.

B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2016.

C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2018.

D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2018.

E. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV 2016.

F. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV 2017.

G. ASME B31.9 - Building Services Piping 2017.

H. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fuzing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications 2019.

I. ASTM B32 - Standard Specification for Solder Metal 2008 (Reapproved 2014).

J. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes 2020.

K. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2020.

L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.

M. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.

N. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.

O. ASTM C425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings 2004 (Reapproved 2018).

P. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings 2020a.

Q. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).

R. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings 2004 (Reapproved 2016).

S. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter 2012a.

T. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems 2012 (Reapproved 2018).

U. ASTM D2661 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings 2014, with Editorial Revision (2018).

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V. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings 2014.

W. ASTM F628 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core 2012, with Editorial Revision (2018).

X. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

Y. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2011 (Amended 2012).

Z. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications 2017 (Revised 2018).

AA. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications 2012 (Revised 2018).

BB. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018.

CC. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010.

DD. NSF 61 - Drinking Water System Components - Health Effects 2019.

EE. NSF 372 - Drinking Water System Components - Lead Content 2016.

FF. ASME - Boiler and Pressure Vessel Code

GG. AGA - American Gas Association Code

1.03 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of California, standards.
   1. Maintain one copy on project site.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.

E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.05 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State of California plumbing code.

B. Conform to applicable code for installation of backflow prevention devices.

C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

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D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET (1500 mm) OF BUILDING

A. ABS Pipe: ASTM F628.
   1. Fittings: ABS.
   2. Joints: Solvent welded with ASTM D2235 cement.

B. PVC Schedule 40 DWV Pipe per ASTM D1785 and ASTM D 2665
   1. Fittings: PVC DWV per ASTM D 2665
   2. Joints: Solvent cement weld per ASTM F 656 and solvent cement per ASTM D2564

2.03 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET (1500 mm) OF BUILDING

A. Copper Pipe: Class 150 bronze unions with brazed joints below grade, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.

2.05 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.

2.06 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches (80 mm) and Under:
   1. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Grooved and Shouldered Pipe End Couplings:
   1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
   2. Sealing gasket: "C" shape composition sealing gasket.

2.07 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Conform to ASME B31.9.
   2. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
   3. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.

C. Plumbing Piping - Water:
   1. Conform to ASME B31.9.

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2. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 Inches (50 mm) to 4 Inches (100 mm): Carbon steel, adjustable, clevis.

2.08 BALL VALVES

A. Manufacturers:
1. Tyco Flow Control: www.tycoflowcontrol.com.
2. Apollo Valves: www.apollovalves.com.
3. Stockham: www.stockham.com

B. Construction, 4 Inches (100 mm) and Smaller: MSS SP-110, Class 150, 400 psi (2760 kPa) CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handlewith balancing stops, solder endswith union.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in

B. valves for piping requiring insulation to ensure valve can be cycled without damaging pipe insulation.

C. Install water piping to ASME B31.9.

D. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

E. Pipe Hangers accordance with manufacturer's instructions.

F. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

G. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

H. Install piping to maintain headroom, conserve space, and not interfere with use of space.

I. Group piping whenever practical at common elevations.

J. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

K. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

L. Shut-off valves shall be provided on all main branches, runs to risers and where shown on drawings. Locate shut-off valves over T-Bar Ceiling when possible. Provide access panesl when shut-off valves are located over hard lid ceilings.

M. Provide access where valves and fittings are not exposed.

N. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Color to be specified by architect.

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O. All exposed, unfinished pipe, fittings, supports, and accessories shall be painted.

P. All piping, fittings, supports and accessories shall approved UV protection

Q. Install valves with stems upright or horizontal, not inverted. Refer to Section 22 05 23.

R. Provide stem extension on all and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as indicated.
   3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
   4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

3.04 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install globe valves for throttling, bypass, or manual flow control services.

C. Provide spring loaded check valves on discharge of water pumps.

3.05 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfect water distribution system in accordance with local jurisdiction. Potable water systems shall be disinfected and flushed prior to use by water-chlorination solution and have bacteriological examination made by an approved agency per 2016 California Plumbing Code section 609.9 and as prescribed in AWWA C651. Methods of cleaning / disinfecting for new or repair piping as described in C651 or NFPA 24.

B. Prior to starting work, verify system is complete, flushed and clean.

3.06 INSTALLATION OF FLOW CONTROL VALVES

A. Install automatic flow control valve in each hot water recirculating loop, and elsewhere as indicated. Install a shutoff valve and strainer upstream and a union, check valve and shutoff valve downstream of each automatic flow control valve.

B. Set flow control valve flow rate as follows:
   1. Preliminary Procedures For Hot Water Return System Balancing:
      a. Before operating the system perform these steps:
         1) Open Valves at recirculation pump and flow control valves to full open position.
         2) Remove and clean all strainers.
         3) Check recirculation pump rotation.
         4) Set water heater temperature as indicated on the drawings.
   2. Procedures For Hot Water Return System Balancing:
      a. Refer to the drawings for required flow rate for each flow control valve.
      b. Provide required instrumentation to obtain proper measurements. Instruments shall be properly maintained and protected against damage.
      c. Apply instrument as recommended by the manufacturer.
      d. Take readings with the eye at the level of the indicated valve to prevent parallax.
      e. Mark flow control valve setting with memory stop. Mark with paint or other suitable, permanent identification materials.
      f. Retest, adjust, and balance systems subsequent to significant systems modifications, and resubmit test results.

C. Reports: Prepare hot water return system balancing reports signed and submit to the architect upon completion of the project. Include the following information:
   1. Valve tag number and description of location
   2. Valve body size

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3. Differential pressure reading from instrument in psi
4. Actual flow rate derived from the manufacturer's charts and tablets for the valve size and measured differential pressure.

3.07 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.
   1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
   2. Provide 18 gage, 0.0478 inch (1.21 mm) galvanized sheet metal sleeve around service main to 6 inch (150 mm) above floor and 6 feet (1800 mm) minimum below grade. Size for minimum of 2 inches (50 mm) of loose batt insulation stuffing.

END OF SECTION

NOT FOR BID

SECTION 22 30 00
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water Heaters:
   1. Commercial electric.

B. In-line circulator pumps.

1.02 REFERENCE STANDARDS

A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels 2019.

B. ICC (IPC) - International Plumbing Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2018.

D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 1453 - Standard for Electric Booster and Commercial Storage Tank Water Heaters Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate pump type, capacity, power requirements.
   3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
   4. Provide electrical characteristics and connection requirements.

B. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

PART 2 PRODUCTS

2.01 WATER HEATERS

A. Manufacturers:
   1. A.O. Smith Water Products Co; [_____]: www.hotwater.com/#sle.
   2. Rheem Manufacturing Company; [_____]: www.rheem.com/#sle.

2.02 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:
   1. Armstrong Fluid Technology; [_____]: www.armstrongfluidtechnology.com/#sle.
   2. Bell & Gossett, a xylem brand; [_____]: www.bellgossett.com/#sle.
   3. Taco Pumps: www.taco-hvac.com.

B. Casing: Bronze, rated for 125 psig (860 kPa) working pressure, with stainless steel rotor assembly.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.

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E. Seal: Carbon rotating against a stationary ceramic seat.

F. Drive: Flexible coupling.

2.03 ELECTRICAL WORK

A. Provide electrical motor driven equipment specified complete with motors, motor starters, controls, and wiring.

B. Electrical characteristics to be as specified or indicated.

C. Furnish motor starters complete with thermal overload protection and other appurtenances necessary for the motor control specified.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.

C. Pumps:

1. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

3.02 SCHEDULES - SEE SHEET P-0.1

END OF SECTION

NOT FOR BID

SECTION 22 40 00
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water closets.
B. Lavatories.
C. Sinks.
D. Service sinks.
E. Under-lavatory pipe supply covers.

1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
B. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures 2011 (Reaffirmed 2017).
C. ANSI Z124.2 - American National Standard for Plastic Shower Units; 1995.
D. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use 1997 (Reaffirmed 2017).
E. ASME A112.18.1 - Plumbing Supply Fittings 2018, with Errata.
F. ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures; The American Society of Mechanical Engineers; 2008 (R2011).
G. ASME A112.19.2 - Ceramic Plumbing Fixtures 2018.
H. ASME A112.19.3 - Stainless Steel Plumbing Fixtures 2017.
I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
J. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
K. NSF 61 - Drinking Water System Components - Health Effects 2019.
L. NSF 372 - Drinking Water System Components - Lead Content 2016.

1.03 SUBMITTALS

A. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
B. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.
B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

NOT FOR BID

2.02 FLUSH VALVE WATER CLOSETS

A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
   1. Flush Volume: 1.28 gallon (4.8 liters), maximum.
   2. Flush Valve: Exposed (top spud).
   3. Flush Operation: Sensor operated.
   4. Handle Height: 44 inches (1117 mm) or less.
   5. Manufacturers:
      a. American Standard Inc: www.americanstandard.com.
      b. Sloan Valve Company: www.sloanvalve.com.
      c. Kohler Company; [_____]: www.kohler.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
   1. Sensor-Operated Type: Solenoid or motor-driven operator, low voltage hard-wired, infrared sensor with mechanical over-ride or over-ride push button.
   2. Manufacturers:
      a. Sloan Valve Company; [_____]: www.sloanvalve.com/#sle.
      b. Zurn Industries, Inc; [_____]: www.zurn.com/#sle.

C. Seats:
   1. Manufacturers:
      a. Bemis Manufacturing Company; [_____]: www.bemismfg.com/#sle.
      b. Church Seat Company; [_____]: www.churchseats.com/#sle.
      c. Olsonite; [_____]: www.olsonite.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.
   2. Solid white plastic, open front, extended back,self-sustaining hinge, brass bolts, with cover.

D. Water Closet Carriers:
   1. Manufacturers:
      a. JOSAM Company; [_____]: www.josam.com.
      b. Jay R. Smith MFG Co: www.jrsmith.com
      c. Substitutions: See Section 01 60 00 - Product Requirements.
   2. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.

2.03 LAVATORIES

A. Lavatory Manufacturers:
   1. American Standard Inc.: www.americanstandard.com
   2. Kohler Company: www.kohler.com

B. Vitreous China Wall Hung Basin: ASME A112.19.2; vitreous china wall hung lavatory, [___] by [___] inch ([___] by [___] mm) minimum, with 4 inch (100 mm) high back, rectangular basin with splash lip, front overflow, and soap depression.

C. Vitreous China Counter Top Basin:
   1. ASME A112.19.2; vitreous china self-rimming counter top lavatory, [20 1/4] x [17 1/2] inches ([_____] x [_____] mm) with drillings on 4 inch (100 mm) centers, front overflow, seal of putty, calking, or concealed vinyl gasket.

D. Supply Faucet Manufacturers:
   1. Chicago Faucets, a Geberit company: www.chicagofaucets.com.
   2. Kohler Company; [_____]: www.kohler.com.

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E. Sensor Operated Faucet: Cast brass, chrome plated, deck mounted with sensor located on neck of spout.
   1. Spout Style: Standard.
   2. Power Supply: Battery, easily replaceable, alkaline or lithium, minimum 200,000 cycles.
   3. Mixing Valve: Internal, automatic.
   4. Water Supply: 3/8 inch (9 mm) compression connections.
   5. Aerator: Vandal resistant, 0.5 GPM (1.89 LPM), laminar flow device.
   6. Finish: Polished chrome.
   7. Sensor Operated Faucet Manufacturers:
      a. The Chicago Faucet Company; [_____]: www.chicagofaucets.com.
      b. Moen Incorporated; [_____]: www.moen.com.
      c. Sloan Valve Company; [_____]: www.sloanvalve.com.
      d. Zurn Industries, Inc; AquaSense Z6913: www.zurn.com/#sle.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

F. Accessories:

   1. Wheel handle stops.
   2. Rigid supplies.
   3. Carrier:
      a. Manufacturers:
         1) JOSAM Company; [_____]: www.josam.com.
         2) Jay R. Smith MFG Co: www.jrsmith.com[_____].

2.04 SINKS

A. Sink Manufacturers:
   1. American Standard, Inc; [_____]: www.americanstandard-us.com.
   2. Kohler Company; [_____]: www.kohler.com.
   3. Elkay[_____].

B. Double Compartment Bowl:
   1. ASME A112.19.3; 33 x 22 x [8 3/16] inch ([_____] x [_____] x [_____] mm) outside dimensions, 19 gage thick, Type 304 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
      a. Drain: 1-1/2 inch (38 mm) chromed brass drain.

C. Accessories: Chrome plated 17 gage (1.3 mm) brass P-trapwith clean-out plug and arm with escutcheon, wheel handle stop, rigid supplies.

2.05 UNDER-LAVATORY PIPE SUPPLY COVERS

A. Manufacturers:
   1. Plumberex Specialty Products, Inc; [_____]: www.plumberex.com.
   2. Substitutions: See Section 01 60 00 - Product Requirements.

B. General:
   1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
   2. Construction: 1/8 inch (3.2 mm) PVC with antimicrobial, antifungal and UV resistant properties.
      a. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
      b. Comply with ICC A117.1.
   3. Color: High gloss white.
   4. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.

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2.06 SERVICE SINKS

A. Service Sink Manufacturers:
   1. American Standard, Inc; [_____]: www.americanstandard-us.com.
   2. Elkay Manufacturing Company; [_____]: www.elkay.com.
   3. Just Manufacturing Company; [_____]: www.justmfg.com.

B. Bowl: 36 by 24 by 10 inch (900 by 600 by 250 mm) high white molded stone, floor mounted, with one inch (25 mm) wide shoulders, vinyl bumper guard, stainless steel strainer.

C. Trim: ASME A112.18.1 exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.

D. Accessories:
   1. Hose clamp hanger.
   2. Mop hanger.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

C. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible supplies to fixtures with loose key or integral stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures, vlaves, cleanouts and openings before rough-in and installation.

3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Do not permit use of fixtures by construction personnel.

C. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 23 00 10
BASIC MECHANICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Basic Mechanical Requirements specifically applicable to Division 23 Sections, in addition to Division 01 - General Requirements.

1.02 DESCRIPTION

A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as required to complete the work of this section, except as otherwise herein specifically excluded.

1.03 REFERENCES

A. Section 23 08 01 - Commissioning of Building Systems

1.04 WORK INCLUDED

A. The complete Heating, Ventilating and Air Conditioning (HVAC) systems, including but not limited to these major items.
   1. Coordinate work of this Section with related trades.
   2. Verify applicable dimensions and locations of existing utilities, fans, and thermostats at the jobsite.
   3. Duct systems; supply, return and exhaust complete with manual dampers.
   4. Diffusers and registers.
   5. Exhaust supply, return fans and air curtains.
   6. Furnishing and installation of miscellaneous hangers, supports, sleeves, inserts, anchors and other auxiliary equipment for systems under this Division.
   7. Duct lining and insulation.
   8. Shop drawings.
   9. Equipment identification.
   10. Equipment and systems adjustments and balancing.
   11. Air, water and gas systems testing, adjusting and balancing.
   12. Written operating and maintenance instructions.
   13. Record drawings.
   14. Guarantee

1.05 WORK SPECIFIED ELSEWHERE

A. Concrete, Rough Carpentry, Joint Sealants, Sheet Metal, Flashing and Trim, Access Door and Frames, Acoustical Ceiling Tile, Door Hardware, Paints and Coatings, Plumbing and Electrical.

1.06 SITE INSPECTION

A. Contractor shall familiarize himself with the conditions at the site. No allowance will be made subsequently for any error through negligence in observing the site conditions. Contractor shall observe and make cost allowance for any mechanical and/or electrical items that must be relocated to accommodate the installation or servicing of any item covered under this contract.

1.07 ORDINANCES, REGULATIONS AND CODES

A. References to Technical Societies, Trade Organizations, Governmental Agencies is made in Division 15 in accordance with the following abbreviations.
   1. AFI - Air Filter Institute
   2. AMCA - Air Moving & Conditioning Association
   3. ARI - Air Conditioning & Refrigeration Institute
   4. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
   5. ASME - American Society of Mechanical Engineers
   6. ASTM - American Society of Testing Materials

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7. AWSC - American Welding Society Code
8. ANSI - American National Standards Institute
9. CBC - California Building Code
10. CCR - California Code of Regulations
11. CEC - California Electrical Code
12. CFC - California Fire Codes
13. CMC - California Mechanical Code
14. CPC - California Plumbing Code
15. FIA - Factory Insurance Association
16. NAFM - National Association of Fan Manufacturers
17. NEMA - National Electrical Manufacturer's Association
18. NFPA - National Fire Protection Association
19. ORS - Office of Regulatory Services
20. SCAQMD - South Coast Air Quality Management District
21. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
22. UFC - Uniform Fire Code
23. UL - Underwriter's Laboratories
24. UPC - Uniform Plumbing Code

B. Requirements of Regulatory Agencies: Materials and installation shall comply with applicable local, state, and national codes and ordinances. Rulings and interpretations of the enforcing agencies shall be considered as part of the local codes. No extras will be permitted for furnishing items required by the local codes but not specified or shown on the drawings.

C. Codes and Standards:
1. IBC and California Amendments (California Building Code - Part 2, Title 24, CCR).
2. UMC and California Amendments (California Mechanical Code - Part 4, Title 24 CCR).
3. UPC and California Amendments (California Plumbing Code - Part 5, Title 24 CCR).
4. Uniform Fire Code with State Amendments (California Fire Code - Part 9, Title 24 CCR).
5. National Fire Protection Associations - National Fire Code.

D. Nothing in these drawings and specifications is to be construed to permit work in violation thereof. Ordinances, regulations and codes are to be construed as minimum requirements.

E. The responsibility of the Architect to conduct construction reviews of the Contractor's performance is not intended to include the adequacy of the Contractor's safety measures in, on, or near the construction site.

F. Ventilating, refrigeration and electrical equipment and appliances are required to be approved by the Underwriters' Laboratories, Inc., or other nationally recognized testing agency and installed per the testing agency's specifications.

1.08 PERMITS, FEES AND INSPECTIONS

A. Obtain and pay for all necessary permits, fees, assessments, complimentary drawings, required by any legally constituted public authorities having jurisdiction.

1.09 DRAWINGS AND SPECIFICATIONS

A. The Architect's decision will be final on interpretation of the Drawings and Specifications.

B. The Drawings and Specifications are complimentary. Any work called for on the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.

C. Piping, ductwork and other equipment shown as existing has been taken from the Owner's drawings. Contractor shall verify exact location in field before proceeding with the work.

D. Where codes, standards, drawings or specifications conflict, the most stringent shall prevail, unless prior approval for variance is obtained. Specific details on the drawings shall supercede the specification in the event of a conflict.

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E. Alternate support or seismic detail proposed by contractor shall have prior approval by the Architect; and the Contractor shall obtain agency approval without any additional cost or time to the contract and without any time penalty on the work schedule.

1.10 SUBMITTALS

A. Before starting work, the Contractor shall furnish for the approval of the Architect, Shop Drawings and Submitalls with Itemized Equipment Lists, complete in all details that they proposes to install. All items shall be submitted at the same time.

B. Submittals must be specific to this project with respect to model number, capacities, performance, etc., generic submittals will not be accepted.

C. Variations or deviations on submitted items from that specified must be clearly tagged and / or identified

D. Submittals shall include, but not necessarily be limited to the following which are mandatory:
1. Draw Equipment Layouts to ¼" scale, including equipment, piping accessories, and showing clearances for operating and servicing.
2. Schedule of pipe, fittings, valves, with manufacturer and catalog number.
3. Specialties, valves, gauges and thermometers of all types.
4. Foundations, supports, hangers, inserts.
5. Earthquake supports and calculations.
6. Insulation.
7. Ventilation and air conditioning equipment, specialties and the air control systems.
8. Fans, fan characteristic curves, fan tests.
9. Dampers, louvers, grilles, registers, diffusers.
10. Shop fabrication drawings and installation drawings of ductwork and piping layouts. Submit for approval prior to fabrication. Drawings shall indicate dimensions from bottom of piping and ductwork to finish floor level.
11. Wiring diagrams, control panel board, motor starters and controls for electrically operated equipment furnished by mechanical trades.
12. Automatic control system diagrams.
13. Exhaust, supply and return fans.
14. Access panels.
15. Hangers, inserts, supports, anchors.
16. Pipe, fittings and specialties.
17. Pipe isolators.
18. Sleeves, escutcheons, caulking, waterproofing, fireproofing.
19. Expansion joints, guides and anchors.
20. Shop fabrications drawings and calculations.
21. Special and miscellaneous products furnished under this section and not listed herein.

1.11 RECORD DRAWINGS AND MANUALS

A. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.

B. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.

C. Final Record Drawings: Conform to Division 01 requirements.

D. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.

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E. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.

F. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.

G. Contents: Each manual shall have an index listing the contents. Information in the manuals shall include not less than:
   1. General introductions and overall equipment description, purpose, functions and simplified theory of operation.
   2. Specifications
   3. Installation instructions, procedures, sequences, and precautions, including tolerances for level, horizontal and vertical alignment.
   4. Grouting requirements.
   5. List showing lubricants for each item of mechanical equipment and recommended lubrication intervals.
   6. Start-up and beginning operation procedures.
   7. Operational procedures.
   8. Shutdown procedures.
   9. Maintenance and calibration procedures
   10. Parts lists
   11. Name, address and telephone number of each manufacturer's local representative.

H. Manual Submittals: Unless otherwise specified, each submittal shall include two copies of each manual, one of which will be returned to the Contractor, marked to show the required review. When approved, deliver four copies to Architect unless otherwise specified.

I. “As-Built” drawings of ductwork and piping, including all elbows, transitions, damper and valve locations shall be provided prior to commencement of air and water balance.

1.12 QUALITY OF EQUIPMENT, MATERIALS AND WORKMANSHIP

A. Unless otherwise specified, equipment and materials used in the installation shall be new and in perfect condition when installed. Articles provided for the same general purpose or use shall be of the same make. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. Furnish the services of an experienced superintendent, who shall be constantly in charge of the work, together with all necessary journeymen, helpers and laborers required.

1.13 SEISMIC DESIGN

A. Contractor shall be responsible for anchors and connections of mechanical work to the building structure including calculations for approval by structural engineer or for approval by inspector of record, as applies, for items or work, where approval is deferred or where alternate support or anchorage detail is proposed to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. The anchorage of all pipes, ducts, conduits, fixtures, equipment, etc. shall withstand the lateral forces and shall accommodate calculated building displacement as required by the California Building Code, and local city/county codes. (Building equipment and connections therefore shall be designed to resist lateral seismic forces equal to 1.0 of equipment weight to working allowable stress. Cantilever posts supporting equipment shall be designed to resist lateral seismic forces equal to 0.5 of equipment weight to allowable working stress. Conform to the following:
   1. In accordance with Title 24, 2016 CBC Chapter 16A, details shall be provided for the seismic anchorage of all mechanical and electrical equipment, anchorage details shall be based upon appropriate design calculations.
   2. For equipment weighing 400 pounds or more anchorage details and appropriate design calculations shall be submitted as part of the mechanical and electrical

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drawings. “Deferred Approval” items will not be permitted unless specifically approved by the plan check supervisor.

a. Exception: Attachments of equipment weighting less than 400 pounds and supported directly on the floor or roof structure, furniture, or temporary or movable equipment and equipment weighing less than 20 pounds that is supported by vibration isolation devices suspended from the roof, wall or floor, need not be detailed on the plans provided the following notes are included on the mechanical and electrical plans.

3. The seismic anchorage of mechanical and electrical equipment shall conform to C.C.R. Title 24, 2016 CBC Chapter 16A. Anchorage details for roof/floor-mounted equipment shall be shown on plans.

1.14 SUBSTITUTIONS AND CHANGES

A. The design has been based on data from certain manufacturers, suitable for each application. Recommendations for alternative manufacturers are made for each product, except when "no substitutions permitted" is indicated.

B. It is the intent of the Owner to have this project constructed with materials, products and system originally designed and specified into the project.

C. Alternatives that may require the modification, realignment and/or adjustment of other associated components, including impact on other trades, shall be accomplished at no additional cost or time to the contract and shall have the approval of the Architect.

D. Substitutions shall be submitted addressing all features listed in the specifications. Features that deviate from the plans and specifications shall be clearly identified including justification for deviations. Design West Engineers will review initial submittal on substitutes only. Subsequent submittals made to correct deficiencies in original submittals will be reviewed at Contractor's expense based on Design West Engineer's hourly rate for engineering services.

E. Should the Contractor elect to propose substitutions for the Owner's interest, the substitutions shall be in compliance with Division 01.

1.15 SUBMITTAL REVIEWS

A. The Architect will have the right to accept or reject equipment, materials, workmanship, tests and determine when the Contractor has complied with the requirements herein specified.

1.16 SELECTION AND ORDERING OF EQUIPMENT AND MATERIALS

A. Immediately after award of the Contract and after the final review of submittals by the Architect and / or Engineer, the Contractor shall arrange for the purchase and delivery of equipment and materials required, in ample quantities and at the proper time to meet the construction schedule. The contractor shall deliver to the Architect and Owner a complete list of equipment and materials ordered, giving descriptions, plate numbers, brochures, name of the wholesalers, date of the orders and approximate delivery dates.

1.17 LOCATIONS AND ACCESSIBILITY

A. Drawings show pipe and ductwork diagrammatically. Conform to Drawings as closely as possible in layout work. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences as reviewed by Architect and / or Engineer. Install piping and ductwork to best suit field conditions after coordinating with other trades. Run exposed piping and ductwork parallel to, or at right angle to, building walls. Keep horizontal lines as close to bottom of structures as possible. Conform to ceiling heights established on Drawings.

B. Install equipment in such a manner as to be readily accessible for maintenance and repairs. Install piping, ducts and conduit in such a manner as to preserve headroom, avoid obstructions and keep openings and passageways clear.

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C. Installation at valves, thermometers, gauges, cleanouts, dampers, controls, steam and water specialties, duct access doors or any other indicating equipment or specialties requiring reading, adjustment, inspection, maintenance shall be conveniently and accessible located with reference to the finished building.

D. Where wall and ceiling access doors are required but not shown, such doors shall be furnished under other sections and as directed by the Architect. Coordinate this requirement with appropriate trade.

E. If changes in the indicated locations or arrangements are required, they shall be made without additional charges.

F. In an existing area, where required, remove, reinstall, reconnect or replace, etc., any existing work to accommodate new work without any additional cost to the Owner. Material shall match existing, unless otherwise specified or approved in writing by the Architect.

G. Provide sheaves and belts if required, to Test, Adjust and Balance Agency, to allow air moving equipment to meet flow requirements specified at no additional cost to the Owner.

1.18 COORDINATION OF TRADES

A. Contractor shall coordinate all trades in the interest of obtaining the most practical overall arrangement of equipment, piping, conduit, and ducts and to maintain maximum headroom and accessibility.

B. No extras will be allowed for changes made necessary by interference or coordination between trades.

C. Submit Composite Coordination Drawings in accordance with Submittal Procedures. Include dimensioned plans, elevations, sections and details and give complete information particularly as to the kinds and types of materials and equipment, size and location of sleeves, inserts, attachments, chases, openings, conduits, ducts, boxes, lighting, structural interferences. Coordinate these Composite Coordination Drawings and field layouts in the field for proper relationship to work of applicable trades based on field conditions. Contractor shall have competent personnel readily available for coordinating, checking, and supervision of field layouts. The procedures for submittals and resubmittals, and final distribution shall be as specified in Division 01. Do not start installation of work involved under Composite Coordination Drawings until the Architect reviews applicable submittal. Discrepancies between the Drawings and Composite Coordination Drawings shall be specifically noted and identified on the Composite Coordination Drawings. Drawings for the various trades involved shall be submitted as required and reviewed prior to preparation of Composite Coordination Drawings.
   1. Equipment Foundations and Bases: Furnish certified details and drawings for approval before fabrication. Furnish parts necessary for each foundation sub base and support.
   2. Pipe Sleeves and Inserts: Furnish and install pipe sleeves and pipe support inserts before concrete is poured.
   3. Roof, Wall and Floor Openings: Furnish Shop Drawings showing exact locations and sizes of openings through roofs, walls and floors.
   4. Concrete: Conform to Concrete Section of the Specifications.

1.19 GUARANTEES

P-2013913Contractor shall guarantee workmanship, equipment and materials installed under his contract for a period of not less than one (1) year from the date of Substantial Completion. Should any defects occur during this period, the Contractor shall promptly repair or replace the defective item and any other damage caused to the building free of charge to the Owner, including cost of labor and materials.

D. Guarantee included in this section to cover:
   1. Faulty or inadequate design of equipment or material installed
   2. Improper assembly or erection
   3. Defective workmanship or material

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4. Incorrect or inadequate operation or other failure

E. The contractor shall guarantee the complete and perfect operation of the entire system and that equipment will be supported in such a way as to be free of objectionable vibration and noise

F. Furnish the parts and labor to replace any items found to be defective in the mechanical equipment with the guarantee period.

G. In addition to other guarantees, furnish free maintenance for the refrigeration equipment, including replacement of refrigerant and oil, for a period of one (1) year. This shall include regular monthly maintenance and "On Call" service if required.

H. For equipment bearing a manufacturer's warranty in excess of one year, furnish a copy of the warranty and proof of shipment date or purchase date per terms of warranty to the Owner, who shall be named as beneficiary.

1.20 PROTECTION OF EQUIPMENT AND MATERIALS

A. Provide adequate storage facilities for equipment and materials on the site and shall make provisions to protect such materials and equipment from damage.

1.21 CLOSING-IN OF UNINSPECTED WORK

P-2013913Contractor shall not allow or cause any of the work, specifically ductwork and piping, to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Should any of work be covered up or enclosed before such inspection and test, he shall at his own expense, uncover the work and after it has been inspected, tested, and approved, make repairs with such materials as may be necessary to restore work to its original and proper condition.

1.22 BUILDING FOOTING CLEARANCES

P-2013913Under no circumstances shall pipes, ducts, or conduits penetrate footings. They shall cross below footings or through sleeves above footings. Those running parallel to footings shall have the minimum clearance from the cone of influence indicated on the Drawings or as required by Code.

1.23 DAMAGE BY LEAKS

A. Contractor shall be responsible for all damage to any part of the premises caused by rain leaks through or around ducts or pipes, leaks or breaks in piping, equipment or fixtures furnished or installed by him for a period of one (1) year from the date of Substantial Completion.

1.24 EQUIPMENT LABELS

A. Equipment provided under this Section shall be provided with the manufacturer's metal identification labels attached to each individual piece of equipment showing complete performance characteristics, size, model and serial number.

1.25 PRELIMINARY OPERATION

A. Should the Owner request that any portion of the plant, apparatus, or equipment be operated for the Owner's beneficial use prior to the final completion and acceptance of the work, the Contractor shall conform to Beneficial Occupancy Provisions of the General Conditions. Such operation shall be under the supervision and direction of the Contractor. Such preliminary operation shall not be construed as an acceptance of any of the work.

1.26 ELECTRICAL WORK

A. Coordinate with Division 26 in making the line and low voltage electrical connections and be responsible for the operation of the equipment furnished under this section.

B. Voltage for electrical work will be included in Division 26. However, any control wiring which is required that is not shown on the control diagram shall be as described under this Section. In

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the event that the Contractor chooses to provide equipment that requires extra expense in the power or control wiring, he shall pay additional electrical costs.

C. Safety switches, starters, circuit breakers, unless provided as a portion of package equipment, and the electrical connections of mechanical equipment to the electrical power service shall be provided under Division 26.

D. Interconnecting wiring, safety switches, relays, controllers and motor starters which are integral components of packaged equipment shall be provided as an integral part of that equipment.

E. All interconnecting power wiring and conduits shall be provided by Division 26.

F. Control wiring shall be provided by Division 23, unless otherwise indicated on the drawings.

G. Conduit for control wiring shall be provided by Division 26.

END OF SECTION

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SECTION 23 05 29
HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes the following hangers and supports for mechanical system piping and equipment:
   1. Steel pipe hangers and supports.
   2. Trapeze pipe hangers.
   3. Metal framing systems.
   4. Thermal-hanger shield inserts.
   5. Fastener systems.
   6. Pipe stands.
   7. Pipe positioning systems.
   8. Equipment supports.

B. Related Sections include the following:
   1. Division 05 for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
   2. Division 21 Section "Fire-Suppression Piping" for pipe hangers for fire-protection piping.
   3. Division 23 Section "Mechanical Vibration and Seismic Controls" for vibration isolation devices.
   4. Division 23 Section "Pipe Expansion Fittings and Loops" for flexible pipe..
   5. Division 23 Section "Metal Ducts" for duct hangers and supports.

1.02 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.03 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.04 SUBMITTALS

A. Product Data: For the following:
   1. Steel pipe hangers and supports.
   2. Thermal-hanger shield inserts.
   3. Powder-actuated fastener systems. Not allowed for this project.
   4. Pipe positioning systems.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
   1. Trapeze pipe hangers. Include Product Data for components.
   2. Metal framing systems. Include Product Data for components.
   3. Pipe stands. Include Product Data for components.
   4. Equipment supports.

C. Welding and brazing certificates.

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1.05 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel." ASME Boiler and Pressure Vessel Code: Section IX.

B. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code--Steel."
   2. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 STEEL PIPE HANGERS AND SUPPORTS

A. Description: ANSI/MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Galvanized, Metallic Coatings: Pre-galvanized or hot dipped.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

D. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.03 TRAPEZE PIPE HANGERS

A. Description: ANSI/MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.04 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.05 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig-minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.06 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
   1. Before Installation: Verify suitability for use in lightweight concrete or concrete slabs less than 4 inches thick with project structural engineer.

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2.07 PIPE STAND FABRICATION

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
   1. Submit: Calculations and details of each pipe stand unit.
   2. Available Manufacturer: MIRO Industries.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
   1. Base: Stainless steel.
   2. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
   3. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
   1. Available Manufacturer: Portable Pipe Hangers.
   2. Bases: One or more plastic.
   3. Vertical Members: Two or more protective-coated-steel channels.
   4. Horizontal Member: Protective-coated-steel channel.
   5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

2.08 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.

B. Available Manufacturer: HOLDRITE Corp.; Hubbard Enterprises.

2.09 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes or struts.

2.10 MISCELLANEOUS MATERIALS

B. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

C. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   1. Properties: Non-staining, non-corrosive, and nongaseous.
   2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 EXECUTION

3.01 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with ANSI/MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

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D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for bare piping for noise abatement.

F. Piping shall be concealed in chases, partitions, walls, and between floors, unless otherwise directed or specifically noted on Drawings. When penetrating wood studs, joists, and other wood members notching. Provide such members with reinforcement steel straps of Kees Protecta-Plate or equal.

G. For fastening to wood rafters and beams, or joists, furnish Grinnell figure 128 or 202 or equal pipe hanger flange fastened with drive screws. Under wood floors, 3/8 inch hanger rods shall be hung from 2 inch x 2 inch x 1/4 inch angle clips 3 inches long, with 2 staggered 10d nails, clinched over joist.

H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated stationary pipes.
   2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 and larger, requiring up to 4 inches of insulation.
   3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, requiring clamp flexibility and up to 4 inches of insulation.
   4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, if little or no insulation is required.
   5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
   6. Adjustable Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of non-insulated stationary pipes, NPS 3/4 to NPS 8.
   7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
   8. Adjustable Band Hangers (MSS Type 9): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
   9. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 2.
   10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of non-insulated stationary pipes, NPS 3/8 to NPS 8.
   11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated stationary pipes, NPS 3/8 to NPS 3.
   12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 and larger.
   13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
   14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 and larger, with steel pipe base stanchion support and cast-iron floor flange.
   15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 and larger, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
   16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.

I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers.
   2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, if longer ends are required for riser clamps.

J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.

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2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
a. Light (MSS Type 31): 750 lb.
b. Medium (MSS Type 32): 1500 lb.
c. Heavy (MSS Type 33): 3000 lb.
2. Side-Beam Brackets (MSS Type 34): For sides of wooden beams.

L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

M. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

N. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

O. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

P. Use pipe-positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.02 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
1. Each trapeze pipe hanger requires submittal of calculations and details.
2. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
3. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
1. Each metal framing system requires submittal of calculations and details.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:
1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

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F. Pipe Stand Installation:
   1. Each pipe stand in requires submittal of calculations and details.
   2. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
   3. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 for curbs specifications.

G. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.

H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

J. Each equipment support requires submittal of calculations and details.

K. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

L. Install lateral bracing with pipe hangers and supports to prevent swaying.

M. Install building attachments. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping.

N. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

O. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

P. Insulated Piping: Comply with the following:
   1. Attach clamps and spacers to piping.
      a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

      b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

      c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

   2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
      a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

   3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
      a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

   4. Shield Dimensions for Pipe: Not less than the following:
      a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

   5. Insert Material: Length at least as long as protective shield.
   6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

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3.03 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.04 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.05 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.06 PAINTING

A. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

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SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.
B. Tags.
C. Adhesive-backed duct markers.
D. Ceiling tacks.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Air Handling Units: Nameplates.
B. Dampers: Ceiling tacks, where located above lay-in ceiling.
C. Ductwork: Nameplates.
D. Thermostats: Nameplates.

2.02 NAMEPLATES

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC; [_____]: www.advancedgraphicengraving.com/#sle.
   2. Brimar Industries, Inc; [_____]: www.pipemarker.com/#sle.
   3. Seton Identification Products, a Tricor Direct Company; [_____]: www.seton.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.
   5. Letter Color: White.
   6. Letter Height: 1/4 inch (6 mm).
   7. Background Color: Black.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving; [_____]: www.advancedgraphicengraving.com/#sle.
   2. Brady Corporation; [_____]: www.bradycorp.com/#sle.
   3. Brimar Industries, Inc; [_____]: www.pipemarker.com/#sle.
   4. Seton Identification Products, a Tricor Company; [_____]: www.seton.com/#sle.

2.04 ADHESIVE-BACKED DUCT MARKERS

A. Manufacturers:
   1. Brimar Industries, Inc; [_____]: www.pipemarker.com/#sle.
   2. Craftmark Pipe Markers; [_____]: www.craftmarkid.com/#sle.
B. Style: Individual Label.
C. Color: Yellow/Black.

2.05 CEILING TACKS

A. Description: Steel with 3/4 inch (20 mm) diameter color coded head.
B. Color code as follows:
   1. HVAC Equipment: Yellow.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
B. Install tags with corrosion resistant chain.

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C. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

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SECTION 23 07 13
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

1.02 RELATED REQUIREMENTS

A. Section 23 31 00 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2017.

D. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) 2019.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.

G. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).

H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

B. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or ASTM E84.

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2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Insulation: www.knaufinsulation.com.
   2. Johns Manville: www.jm.com.
   3. Owens Corning Corporation: www.ocbuildingspec.com.
   4. CertainTeed Corporation: www.certainteed.com/#sle.

B. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch (0.029 ng/Pa s m), when tested in accordance with ASTM E96/E96M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated ducts conveying air below ambient temperature:
   1. Finish with tape and vapor barrier jacket.
   2. Continue insulation through walls, sleeves, hangers, and other duct penetrations.

D. Insulated ducts conveying air above ambient temperature:

E. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.

F. External Duct Insulation Application:
   1. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   2. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.

G. Duct and Plenum Liner Application:
   1. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
   2. Seal and smooth joints. Seal and coat transverse joints.
   3. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.03 R-VALUE FOR INSULATION ON DUCTS SHALL BE PER TITLE-24 REQUIREMENTS

END OF SECTION

NOT FOR BID

SECTION 23 08 02
INSTALLATION & ACCEPTANCE TESTING OF MECHANICAL SYSTEMS

PART 1 GENERAL

1.01 INTRODUCTION

A. Title 24 requires the completion of applicable Certificates of Installation and Certificates of Acceptance for mechanical systems. This shall include applicable mechanical systems as defined in the energy compliance sheets included with the contract documents.

1.02 RELATED DOCUMENTS

A. Contract drawings and specifications, general provisions of the contract, including general and supplementary conditions, mechanical provisions and Division-1 Specification sections apply to work of this section.

1.03 DESCRIPTION OF WORK

A. Complete Title 24 required Certificate(s) of Installation (NRCI) and Certificate(s) of Acceptance (NRCA) to be completed per the contract documents.

1.04 RESPONSIBILITIES OF INSTALLING CONTRACTORS

A. General Contractor (GC)
   1. Ensure that contractors identified as the contractor responsible for acceptance testing and completion of the Title 24 Certificate(s) of Acceptance are certified by the State of California or its designated body to conduct each respective test.

B. Mechanical Contractor (MC)
   1. Verify proper installation and performance of mechanical services provided.
   2. Complete Title 24 Certificate(s) of Installation and manufacturer's pre-start checklists prior to scheduling startup/programming of mechanical control equipment.
      a. Retain Certificate(s) of Installation in a 3-ring binder in an organized fashion. Binder is to remain on the job site
      b. Make Certificate(s) of Installation available for building inspector's review.
      c. Retain calibration records for equipment provided with manufacturer calibrated sensors in the Certificate(s) of Installation binder.
      d. Correct labeling of circuits with connected equipment.
   3. Complete the Certificate(s) of Acceptance per the contract documents.
      a. The company installing the mechanical systems must be an authorized Mechanical Controls Acceptance Test Employer certified by a Mechanical Controls Acceptance Test Technician Certification Provider or include in their bid the cost of retaining and overseeing a contractor who is an authorized Mechanical Controls Acceptance Test Employer to complete the acceptance testing.
      b. At the discretion of the GC, the Mechanical Controls Acceptance Testing may be completed by the Testing & Balancing (TAB) Contractor if the TAB contractor' s company and personnel meet requirements in this specification section.
      c. Required acceptance testing must be completed by a Mechanical Controls Acceptance Test Technician employed by the Mechanical Controls Acceptance Test Employer.
      d. Retain Certificate(s) of Acceptance in a 3-ring binder in an organized fashion. Binder is to remain on the job site
      e. Provide copies of Certificate(s) of Acceptance to the GC for review by the building inspector

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f. Upload Certificate(s) of Acceptance to the California Title 24 Certificates of Acceptance database, if, at the time of project completion, the database is available to the public.

4. Successful completion of the required Acceptance Tests is the responsibility of the installing contractor. Any costs associated with modifications necessary to obtain compliance and re-testing of systems shall be included in the base bid of this project.

END OF SECTION

NOT FOR BID

SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

1.02 RELATED REQUIREMENTS

A. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

B. Section 23 07 13 - Duct Insulation: External insulation and duct liner.

C. Section 23 33 00 - Air Duct Accessories.

D. Section 23 37 00 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2018.

D. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2018.

E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).

F. SMACNA (FGD) - Fibrous Glass Duct Construction Standards 2003.

G. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors current edition, including all revisions.

1.04 PERFORMANCE REQUIREMENTS

A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

A. Product Data: Provide data for duct materials, duct liner, and duct connections.

B. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.06 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.

B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

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1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
2. VOC Content: Not more than 250 g/L, excluding water.
3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

C. Flexible Ducts:
1. UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire.
a. Pressure Rating: 10 inches WG (2.50 kPa) positive and 1.0 inches WG (250 Pa) negative.
b. Maximum Velocity: 4000 fpm (20.3 m/sec).
c. Temperature Range: -20 degrees F to 210 degrees F (-28 degrees C to 99 degrees C).

D. Insulated Flexible Ducts:
1. UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire; fiberglass insulation; polyethylene vapor barrier film.
a. Pressure Rating: 10 inches WG (2.50 kPa) positive and 1.0 inches WG (250 Pa) negative.
b. Maximum Velocity: 4000 fpm (20.3 m/sec).
c. Temperature Range: -20 degrees F to 210 degrees F (-28 degrees C to 99 degrees C).

E. Low Pressure Supply (System with Cooling Coils): 1 inch w.g. (250 Pa) pressure class, galvanized steel.

F. Return and Relief: 1 inch w.g. (250 Pa) pressure class, galvanized steel.

G. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

H. Hanger Rod: ASTM A 36/A 36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.03 DUCTWORK FABRICATION

A. Fabricate ductwork gauge in accordence with current (CMC) California Mechanical Code and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.

B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Tee's, bends, and elbows: Construct according to (CMC) California Mechanical Code and SMACNA (DCS).

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

E. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

F. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

G. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.04 DUCT MANUFACTURERS

A. Metal-Fab, Inc: www.mtlfab.com.

B. SEMCO Incorporated: www.semcoinc.com.

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C. United McGill Corporation: www.unitedmcgill.com.

2.05 MANUFACTURED DUCTWORK AND FITTINGS

A. Manufacture in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages,reinforcing, and sealing for operating pressures indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install in accordance with manufacturer's instructions.

C. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

D. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

E. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

F. Locate ducts and dampers with sufficient space around equipment to allow normal operating and maintenance activities.

G. Use crimp joints with or without bead for joining round duct sizes 8 inch (200 mm) and smaller with crimp in direction of air flow.

H. Use double nuts and lock washers on threaded rod supports.

I. Connect terminal units to supply ducts directly or with one foot (300 mm) maximum length of flexible duct. Do not use flexible duct to change direction.

J. Connect diffusers or light troffer boots to low pressure ducts directly or with 7 feet maximum length of flexible duct held in place with strap or clamp.

K. At exterior wall louvers, seal duct to louver frame and install blank-out panels.

L. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

3.02 CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION

NOT FOR BID

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Backdraft dampers.

C. Duct access doors.

D. Duct test holes.

E. Flexible duct connections.

F. Volume control dampers.

1.02 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2018.

B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).

C. UL 33 - Safety Heat Responsive Links for Fire-Protection Service Current Edition, Including All Revisions.

D. UL 555 - Standard for Fire Dampers Current Edition, Including All Revisions.

E. UL 555S - Standard for Smoke Dampers Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, and hardware used. Include electrical characteristics and connection requirements.

B. Manufacturer's Installation Instructions: Provide instructions for fire dampers and combination fire and smoke dampers.

1.04 QUALITY ASSURANCE

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Krueger-HVAC, Division of Air System Components; [_____]: www.krueger-hvac.com/#sle.
   2. PCI Industries, Inc; Pottorff Brand : www.portorff.com.
   3. Ruskin Company; [_____]: www.ruskin.com/#sle.
   4. Titus HVAC, a brand of Johnson Controls; [_____]: www.titus-hvac.com/#sle.

B. Multi-blade device with radius blades attached to pivoting frame and bracket, steel construction, with worm drive mechanism with removable key operator.

2.02 BACKDRAFT DAMPERS

A. Manufacturers:
   1. Louvers & Dampers, Inc, a brand of Mestek, Inc; [_____]: www.louvers-dampers.com/#sle.
   2. Nailor Industries, Inc; [_____]: www.nailor.com/#sle.

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3. PCI Industries, Inc; Pottorff Brand : www.portorff.com.
4. Ruskin Company; [_____]: www.ruskin.com/#sle.

B. Gravity Backdraft Dampers, Size 18 by 18 inches (450 by 450 mm) or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.03 DUCT ACCESS DOORS

A. Manufacturers:
1. Nailor Industries, Inc; [_____]: www.nailor.com/#sle.
2. Ruskin Company; [_____]: www.ruskin.com/#sle.
3. SEMCO LLC; [_____]: www.semcohvac.com/#sle.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

2.04 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.05 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.06 VOLUME CONTROL DAMPERS

A. Manufacturers:
1. Louvers & Dampers, Inc, a brand of Mestek, Inc; [_____]: www.louvers-dampers.com/#sle.
2. Nailor Industries, Inc; [_____]: www.nailor.com/#sle.
3. PCI Industries, Inc; Pottorff Brand : www.portorff.com.
4. Ruskin Company; [_____]: www.ruskin.com/#sle.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch (150 x 760 mm).

D. Quadrants:
1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.

B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch (200 x 200 mm) size for hand access, 18 x 18 inch (450 x 450 mm) size for shoulder access, and as indicated. Provide 4 x 4 inch (100 x 100 mm) for balancing dampers only. Review locations prior to fabrication.

D. Provide duct test holes where indicated and required for testing and balancing purposes.

E. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

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F. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.

G. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

NOT FOR BID

SECTION 23 37 00
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

1.02 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating 2015.

B. ARI 890 - Standard for Air Diffusers and Air Diffuser Assemblies; Air-Conditioning and Refrigeration Institute; 2008.

C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets 2006 (Reaffirmed 2011).

D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).

1.03 SUBMITTALS

A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.04 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Krueger: www.krueger-hvac.com.

B. Price Industries: www.price-hvac.com.

C. Titus: www.titus-hvac.com.

2.02 RECTANGULAR CEILING DIFFUSERS

A. Type: Provide square, stamped, multi-core, square, adjustable pattern, stamped, multi-core, square and rectangular, multi-louvered, square and rectangular, adjustable pattern, multi-louvered, and [_____] diffuser to discharge air in 360 degree, one way, two way, three way, four way, and [_____] pattern with sectorizing baffles where indicated.

B. Frame: Surface mount type. In plaster ceilings, provide plaster frame and ceiling frame.

C. Fabrication: Aluminum with baked enamel off-white finish.

2.03 CEILING SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, two-way deflection.

B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting and gasket.

C. Fabrication: Aluminum extrusions with factory off-white enamel finish.

D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.04 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch (19 mm) minimum depth, 3/4 inch (19 mm) maximum spacing, with blades set at 45 degrees, vertical face.

B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting.

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C. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

3.02 SCHEDULES SHOWN ON SHEET M0.1

END OF SECTION

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SECTION 26 00 10
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE

A. This section supplements all sections of this division and shall apply to all phases of work hereinafter specified, shown on the drawings, or required to provide a complete installation of electrical systems for the Project. The work required under this division is not limited to the electrical specifications and drawings. Refer to all bid documents including Civil, Architectural, Structural, and Mechanical documents which may designate Work to be accomplished. The intent of the Specifications is to provide a complete and operable electrical system, which shall include all documents that are a part of the entire Project Contract.

1. Work included: Furnish all labor, material, tools, equipment, facilities, transportation, skilled supervision necessary for, and incidental to, performing operations in connection with furnishing, delivery, and installation of the work in this division complete as shown or noted on the Drawings and specified herein.

B. Related Work Specified Elsewhere:

1. Refer to all sections in the general contract conditions, Contract Requirements and Division 1, General Requirements.

C. Work Installed but Furnished by Others:

1. The electrical work includes the installation or connection of certain materials and equipment furnished by others. Verify installation details. Foundations for apparatus and equipment will be furnished by others unless otherwise noted or detailed.

1.2 GENERAL REQUIREMENTS

A. Guarantee See General Conditions:

1. Except as may be specified under other Sections in the specification, guarantee equipment furnished under the specifications for a period of one year, except for equipment required to have a longer guarantee period, from date of final completion. Guarantee all work against defective workmanship, material, and improper installation. Upon notification of failure, correct deficiency immediately and without additional cost to the Owner.

2. Standard warranty of manufacturer shall apply for replacement of parts after expiration of the above period. Manufacturer shall furnish replacement parts to the Owner or his service agency as approved. Furnish to the Owner, through the

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Architect, printed manufacturer's warranties complete with material included and expiration dates, upon completion of project. Conform to Division 01.

B. Equipment Safety: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety.

C. Codes and Regulations:

1. Design, manufacturer, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications or standard rules of the following:

a. Institute of Electrical and Electronic Engineers - IEEE

b. National Electrical Manufacturers' Association - NEMA

c. Underwriters' Laboratories, Inc. - UL

d. National Fire Protection Association - NFPA

e. American Society for Testing and Materials - ASTM

f. American National Standards Institute - ANSI

g. California Electrical Code - CEC, Title 24, Part 3

h. California Code of Regulations, Title 8, Subchapter 5

i. California Building Code-CBC, Title 24 Parts 1 &2

j. State & Municipal Codes in Force in the Specific Project Area

k. Occupational Safety & Health Administration - OSHA

l. California State Fire Marshal

m. California Fire Code- CFC, Title 24 Part 9

n. National Electrical Testing Association - NETA

2. The term "Code", when used within the specifications, shall refer to the Publications, Standards, ordinances and codes, listed above. In the case where the codes have different levels of requirements the most stringent rules shall apply.

D. Requirements of Regulatory Agencies:

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1. Codes, Permits, and Fees: Where the Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply. The most stringent condition shall be as interpreted by the Engineer.

    a. Comply with all requirements for permits, licenses, fees and Code. Permits, licenses, fees, inspections and arrangements required for the Contractor at his expense shall obtain the Work, unless otherwise specified.

    b. Comply with the requirements of the applicable utility companies serving the Project. Make all arrangements with the utility companies for proper coordination of the Work.

E. Shop Drawings:

1. See Division 01 for additional requirements.

2. Time Schedules for Submission and Ordering: The Contractor shall prepare, review and coordinate his schedule of submissions carefully, determining the necessary lead time for preparing, submitting, checking, ordering and delivery of materials and equipment for timely arrival. The Contractor shall be responsible for conformance with the overall construction schedule.

3. Submittals will be checked for general compliance with specifications only. The Contractor shall be responsible for deviations from the drawings or specifications and for errors or omissions of any sort in submittals.

4. Submit a complete list of materials and equipment proposed for the job, including manufacturers names and catalog numbers.

5. Shop drawings shall be submitted in completed groups of materials (i.e., lighting fixtures or switchgear). The Contractor shall add and sign the following paragraph on equipment and materials submitted for review. "It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into the project; is in compliance with the Contract Drawings and specifications and can be installed in the allocated spaces". Failure to add the above written statement for compliance will result in return of submittals without review.

    a. Bind catalog cuts, plate numbers, descriptive bulletins and drawings, 11" x 17" (275 mm x 435 mm) or smaller, in sets with covers neatly showing titles.

    b. The Contractor shall verify dimensions of equipment and be satisfied as to Code compliance for fit prior to submitting shop drawings for approval.

    c. Where current limiting devices are specified, submit technical data to substantiate adequate protection of equipment cascaded

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downstream. Submittals shall not be reviewed unless supporting calculations and data are submitted therewith.

d. Include complete catalog information such as construction, ratings, insulation systems, as applicable.

e. For any material specified to meet UL or trade standards, furnish the manufacturers or vendor's certification that the material furnished for the work does in fact equal or exceed such specifications.

f. Reference listings to the specifications' Sections and Article to which each is applicable.

g. Equipment Floor Plans: After approval of material is secured prepare a floor plan of each electrical and communication equipment space, room or yard, drawn to scale at 1/2 inch equals 1 foot and submit for approval in the same manner as for shop drawings. The layout drawings shall be exact scale.

6. Contractor shall prepare coordinated drawings when required by Division 01 or where noted otherwise.

F. Interpretations: The Contractor through the Architect must make Requests for interpretations of drawings and specifications. Any such requests made by equipment manufacturers or suppliers will be referred to the Contractor.

G. Standard of Quality

1. The contract Drawings and Specifications establish the “MINIMUM STANDARD OF QUALITY” each product and/or system must meet to be considered acceptable. Products of other manufactures will be considered if the product and/or system meet or exceed the “MINIMUM STANDARD OF QUALITY” established by this Contract Document.

2. Items for similar application shall be of the same manufacturer.

3. The label of listing by UL shall appear on all materials and equipment for which standards have been established by the agency.

4. Where codes as listed in Section General Requirement Section of the Specifications that establish label or approved requirements, furnish all materials and equipment with either the required labels affixed or the necessary written approval.

5. Provide the type and quantity of electrical materials and equipment necessary to complete Work and all systems in operation, tested and ready for use.

6. Provide and install all incidental items that belong to the Work described and which are required for complete systems.

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7. All switchboards, distribution boards, panel boards and circuit breakers shall be of the same manufacturer.

8. All wiring devices such as switches and receptacles shall be of the same manufacturer.

H. Substitutions: Refer to Division 01

I. Submit comprehensive material list, shop drawings and complete technical data for the following equipment and materials:

1. General Requirements:

a. Main service and distribution switchboards.

b. Panelboards.

c. Conduits

d. Conductors, include all selected insulation types.

e. Fuses

f. Disconnect switches and Starters.

g. Pullboxes, manholes and handholes.

h. Standard lighting fixtures, specially fabricated fixtures, ballasts and lamps, with samples and sample of standard finish available (where requested).

i. Control devices, standard and special receptacles, switches, outlets and finish device plates.

j. Cabinets for signal and telephone system, special terminals and cabinets. Include all cabinet dimensions.

k. Fire alarm system.

l. Transformers

J. Record Drawings: Refer to Division 01, Contract Closeout.

K. Work Responsibilities:

1. The drawings indicate diagrammatically the desired locations or arrangement of conduit runs, outlets, junction boxes and equipment and are to be followed. Execute the work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations. The Contractor is responsible for the correct placing of his work. Where conflicts

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occur in plans and/or specifications, the most stringent application shall apply and shall be part of the base bid.

2. Locations shown on architectural plan or on wall elevations shall take precedence over electrical plan locations, but where a major conflict is evident, notify the Architect.

3. In the event minor changes in the indicated locations or arrangement are necessary due to developed conditions in the building construction or rearrangement of furnishings or equipment or due to interference with other trades, such changes shall be made without extra cost.

4. Verify dimensions and the correct location of Owner-Furnished equipment before proceeding with the roughing-in of connections.

5. All scaled and figured dimensions are approximate of typical equipment of the class indicated. Before proceeding with work carefully check and verify dimensions and sizes with the drawings to see that the furnished equipment will fit into the spaces provided without violation of applicable Codes.

6. Should any changes to the work indicated on the drawings or described in the specifications be necessary in order to comply with the above requirements, notify the Architect.

7. Contractor shall be responsible for coordination of coordinated drawings when required by the Architect.

8. Replace or repair, without additional compensation any work which does not comply with or which is installed in violation of any of these requirements.

L. Installation General: For special requirements, refer to specific equipment under these requirements.

1. Unless otherwise specified elsewhere in the specifications, do all excavating necessary for the proper installation of the electrical work.

2. Locations of Openings: Locate chases, shafts and openings required for the installation of the electrical work during framing of the structure. Do any additional cutting and patching required. Cutting or drilling in any structural member is prohibited without approval of the Architect. Furnish all access panels to make all boxes, connections and devices accessible as required by CEC.

3. Location of Sleeves: Where conduits pass through concrete walls, suspended slabs or metal deck floors, install sleeves of adequate size to permit installation of conduit. Sleeves shall be installed prior to pouring of concrete and shall have ends flush with the wall or extend 2 inches above floor surfaces. Verify locations.

NOT FOR BID

4. Wherever conduit extends through roof, install flashings in accordance with drawings and details.

5. Contractor shall be responsible for cutting and patching which may be required for the proper installation of the electrical work.

6. Protect work, materials and equipment and provide adequate and proper storage facilities during the progress of the work. Storage outdoors shall be weather protected and shall include space heaters to prevent condensation. Provide for the safety and good condition of all work until final acceptance of the work. Replace all damaged or defective work, materials and equipment before requesting final acceptance.

7. Conduit and Equipment to be Installed: Clean thoroughly to remove plaster, spattered paint, cement and dirt on both exterior and interior. All underground conduits shall be mandrelled prior to pulling wire.

8. Conduit and Equipment to be Painted: Clean conduit exposed to view in completed structure by removing plaster and dirt. Remove grease, oil and similar material from conduit and equipment by wiping with clean rags and suitable solvents in preparation for paint.

9. Items with Factory Finish: Remove cement, plaster, grease and oil, and leave surfaces, including cracks and corners, clean and polished. Touch up scratched or bare spots to match finish.

10. Site Cleaning: Remove from site all packing cartons, scrap materials and other rubbish on a weekly basis. Vacuum out all cabinets, switchgear and panels and junction boxes prior to pulling any conductors.

11. Electrical equipment and materials exposed to public and in finished areas shall be finish-painted after installation in accordance with the Painting Section. All exposed screw-type fasteners, exterior, or interior in restrooms, shall be vandal-resistant spanner type; include tool.

M. Excavation, Cutting and Patching:

1. Excavating, trenching and backfilling required for the work of this Division in accordance with the applicable requirements of Division 2. Excavating and backfilling connected with electrical work, repaving cuts and providing and maintaining protective measures for the electrical work excavation required by the governing authorities having jurisdiction shall be performed as a part of the work of this Division.

2. Verify openings indicated on the drawings. Provide all cutting, patching and reinforcement of the construction of the building as required to install electrical work.

NOT FOR BID

N. Tests

1. Equipment and systems for which the National Electrical Testing Association (NETA) has an approved or recommended procedure, shall be tested in accordance with that procedure. Test values shall equal values recommended by NETA. Copies of test reports shall be submitted as required under shop drawing submittals.

2. Resistance to ground tests shall be accomplished by a qualified independent testing firm to measure resistance to ground at grounding electrodes. Make tests before slabs or affected areas are poured in order that corrective measures, if required, may be taken. Submit a report showing the results of these measurements. If the resistances exceed values specified elsewhere or NETA test procedure recommendations, perform corrective measures required to reduce resistance to acceptable values.

3. Prior to energizing any motor, measure the service voltage for phase balance and report if unbalance exceeds 1% from mean.

4. Measure the three-phase voltage at no load and at maximum load conditions and submit to the engineer a report showing the results of these measurements.

5. Upon completion of the work and adjustment of all equipment, conduct an operating test. Conduct the test in the presence of an authorized representative of the Owner's Representative. Demonstrate system and equipment to operate in accordance with requirements of the Contract Documents and to be free from electrical and mechanical defects. Provide systems free from short circuits and grounds and show an insulation resistance between phase conductors and ground not less than the requirements of the governing electric code. Test circuits for proper neutral connection.

6. Complete tests prior to final inspection of project, including corrective work based on the results of the tests.

7. Perform special tests on systems and equipment as specified herein using personnel qualified to perform such tests.

O. Protection: Protect finish parts of the materials and equipment against damage during the progress of the work and until final completion and acceptance. Cover materials and equipment in storage and during construction in such a manner that no finished surfaces will be damaged or marred. Keep moving parts clean, dry and lubricated.

P. Cleaning Up:

1. Upon completion of the work and at various time during the progress of the work, remove from the building all surplus materials, rubbish and debris resulting from the work of this Division.

NOT FOR BID

2. Thoroughly clean switchgear including busses, apparatus, exposed conduit, metal work including the exterior and interior, and accessories for the work of this Division, of cement, plaster and other deleterious materials; remove grease and oil spots with cleaning solvent; carefully wipe surfaces and scrape cracks and corners clean.

3. Thoroughly polish chromium or plated work. Remove dirt and stains from lighting fixtures.

4. Leave the entire installation in a clean condition.

Q. Completion:

1. The work will not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, panel directories and nameplates specified herein have been approved and properly posted or installed and final cleaning of equipment and premises has been completed.

2. When the installation is complete and adjustments have been made, operate the system for a period of one week, during which time demonstrate that systems are completed and operating in conformance with the specifications.

R. Operating and Maintenance Data: Submit complete and at one time, prior to acceptance of the installation, 4 copies of manufacturer's instructions for operation and maintenance of electrical equipment, including replacement parts lists. As specified in Division 01

S. Inspection and Acceptance Procedures: The Architect will submit observation reports periodically during the construction phase detailing Contract deficiencies. The Contractor is responsible for making corrections immediately. Notice of Completion of the project will not be made until all items have been corrected.

T. Final Completion of Electrical Systems:

1. Prior to Final Completion of operating electrical systems, the Contractor shall:

a. Provide materials of the type and quality specified and as necessary for proper operation, tested and ready for use.

b. Furnish the required Operating and Maintenance Data/Manuals.

c. Clean up of the project pertaining to this Division of the work.

d. After installation has been completed and adjustments made, operate the system for a period of one week, during which time, demonstrate to the Architect that systems are complete and operating in conformance with Contract Documents.

NOT FOR BID

e. Conduct tests required and as specified in this Division and submit test reports and corrective actions taken.

f. Submission of warranties and guarantees.

2. Final Completion of Work Shall be Contingent On:

a. Contractor replacing defective materials and workmanship.

b. Upon completion of work and adjustments made, Contractor shall conduct an operating test for each system for approval at such time as Architect directs. Conduct test in presence of authorized representative of Architect and demonstrate that systems and equipment do operate in accordance with requirements of the Contract Documents and are free from electrical and mechanical defects.

c. Contractor shall provide the necessary training programs and instructions to the Owner's representative. Number of hours shall be a minimum of four (4) hours for each system or days as required under separate Sections of these Specifications. Complete operation and maintenance manuals shall be provided at least two (2) weeks prior to training.

d. Submit copies of manufacturer's instructions and maintenance of electrical equipment including replacement parts lists. Each set shall include one set of shop drawings of equipment installed.

U. Submittals for Change Orders: When changes are made during the construction phase, deletions and additions shall be presented in a manner that will indicate the cost of each item of material and corresponding labor. Markup shall be then added in accordance with the requirements of the General Conditions as modified by the Supplementary Conditions.

V. The Contractor at a time convenient to the Owner shall provide instruction to the Owner's operating personnel in the proper operation and maintenance of all equipment and systems. The instructors shall have received factory training and shall be thoroughly familiar with the equipment installed. The operating personnel shall receive the number of days instruction as indicated in other sections.

1.3 PROJECT RECORD DOCUMENTS

A. Record Drawings: CAD: Use a computer aided drafting (CAD) system in the preparation of record drawings for this Project. Acceptable CAD systems shall be capable of producing files in AutoCAD Version 2004 compatible DWG or DXF format. Owner's consultant will furnish CAD backgrounds for use by the Contractor after construction is 85% complete except where prohibited by Contract.

NOT FOR BID

B. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.

C. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.

D. Final Record Drawings: Conform to Division 01 requirements.

E. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.

F. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.

G. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.

H. At all times when the work is in progress, maintain at the workplace, fabrication shop or Project Site as applies, a complete separate, clean, undamaged set of the latest stamped, actioned submittals. As work progresses, maintain records of "as installed" conditions on this set in suitable ink or chemical fluid. Update the set daily. After successful completion of Project Site testing specified herein, and after completion of Punch List corrections, copy all records of "as installed" conditions on to originals.

I. Quantity:

1. Review sets:As for Shop and Field Drawings.

2. Record set:Refer to Division 01.

J. Content: All drawings required under "Field and Shop Drawings". Show "as installed" condition. Where room designations according to Project permanent signage differ from construction designations in the Contract Documents, show both designations.

K. Warranty Certificates: Comply with Division 01.

END OF SECTION

NOT FOR BID

SECTION 26 05 19
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single conductor building wire.

B. Wiring connectors.

C. Electrical tape.

D. Heat shrink tubing.

E. Wire pulling lubricant.

F. Cable ties.

1.2 RELATED REQUIREMENTS

A. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.3 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.

F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes 2013.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2009.

NOT FOR BID

I. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.

J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.

L. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.

M. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.

N. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.

O. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.

P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.

3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

B. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

NOT FOR BID

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

D. Underground feeder and branch-circuit cable is not permitted.

E. Service entrance cable is not permitted.

F. Armored cable is not permitted.

G. Metal-clad cable is not permitted.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Provide new conductors and cables manufactured not more than one year prior to installation.

D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

E. Comply with NEMA WC 70.

F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

H. Conductor Material:

NOT FOR BID

1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.

2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.

3. Tinned Copper Conductors: Comply with ASTM B33.

I. Minimum Conductor Size:

1. Branch Circuits: 12 AWG.

a. Exceptions:

1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.

2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.

3) 20 A, 277 V circuits longer than 150 feet (46 m): 10 AWG, for voltage drop.

2. Control Circuits: 14 AWG.

J. Conductor Color Coding:

1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.

2. Color Coding Method: Integrally colored insulation.

a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.

3. Color Code:

a. 480Y/277 V, 3 Phase, 4 Wire System:

1) Phase A: Brown.

2) Phase B: Orange.

3) Phase C: Yellow.

4) Neutral/Grounded: Gray.

b. 208Y/120 V, 3 Phase, 4 Wire System:

NOT FOR BID

1) Phase A: Black.

2) Phase B: Red.

3) Phase C: Blue.

4) Neutral/Grounded: White.

c. Equipment Ground, All Systems: Green.

2.3 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:

1. Copper Building Wire:

a. Cerro Wire LLC: www.cerrowire.com/#sle.

b. Encore Wire Corporation: www.encorewire.com/#sle.

c. Southwire Company: www.southwire.com/#sle.

d. Rome Wire and Cable.

e. Okonite Wire

f. Pirelli Wire and Cable

g. Carol Cable

B. Description: Single conductor insulated wire.

C. Conductor Stranding:

1. Feeders and Branch Circuits:

a. Size 10 AWG and Smaller: Solid.

b. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:

1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

a. Size 4 AWG and Larger: Type XHHW-2.

b. Installed Underground: Type XHHW-2.

NOT FOR BID

2.4 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Wiring Connectors for Splices and Taps:

1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.

2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

C. Wiring Connectors for Terminations:

1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.

2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.

3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.

4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.

D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.

F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

G. Mechanical Connectors: Provide bolted type or set-screw type.

H. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.5 WIRING ACCESSORIES

A. Electrical Tape:

NOT FOR BID

1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.

4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).

5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.

C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

NOT FOR BID

3.2 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.3 INSTALLATION

A. Circuiting Requirements:

1. Unless dimensioned, circuit routing indicated is diagrammatic.

2. When circuit destination is indicated without specific routing, determine exact routing required.

3. Arrange circuiting to minimize splices.

4. Include circuit lengths required to install connected devices within 10 ft (3.0 m) of location indicated.

5. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.

6. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Installation in Raceway:

1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.

2. Pull all conductors and cables together into raceway at same time.

3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.

4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

NOT FOR BID

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

G. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.

H. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.

I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

K. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.

2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.

3. Do not remove conductor strands to facilitate insertion into connector.

4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

NOT FOR BID

1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.

    a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.

2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.

    a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.

    b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.

3. Wet Locations: Use heat shrink tubing.

M. Insulate ends of spare conductors using vinyl insulating electrical tape.

N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

O. Identify conductors and cables in accordance with Section 26 05 53.

P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section Firestopping.

Q. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.4 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

C. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

NOT FOR BID

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

<<<<<<<<< UPDATE NOTES

PART 1 GENERAL

2.1 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

2.2 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

C. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.

D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

2.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Verify exact locations of underground metal water service pipe entrances to building.

2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.

3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

2.4 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

B. Field quality control test reports.

NOT FOR BID

C. Project Record Documents: Record actual locations of grounding electrode system components and connections.

2.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

2.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

3.1 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:

1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.

2. Grounding Electrode System: Not greater than 25 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.

E. Grounding Electrode System:

1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.

a. Provide continuous grounding electrode conductors without splice or joint.

NOT FOR BID

b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.

2. Metal Underground Water Pipe(s):

a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.

b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.

c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.

3. Metal In-Ground Support Structure:

a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.

4. Concrete-Encased Electrode:

a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.

5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

F. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.

2. --CHOOSE ONE OF THE TWO SUBPARAGRAPHS BELOW--

3. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.

4. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.

NOT FOR BID

5. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

6. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.

7. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

3.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.

2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:

1. Use insulated copper conductors unless otherwise indicated.

a. Exceptions:

1) Use bare copper conductors where installed underground in direct contact with earth.

2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.

2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.

3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

NOT FOR BID

PART 3 EXECUTION

4.1 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

4.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.

2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.

3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.

4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D. Identify grounding and bonding system components in accordance with Section 26 05 53.

4.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.13.

C. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

NOT FOR BID

D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

NOT FOR BID

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.

1.3 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

D. MFMA-4 - Metal Framing Standards Publication 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.

2. Coordinate the work with other trades to provide additional framing and materials required for installation.

3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

NOT FOR BID

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems.

B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.6 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.

2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supportedwith a minimum safety factor of 5 times the applied force. Include consideration for vibration, equipment operation, and shock loads where applicable.

4. Do not use products for applications other than as permitted by NFPA 70 and product listing.

NOT FOR BID

5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.

    a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.

    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.

    c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

    d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.

1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.

2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

1. Comply with MFMA-4.

2. Channel Material:

    a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.

    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2. New Concrete: Use preset concrete inserts.

3. Existing Concrete: Use expansion anchors.

NOT FOR BID

4. Solid or Grout-Filled Masonry: Use expansion anchors.
5. Hollow Masonry: Use toggle bolts.
6. Hollow Stud Walls: Use toggle bolts.
7. Steel: Use welded threaded studs complying with AWS D1.1/D1.1M with lock washers and nuts or Beam clamps (MSS Type 19 21 23 25 or 27) complying with MSS SP-69.
8. Wood: Fasten with lag screws or through bolts.
9. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

NOT FOR BID

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

I. Secure fasteners according to manufacturer's recommended torque settings.

J. Remove temporary supports.

3.3 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete or Cast-in-Place Concrete (Limited Applications)" as applicable.

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

2. Install anchor bolts to elevations required for proper attachment to supported equipment.

NOT FOR BID

3. Install anchor bolts according to anchor-bolt manufacturers written instructions.

3.4 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

NOT FOR BID

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

<<<< UPDATE NOTES

SPECIFYING STRATEGY

2.1 STEP 1: REVIEW OPTIONAL "CONDUIT APPLICATIONS" ARTICLE UNDER PART 2.

2.2 STEP 2: REVIEW "CONDUIT REQUIREMENTS" ARTICLE UNDER PART 2.

2.3 STEP 3: REVIEW CONDUIT PRODUCT ARTICLES UNDER PART 2.

A. Links for some products should already be activated according to selections made in "CONDUIT APPLICATIONS" article, if included.

2.4 STEP 4: REVIEW PART 3.

2.5 STEP 5: REVIEW PART 1.

A. Pay particularly close attention to "RELATED REQUIREMENTS" article for conduit requirements that might need to be specified elsewhere.

2.6 ----------

2.7

PART 1 GENERAL

3.1 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. PVC-coated galvanized steel rigid metal conduit (RMC).

C. Flexible metal conduit (FMC).

D. Liquidtight flexible metal conduit (LFMC).

E. Electrical metallic tubing (EMT).

F. Rigid polyvinyl chloride (PVC) conduit.

G. Conduit fittings.

H. Accessories.

3.2 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2015.

NOT FOR BID

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2015.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2013.

E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit 2018.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2013.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2016.

J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.

L. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Steel Conduit Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

3.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.

NOT FOR BID

4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

3.4 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

B. Project Record Documents: Record actual routing for conduits installed underground and conduits 2 inch (53 mm) trade size and larger.

3.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

4.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:

1. Under Slab on Grade: Use rigid PVC conduit.

2. Exterior, Direct-Buried: Use rigid PVC conduit.

3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.

4. Where rigid polyvinyl (PVC) conduitlarger than 2 inch (53 mm) trade size is provided, use PVC-coated galvanized steel rigid metal conduit elbows for bends.

NOT FOR BID

5. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.

6. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.

D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

E. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).

F. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.

1. Locations subject to physical damage include, but are not limited to:

a. Where exposed below 8 feet (2.4 m), except within electrical and communication rooms or closets.

J. Exposed, Exterior: Use galvanized steel rigid metal conduit.

K. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.

L. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.

1. Maximum Length: 6 feet (1.8 m).

M. Connections to Vibrating Equipment:

1. Dry Locations: Use flexible metal conduit.

2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.

3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.

4. Vibrating equipment includes, but is not limited to:

NOT FOR BID

a. Transformers.

b. Motors.

N. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

4.2 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Minimum Conduit Size, Unless Otherwise Indicated:

1. Branch Circuits: 3/4 inch (21 mm) trade size.

2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.

3. Control Circuits: 1/2 inch (16 mm) trade size.

4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.

5. Underground, Exterior: 1 inch (27 mm) trade size.

D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

4.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:

1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

4.4 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil (1.02 mm).

NOT FOR BID

C. PVC-Coated Fittings:

1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.

2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.

3. Material: Use steel or malleable iron.

4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil (1.02 mm).

D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil (0.38 mm).

4.5 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

4.6 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

4.7 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

NOT FOR BID

2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use compression (gland) or set-screw type.

   a. Do not use indenter type connectors and couplings.

4.8 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:

1. Manufacturer: Same as manufacturer of conduit to be connected.

2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

4.9 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).

PART 3 EXECUTION

5.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Conduit Routing:

1. Unless dimensioned, conduit routing indicated is diagrammatic.

NOT FOR BID

2. When conduit destination is indicated without specific routing, determine exact routing required.

3. Conceal all conduits unless specifically indicated to be exposed.

4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.

5. Arrange conduit to maintain adequate headroom, clearances, and access.

6. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.

7. Arrange conduit to provide no more than 150 feet (46 m) between pull points.

8. Route conduits above water and drain piping where possible.

9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.

10. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.

11. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:

    a. Heaters.

    b. Hot water piping.

    c. Flues.

12. Group parallel conduits in the same area together on a common rack.

G. Conduit Support:

1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.

4. Use conduit strap to support single surface-mounted conduit.

NOT FOR BID

a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.

5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.

6. Use conduit clamp to support single conduit from beam clamp or threaded rod.

7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.

8. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).

9. Use of spring steel conduit clips for support of conduits is not permitted.

10. Use of wire for support of conduits is not permitted.

H. Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.

2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.

3. Use suitable adapters where required to transition from one type of conduit to another.

4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.

5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.

6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.

7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

I. Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.

2. Make penetrations perpendicular to surfaces unless otherwise indicated.

NOT FOR BID

3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.

4. Conceal bends for conduit risers emerging above ground.

5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.

6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.

7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.

8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

J. Underground Installation:

1. --CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

2. Minimum Cover, Unless Otherwise Indicated or Required:

a. Underground, Exterior: 24 inches (610 mm).

b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.

3. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length.

K. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section Concrete with minimum concrete cover of 3 inches (76 mm) on all sides unless otherwise indicated.

L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.

2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.

NOT FOR BID

3. Where conduits are subject to earth movement by settlement or frost.

M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:

1. Where conduits pass from outdoors into conditioned interior spaces.

2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

N. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.

O. Provide grounding and bonding in accordance with Section 26 05 26.

P. Identify conduits in accordance with Section 26 05 53.

5.2 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

C. Correct deficiencies and replace damaged or defective conduits.

5.3 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

5.4 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

NOT FOR BID

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

1.2 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2018.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

I. UL 508A - UL Standard for Safety Industrial Control Panels 2018.

J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

NOT FOR BID

3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.

4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.

5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.

6. Coordinate the work with other trades to preserve insulation integrity.

7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.

8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.4 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for floor boxes and underground boxes/enclosures.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.1 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.

2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.

3. Provide products listed, classified, and labeled as suitable for the purpose intended.

4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:

NOT FOR BID

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use suitable concrete type boxes where flush-mounted in concrete.
4. Use suitable masonry type boxes where flush-mounted in masonry walls.
5. Use raised covers suitable for the type of wall construction and device configuration where required.
6. Use shallow boxes where required by the type of wall construction.
7. Do not use "through-wall" boxes designed for access from both sides of wall.
8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
12. Minimum Box Size, Unless Otherwise Indicated:
    a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
    b. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
    c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
13. Wall Plates: Comply with Section 26 27 26.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):

1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.

NOT FOR BID

2. NEMA 250 Environment Type, Unless Otherwise Indicated:

3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):

   a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Box Locations:

1. Locate boxes to be accessible. Provide access panels in accordance with Section Access Panels as requiredwhere approved by the Architect.

2. Unless dimensioned, box locations indicated are approximate.

3. Locate boxes as required for devices installed under other sections or by others.

   a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.

4. Locate boxes so that wall plates do not span different building finishes.

5. Locate boxes so that wall plates do not cross masonry joints.

6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.

7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.

NOT FOR BID

8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) horizontal separation.

9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.

    a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.

    b. Do not install flush-mounted boxes with area larger than 16 square inches (0.0103 sq m) or such that the total aggregate area of openings exceeds 100 square inches (0.0645 sq m) for any 100 square feet (9.29 sq m) of wall area.

10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.

11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:

    a. Concealed above accessible suspended ceilings.

    b. Within joists in areas with no ceiling.

    c. Electrical rooms.

    d. Mechanical equipment rooms.

H. Box Supports:

1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

I. Install boxes plumb and level.

J. Flush-Mounted Boxes:

1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.

NOT FOR BID

2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.

3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.

K. Install boxes as required to preserve insulation integrity.

L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

N. Close unused box openings.

O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

P. Provide grounding and bonding in accordance with Section 26 05 26.

3.2 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.3 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

NOT FOR BID

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Underground warning tape.

F. Warning signs and labels.

1.2 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

B. Section 26 27 26 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

1.3 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 70E - Standard for Electrical Safety in the Workplace 2018.

E. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:

NOT FOR BID

1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.

2. Do not install identification products until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

B. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.7 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.

a. Switchboards:

1) Identify ampere rating and name.

2) Identify voltage and phase.

3) Identify power source and circuit number. Include location when not within sight of equipment.

4) Use identification nameplate to identify main overcurrent protective device.

5) Use identification nameplate to identify load(s) served for each branch device.Identify spares and spaces.

b. Panelboards:

1) Identify ampere rating and name.

NOT FOR BID

2) Identify voltage and phase.

3) Identify power source and circuit number. Include location when not within sight of equipment.

4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.

5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device.Identify spares and spaces.

c. Transformers:

1) Identify kVA rating and name.

2. Service Equipment:

a. Use identification nameplate to identify each service disconnecting means.

3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.

a. Service equipment.

b. Industrial control panels.

c. Motor control centers.

d. Elevator control panels.

e. Industrial machinery.

4. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.

a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).

b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

B. Identification for Conductors and Cables:

NOT FOR BID

1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.

2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:

    a. At each source and load connection.

    b. Within boxes when more than one circuit is present.

    c. Within equipment enclosures when conductors and cables enter or leave the enclosure.

4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.

C. Identification for Raceways:

1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet (6.1 m).

2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.

3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.

4. Use underground warning tape to identify underground raceways.

D. Identification for Boxes:

1. Use voltage markers to identify highest voltage present.

2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.

    a. For exposed boxes in public areas, use only identification labels.

E. Identification for Devices:

NOT FOR BID

1. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.

2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.

    a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.

3. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

F. Identification for Luminaires:

1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Materials:

    a. Indoor Clean, Dry Locations: Use plastic nameplates.

    b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.

2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.

    a. Exception: Provide minimum thickness of 1/8 inch (3 mm) when any dimension is greater than 4 inches (100 mm).

3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.

NOT FOR BID

2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:

1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend:
    a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
    a. Equipment Designation: 1/2 inch (13 mm).
    b. Other Information: 1/4 inch (6 mm).
5. Color:
    a. Normal Power System: White text on black background.

D. Format for Caution and Warning Messages:

1. Minimum Size: 2 inches (51 mm) by 4 inches (100 mm).
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch (13 mm).
5. Color: Black text on yellow background unless otherwise indicated.

E. Format for Receptacle Identification:

1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).
2. Legend: Power source and circuit number or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch (5 mm).
5. Color: Black text on clear background.

F. Format for Control Device Identification:

1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).

NOT FOR BID

2. Legend: Load controlled or other designation indicated.

3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height: 3/16 inch (5 mm).

5. Color: Black text on clear background.

2.3 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch (3 mm).

F. Color: Black text on white background unless otherwise indicated.

2.4 VOLTAGE MARKERS

A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

C. Minimum Size:

1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.

2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches (29 by 110 mm).

3. Markers for Junction Boxes: 1/2 by 2 1/4 inches (13 by 57 mm).

D. Legend:

1. Markers for Voltage Identification: Highest voltage present.

E. Color: Black text on orange background unless otherwise indicated.

NOT FOR BID

2.5 UNDERGROUND WARNING TAPE

A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Non-detectable Type Tape: 6 inches (152 mm) wide, with minimum thickness of 4 mil (0.1 mm).

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:

2.6 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:

1. Materials:

2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.

2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.

3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:

1. Surface-Mounted Equipment: Enclosure front.

2. Flush-Mounted Equipment: Inside of equipment door.

3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.

4. Elevated Equipment: Legible from the floor or working platform.

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5. Branch Devices: Adjacent to device.
6. Interior Components: Legible from the point of access.
7. Conduits: Legible from the floor.
8. Boxes: Outside face of cover.
9. Conductors and Cables: Legible from the point of access.
10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.

G. Mark all handwritten text, where permitted, to be neat and legible.

3.2 FIELD QUALITY CONTROL

A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

NOT FOR BID

SECTION 26 05 73
POWER SYSTEM STUDIES

PART 1 GENERAL

1.1 REFERENCE STANDARDS

A. NEMA MG 1 - Motors and Generators 2018.

B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work to provide equipment and associated protective devices complying with criteria for selection and adjustment, as determined by studies to be performed.

2. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Submit study reports prior to or concurrent with product submittals.

2. Do not order equipment until matching study reports and product submittals have both been evaluated by Architect.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Study reports, stamped or sealed and signed by study preparer.

1.4 POWER SYSTEM STUDIES

A. Scope of Studies:

1. Except where study descriptions below indicate exclusions, analyze system at each bus from primary protective devices of utility source down to each piece of equipment involved, including parts of system affecting calculations being performed (e.g. fault current contribution from motors).

2. Include in analysis alternate sources and operating modes (including known future configurations) to determine worst case conditions.

B. General Study Requirements:

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1. Comply with NFPA 70.

2. Perform studies utilizing computer software complying with specified requirements; manual calculations are not permitted.

C. Data Collection:

1. Compile information on project-specific characteristics of actual installed equipment, protective devices, feeders, etc. as necessary to develop single-line diagram of electrical distribution system and associated input data for use in system modeling.

a. Utility Source Data: Include primary voltage, maximum and minimum three-phase and line-to-ground fault currents, impedance, X/R ratio, and primary protective device information.

1) Obtain up-to-date information from Utility Company.

b. Generators: Include manufacturer/model, kW and voltage ratings, and impedance.

c. Motors: Include manufacturer/model, type (e.g. induction, synchronous), horsepower rating, voltage rating, full load amps, and locked rotor current or NEMA MG 1 code letter designation.

d. Transformers: Include primary and secondary voltage ratings, kVA rating, winding configuration, percent impedance, and X/R ratio.

e. Protective Devices:

1) Circuit Breakers: Include manufacturer/model, type (e.g. thermal magnetic, electronic trip), frame size, trip rating, voltage rating, interrupting rating, available field-adjustable trip response settings, and features (e.g. zone selective interlocking).

2) Fuses: Include manufacturer/model, type/class (e.g. Class J), size/rating, and speed (e.g. time delay, fast acting).

f. Protective Relays: Include manufacturer/model, type, settings, current/potential transformer ratio, and associated protective device.

g. Conductors: Include feeder size, material (e.g. copper, aluminum), insulation type, voltage rating, number per phase, raceway type, and actual length.

D. Study Reports:

1. General Requirements:

a. Identify date of study and study preparer.

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b. Identify study methodology and software product(s) used.

c. Identify scope of studies, assumptions made, implications of possible alternate scenarios, and any exclusions from studies.

d. Identify base used for per unit values.

e. Include single-line diagram and associated input data used for studies; identify buses on single-line diagram as referenced in reports, and indicate bus voltage.

f. Include conclusions and recommendations.

1.5 QUALITY ASSURANCE

A. Study Preparer Qualifications: Professional electrical engineer licensed in the State in which the Project is located and with minimum five years experience in the preparation of studies of similar type and complexity using specified computer software.

B. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.

END OF SECTION

NOT FOR BID

SECTION 26 09 43
NETWORK LIGHTING CONTROLS - NLIGHT

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Network lighting control system and components:

1. Touch panel controls
2. Lighting management panels
3. Lighting management modules
4. Low voltage wall stations
5. Power interfaces
6. Wired sensors

1.2 RELATED DOCUMENTS

A. Section 262726 Wiring Devices

B. Section 260923 Lighting Control Devices

C. Section 260943.13 Digital-Network Lighting Controls

D. Section 260943.16 Addressable Fixture Lighting Control

E. Section 260943.19 Wireless Network Lighting Controls

F. Section 265113 Interior Lighting Fixtures

1.3 SUMMARY

A. The lighting control system specified in this section shall provide time-based, sensor-based (both occupancy and daylight), and manual lighting control

B. The system shall be capable of turning lighting loads on/off as well as dimming lights (if lighting load is capable of being dimmed). Specific dimmers will be capable of "dimming lights to off"

C. All system devices shall be networked together, enabling digital communication between devices, and shall be individually addressed.

D. The system architecture shall be capable of enabling stand-alone groups (rooms) of devices to function in some default capacity, even if network connectivity to the greater system is lost.

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E. The system architecture shall facilitate remote operation via a computer connection.

F. The system shall not require any centrally hardwired switching equipment.

G. The system shall be capable of wireless, wired, or hybrid wireless/wired architectures.

1.4 SUBMITTALS

A. Product Datasheets (general device descriptions, dimensions, electrical specifications, wiring details, nomenclature)

B. Riser Diagrams – typical per room type (detailed drawings showing device interconnectivity of devices)

C. Other Diagrams – as needed for special operation or interaction with other system(s)

D. Example Contractor Startup/Commissioning Worksheet – must be completed prior to factory start-up

E. Hardware and Software Operation Manuals

F. Other operational descriptions as needed

1.5 PROJECT CLOSEOUT DOCUMENTATION

A. Provide a factory published manual

1. Warranty

2. Technical support contact

3. Electronic manual on manufacturer's website for free download

1.6 QUALITY ASSURANCE

A. All steps in sensor manufacturing process shall occur in North America; including population of all electronic components on circuit boards, soldering, programming, wiring, and housing.

B. All components and the manufacturing facility where product was manufactured must be RoHS compliant.

C. In high humidity or cold environments, the sensors shall be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.

D. All applicable products must be UL / CUL Listed or other acceptable national testing organization.

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1.7 PROJECT CONDITIONS

A. Only install equipment after the following site conditions are maintained:

1. Ambient Temperature 14 to 105 degrees F (-10 to 40 degrees C)
2. Relative Humidity less than 90% non-condensing
3. Standard electrical enclosures are permanently installed
4. Equipment is protected from dust, debris and moisture

1.8 WARRANTY

A. Five (5) year 100% parts replacement

1.9 MAINTENANCE & SUSTAINABILITY

A. Provide new parts, upgrades, and/or replacements available for a minimum of 5 years available to the end user

B. Provide free telephone technical support

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable: Acuity Brands Lighting, Inc. – System: nLight by Acuity Controls

B. Basis of controls design Manufacturer: Acuity Brands, One Lithonia Way, Conyers GA 30012, www.acuitycontrols.com

C. Substitutions: Not Permitted {Under Division 1}:

1. All substitutions must be submitted in writing for approval at least 14 days prior to bid date.
2. Proposed substitute products must be documented with a line by line compliance review

2.2 SYSTEM REQUIREMENTS

A. System shall have an architecture that is based upon three main concepts; 1) intelligent lighting control devices 2) standalone lighting control zones 3) network backbone for remote or time based operation.

B. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these

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components into a single device enclosure should be permissible so as to minimize overall device count of system.

C. System must interface directly with intelligent LED luminaires such that only CAT-5 cabling is required to interconnect luminaires with control components such as sensors and switches (see Networked LED Luminaire section).

D. Intelligent lighting control devices shall communicate digitally, require <7 mA of current to function (Graphic wall stations excluded), and possess RJ-45 style connectors.

E. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.

F. Devices within a lighting control zone shall be connected with CAT-5e low voltage cabling in any order.

G. Lighting control zone shall be capable of automatically configuring itself for default operation without any start-up labor required.

H. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.

I. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, controls enabled luminaires, or from the network backbone. Standalone “bus power supplies” shall not be required in all cases.

J. All switching and dimming for a specific lighting zone shall take place within the devices located in the zone itself (i.e. not in remotely located devices such as panels) to facilitate system robustness and minimize wiring requirements. Specific applications that require centralized or remote switching shall be capable of being accommodated.

K. System shall have one or more primary wall mounted network control “gateway” devices that are capable of accessing and controlling connected system devices and linking into an Ethernet LAN.

L. System shall use “bridge” devices that route communication and distribute power for up to 8 directly connected lighting zones together for purposes of decreasing system wiring requirements.

M. System shall be capable of wirelessly connecting a lighting zone to a WiFi (802.11n) wireless data network for purposes of eliminating the “bridge” devices and all cabling that connects zones to bridge devices.

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N. WiFi enabled devices shall be able to detect when WiFi network is down and revert to a user directed default state.

O. WiFi-enabled devices shall be capable of current monitoring

P. WiFi-enabled devices shall utilize WPA2 AES encryption

Q. WiFi-enabled devices shall be able to connect to 802.11b/g/n WiFi networks

R. WiFi-enabled devices shall have two local RJ-45 port for communicating with non WiFi-enabled system devices

S. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control schedules and profiles.

T. Individual lighting zones shall be capable of being segmented into several “local” channels of occupancy, photocell, and switch functionality for more advanced configurations and sequences of operation.

U. Devices located in different lighting zones shall be able to communicate occupancy, photocell (non-dimming), and switch information via either the wired or WiFi backbone.

V. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week, utilization of a space. Note: Operating modes should be utilized only in manners consistent with local energy codes.

1. Auto-On / Auto-Off (via occupancy sensors)

2. • Zones with occupancy sensors automatically turn lights on when occupant is detected.

a. • Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.

1) • Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until switch is pressed again, restoring the sensor to Automatic On functionality.

(a) Manual-On / Auto-Off (also called Semi-Automatic)

2) • Pushing a switch will turn lights on.

3) • Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.

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(a) Manual-On to Auto-On/Auto-Off

4) • Pushing a switch will turn lights on.

5) • After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.

6) • Sequence can be reset via scheduled (ex. daily each morning) events.

(a) Auto-to-Override On

7) • Zones with occupancy sensors automatically turn lights on when occupant is detected.

8) • Zone lighting then goes into an override on state for a set amount of time, or until the next time event returns the lighting to an auto-off style of control.

9) • Sequence can be reset via scheduled (ex. daily each morning) events.

(a) Manual-to-Override On

10) • Pushing a switch will turn lights on.

11) • Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.

12) • Sequence can be reset via scheduled (ex. daily each morning) events.

(a) Auto On / Predictive Off

13) • Zones with occupancy sensors automatically turn lights on when occupant is detected.

14) • Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.

15) • Pressing the switch will turn the lights off and a short “exit timer” begins. After the timer expires, sensor scans the room to detect whether occupant is still present. If no occupancy is detected, zone returns to auto-on. If occupancy is detected, lights must be turned on via the switch.

(a) Multi-Level Operation (multiple lighting levels per manual button press)

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16) • Operating mode designed specifically for bi-level applications.

17) • Enables the user to cycle through up to four potential on/off/dim low/dim high lighting states using only a single button.

18) • Eliminates user confusion as to which of two buttons controls which load

19) • Three different transition sequences are available in order to comply with energy codes or user preference).

20) • Mode available as a setting on all devices that have single manual on/off switch (ex. nPODM, nPODM-DX, nWSX LV).

21) • Depending on the sequence selected, every button push steps through relay/dimming states according to below table

22) • In addition to achieving bi-level lighting control by switching loads with relays, the ability to command dimming outputs to “step” in a sequence that achieves bi-level operation is present.

3. A taskbar style desktop application shall be available for personal lighting control.

4. An application that runs on “smart” handheld devices (such as an Apple® IPhone®) shall be available for personal lighting control.

5. Control software shall enable logging of system performance data and presenting thisl information in a web-based format and downloadable to .CSV files.

6. Control software shall enable integration with a BMS via BACnet IP, although a hardware BACnet IP integration solution is also available.

7. System shall provide the option of having pre-terminated plenum rated CAT-5e cabling supplied with hardware.

2.3 INDIVIDUAL DEVICE SPECIFICATIONS

A. Control module (gateway)

1. Control module shall be a device that facilitates communication and time-based control of downstream network devices and linking into an Ethernet network.

2. Devices shall have a user interface that is capable of wall mounting, powered by low voltage, and have a touch screen.

3. Control device shall have three RJ-45 ports for connection to the graphic touch screen, other backbone devices bridges) or directly to lighting control devices(up to 128 per port).

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4. Device shall automatically detect all devices downstream of it.
5. Device shall have a standard and astronomical internal time clock.
6. Device shall have one RJ-45 10/100 BaseT Ethernet connection.
7. Device shall have a USB port
8. Each control gateway device shall be capable of linking 1500 devices to the management software, with reduced memory version capable of support up to 400 devices.
9. Device shall be capable of using a dedicated static or DHCP assigned IP address.
10. Network Control Gateway device shall be the following nLight model Series:
    a. nGWY2
11. Networked system occupancy sensors
    a. Occupancy sensors shall sense the presence of human activity within the desired space and fully control the on/off function of the lights.
    b. Sensors shall utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic or Microwave based sensing technologies shall not be accepted.
    c. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional “dual” technology shall be used.
    d. Dual technology sensors shall have one of its two technologies not require motion to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT) which both looks for occupant motion and listens for sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) shall not be acceptable.
    e. All sensing technologies shall be acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonics technology. Ultrasonic or Microwave based sensing technologies shall not be accepted.

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f. Sensors shall be available with zero or one integrated dry contact switching relays, capable of switching 1 amp at 24 VAC/VDC (resistive only).

g. Sensors shall be available with one or two occupancy “poles”, each of which provides a programmable time delay.

h. Sensors shall be available in multiple lens options which are customized for specific applications.

i. Communication and Class 2 low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.

j. All sensors shall have two RJ-45 ports or capable of utilizing a splitter.

k. All sensors shall have the ability to detect when it is not receiving valid communication (via CAT-5 connections) and blink its LED in a pattern to visually indicate of a potential wiring issue

l. Every sensor parameter shall be available and configurable remotely from the software and locally via the device push-button.

m. Sensors shall be able to function together with other sensors in order to provide expanded coverage areas by simply daisy-chain wiring together the units with CAT-5 cabling.

n. Sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements.

o. Wall switch sensors shall recess into single-gang switch box and fit a standard GFI opening.

p. Wall switch sensors must meet NEC grounding requirements by providing a dedicated ground connection and grounding to mounting strap. Line and load wire connections shall be interchangeable. Sensor shall not allow current to pass to the load when sensor is in the unoccupied (Off) condition.

q. Wall switch sensors shall have optional features for photocell/daylight override, and low temperature/high humidity operation.

r. Wall switch sensors shall be available in four standard colors (Ivory, White, Light Almond, Gray)

s. Wall switch sensors shall be available with optional raise/lower dimming adjustment controls.

t. Wall switch sensors shall be the following nLight model numbers, with device color and optional features as specified:

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1) nWSX (PIR, 1 Relay)

2) nWSX PDT (Dual Tech, 1 Relay)

3) nWSX LV (PIR, No Relay)

4) nWSX PDT LV (Dual Tech, No Relay)

5) nWSX LV NL (PIR w/ Night Light, No Relay)

6) nWSX PDT LV NL (Dual Tech w/ Night Light, No Relay)

7) nWSX LV DX (PIR, No Relay, Raise/Lower Dim Ctrl)

8) nWSX PDT LV DX (Dual Tech, No Relay,Raise/Lower Dim Ctrl)

(a) Network system shall have sensors that can be embedded into luminaire such that only the lens shows on luminaire face.

(1) Embedded sensors shall be capable of both PIR and Dual Technology occupancy detection

(2) Embedded sensors shall have an optional photocell

(3) Embedded sensors shall be the following nLight model number:

(4) nES 7 (PIR, No Relay)

(5) nES 7 ADCX (PIR w/ Photocell, No Relay)

(6) nES PDT 7 (Dual Technology, No Relay)

(7) nES PDT 7 ADCX (Dual Technology w/ Photocell, No Relay)

(8) Network system shall also have ceiling, fixture, recessed, & corner mounted sensors available.

(9) Sensors shall have optional features for photocell/daylight override, dimming control, and low temperature/high humidity operation.

(10) Sensors shall be the following nLight model numbers, with device options as specified:

B. Model # Series Occupancy Poles # of Relays Lens Type Detection Technology

C. nCM(B) 9 1 - Standard PIR

D. nCM(B) 9 2P 2 - Standard PIR

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E. nCM 9 RJB 1 - Standard PIR

F. nCM 9 2P RJB 2 - Standard PIR

G. nCM(B) PDT 9 1 - Standard Dual

H. nCM(B) PDT 9 2P 2 - Standard Dual

I. nCM PDT 9 RJB 1 - Standard Dual

J. nCM PDT 9 2P RJB 2 - Standard Dual

K. nCM(B) 10 1 - Extended PIR

L. nCM(B) 10 2P 2 - Extended PIR

M. nCM 10 RJB 1 - Extended PIR

N. nCM 10 2P RJB 2 - Extended PIR

O. nCM(B) PDT 10 1 - Extended Dual

P. nCM(B) PDT 10 2P 2 - Extended Dual

Q. nCM PDT 10 RJB 1 - Extended Dual

R. nCM PDT 10 2P RJB 2 - Extended Dual

S. 1 - Standard PIR

T. nRM PDT 9 1 - Standard Dual

U. nRM 10 1 - Extended PIR

V. nRM PDT 10 1 - Extended Dual

W. 1 - High Bay PIR

X. nRM 50 1 - Aisle Way PIR

Y. nWV 16 1 - Wide View PIR

Z. nWV PDT 16 1 - Wide View Dual

AA. 1 - Hallway PIR

BB. nCM(B) 6 1 - High Bay PIR

CC. nCM 6 RJB 1 - High Bay PIR

1. Networked system daylight (photocell and/or dimming) sensors

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a. Photocell shall provide for an on/off set-point, and a deadband to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.

b. Photocell and dimming sensor's set-point and deadband shall be automatically calibrated through the sensor's microprocessor by initiating an "Automatic Set-point Programming" procedure. Min and max dim settings as well as set-point may be manually entered.

c. Deadband setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).

d. Photocell and dimming sensors shall be equipped with an automatic override for100 hour burn-in of lamps. This feature must be available at any time for lamp replacements. (Note: This function should be performed prior to any dimming of the lamps including the "auto set-point" setting.)

e. Combination units that have all features of on/off photocell and dimming sensors shall also be available.

f. A dual zone option shall be available for On/Off Photocell, Automatic Dimming Control Photocell, or Combination units. The second zone shall be capable of being controlled as an "offset" from the primary zone.

g. Sensor shall be the following nLight model numbers, with device options as specified:

1) nCM(B) PC (RJB) (on/off)

2) nCM(B) PC DZ (RJB) (on/off control, dual zone)

3) nCM(B) ADCX (RJB) (remote automatic dimming control photocell)

4) nCM(B) ADCX DZ (RJB) (remote automatic dimming control photocell, dual zone)

5) nRM PC (on/off)

6) nRM PC DZ (on/off, dual zone)

7) nRM ADCX (remote automatic dimming control photocell)

8) nRM ADCX DZ (remote automatic dimming control photocell, dual zone)

(a) Network system shall have dimming photocells that can be embedded into luminaire such that only the lens shows on luminaire face.

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(1) Embedded sensors shall be the following nLight model number:

9) nES ADCX (Dimming Photocell)

2. Networked System Power (Relay) Packs

a. Power Packs shall incorporate one Class 1 relay, a 0-10 VDC dimming output, and contribute low voltage power to the rest of the system. Secondary Packs shall incorporate the relay and 0-10 VDC or line voltage dimming output, but shall not be required to contribute system power. Power Supplies shall provide system power only, but are not required to switch line voltage circuit. Auxiliary Relay Packs shall switch low voltage circuits only.

b. Power Packs shall accept 120 or 277 VAC (or optionally 347 VAC), be plenum rated, and provide Class 2 power to the system.

c. All devices shall have two RJ-45 ports.

d. Every Power Pack parameter shall be available and configurable remotely from the software and locally via the device push-button.

e. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple or be capable of being secured within a luminaire ballast channel. Plastic clips into junction box shall not be accepted. All Class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.

f. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All Class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.

g. Power Packs and Power Supplies shall be available that are WiFi enabled.

h. Power Packs (Secondary) shall be available that provide up to 16 Amp switching of all lighting load types.

i. Power Packs shall be available that provide up to 5 Amps switching of all lighting load types as well as 0-10 VDC dimming or fluorescent ballasts/LED drivers.

j. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120 VAC incandescent lighting loads or 120/277 VAC line voltage dimmable fluorescent ballasts (2-wire and 3-wire versions).

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k. Specific Secondary Packs shall be available that provide up to 5 Amps of switching and can dim 120/277 VAC magnetic low voltage transformers.

l. Specific Secondary Packs shall be available that provide up to 4 Amps of switching and can dim 120 VAC electronic low voltage transformers.

m. Specific Power/Secondary Packs shall be available that are UL924 listed for switching of Emergency Power circuits.

n. Specific Secondary Packs shall be available that control louver/damper motors for skylights.

o. Specific Secondary Packs shall be available that provide a pulse on/pulse off signal for purposes of controlling shade systems via relay inputs.

p. Power (Secondary) Packs shall be available that provide up to 20 Amps switching of general purposed receptacle (plug-load) control.

q. Power (Relay) Packs and Supplies shall be the following nLight model numbers:

1) nPP16 (Power Pack w/ 16A relay)

2) nPP16 D (Power Pack w/ 16A relay and 0-10VDC dimming output)

3) nPP16 WIFI (Power Pack w/ 16A relay, WIFI enabled)

4) nEPP5 D (Power Pack w/ 5A relay and 0-10VDC dimming output)

5) nSP16 (Secondary Pack w/ 16A relay)

6) nPP16 ER (UL924 Listed Secondary Pack w/ 16A relay for switching emergency power circuits)

7) nPP16 D ER UL924 Listed Secondary Pack w/ 16A relay and 0-10VDC dimming output for switching/dimming emergency power circuits)

8) nSP5 PCD 2W (Secondary Pack w/ 5A relay and incandescent dimming or 2-wire line voltage fluorescent dimming output)

9) nSP5 PCD 3W (Secondary Pack w/ 5A relay and 3-wire line voltage fluorescent dimming output)

10) nSP5 PCD MLV (Secondary Pack w/ 5A relay and magnetic low voltage dimming output)

11) nSP5 PCD ELV 120 (Secondary Pack w/ 4A relay and electronic low voltage dimming output)

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12) nSP5 2P LVR (Louver/Damper Control Pack

13) nSHADE (Pulse On/Off Control Pack

14) nPP20 PL (Secondary Pack w/ 20A relay for general purpose receptacle load)

15) nPS 80 (Auxiliary Bus Power Supply)

16) nPS 80 WIFI (Auxiliary Bus Power Supply, WiFi enabled)

17) nAR 40 (Low voltage auxiliary relay pack)

3. Networked System Relay & Dimming Panels

   a. Panel shall incorporate up to 4 normally closed latching relays capable of switching 120/277 VAC or up to 2 Dual Phase relays capable of switching 208/240/480 VAC loads.

   b. Relays shall be rated to switch up to a 30A ballast load at 277 VAC.

   c. Panel shall provide one 0-10VDC dimming output paired with each relay.

   d. Panel shall power itself from an integrated 120/277 VAC supply.

   e. Panel shall be capable of operating as either two networked devices or as one.

   f. Panel shall supply current limited low voltage power to other networked devices connected via CAT-5.

   g. Panel shall provide auxiliary low voltage device power connected wired directly to a dedicated terminal connection.

   h. Power (Relay) Packs and Supplies shall be the following nLight model numbers:

      1) nPANEL 4 (Panel w/ four 120/277 VAC relays and four 0-10 VDC dimming outputs)

      2) nPANEL 2 480 (Panel w/ two dual phase relays (208/240/480 VAC) and two 0-10 VDC dimming outputs)

4. Networked Auxiliary Input / Output (I/O) Devices

   a. Devices shall be plenum rated and be inline wired, screw mountable, or have an extended chase nipple for mounting to a ½" knockout.

   b. Devices shall have two RJ-45 ports

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c. Communication and low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.

d. Specific I/O devices shall have a dimming control output that can control 0-10 VDC dimmable ballasts or LED drivers by sinking up to 20 mA of current.

e. Specific I/O devices shall have an input that reads a 0-10 VDC signal from an external device.

f. Specific I/O devices shall have a switch input that can interface with either a maintained or momentary switch and run a switch event (toggle the lighting load) or run a local/remote control profile.

g. Specific I/O devices shall sense state of low voltage outdoor photocells.

h. Specific I/O devices shall enable RS-232 communication between lighting control system and Touch Screen based A/V control systems.

i. Specific I/O devices shall sense momentary and maintained contact closures, and either toggle a connected load after a momentary contact or ramp the load high/low during a maintained contact (stopping when the contact releases).

j. Auxiliary Input/Output Devices shall be the following nLight model numbers:

1) nIO D (I/O device with 0-10 dimming output)

2) nIO 1S or nIO RLX (I/O device with contact closure or 0-10VDC dimming input)

3) nIO NLI (Input device for detecting state of low voltage outdoor photocell; sold in nIO PC KIT only)

4) nIO X (Interface device for communicating with RS-232 enabled AV Touch Screens

5. Networked LED Luminaires

a. -Networked LED luminaire shall have a mechanically integrated control device

b. Networked LED luminaire shall have two RJ-45 ports available (via control device directly or incorporated RJ-45 splitter)

c. Networked LED luminaire shall be able to digitally network directly to other network control devices (sensors, photocells, switches, dimmers)

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d. Networked LED luminaire shall provide low voltage power to other networked control devices (excluding EMG versions)

e. System shall be able to turn on/off specific LED luminaires without using a relay, if LED driver supports “sleep mode”

f. System shall be able to maintain constant lumen output over the specified life of the LED luminaire (also called lumen compensation) by varying the input control power (and thus saving up to 20% power usage).

g. System shall indicate (via a blink warning) when the LED luminaire has reached its expected life (in hrs).

h. Integrated control devices shall be the following nLight model series:

1) nIO LEDG (ER)

6. nIO EZ PH (ER)
7. nPS 80 EZ (ER)
8. nEPS 60 IO EZ
9. nEIO EZ LC (ER)

a. LED Luminaires shall be the following Acuity Brands LED fixtures, which come factory enabled with nLight devices:

1) Lithonia model families:

2) RTL(X)

3) TL(X)

4) VTL(X)

5) FSL(X)

6) ACL(X)

7) ALL(S)

8) AVL

9) BZL

10) GTL

11) SBS

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12) IBL/IBH
13) PTN
14) LDN
15) DOM
16) WL
17) STL
    (a) Gotham model families:
        (1) EVO
        (2) Incito
    (b) Mark model families:
        (1) Slot 2/4/6
        (2) Fin
        (3) Veil
        (4) Whisper
        (5) Nol
        (6) SPR
    (c) Peerless model families:
        (1) Vellum
        (2) Mino
        (3) Round 2/4
        (4) Square
        (5) Origami
        (6) Bruno
        (7) Staple
        (8) Lightline
        (9) Lightedge

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(10) Icetray

(11) Cerra

(12) Prima

(13) Naro

(14) Tulip

(15) Envision

(16) Aero

(17) Enzo

10. Networked System Wall Switches & Dimmers

    a. Devices shall recess into single-gang switch box and fit a standard GFI opening.

    b. Communication and low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.

    c. All devices shall have two RJ-45 ports.

    d. All devices shall provide toggle switch control. Dimming control and low temperature/high humidity operation are available options.

    e. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).

    f. Devices with mechanical push-buttons shall provide tactile and LED user feedback.

    g. Devices with mechanical push-buttons shall be made available with custom button labeling

    h. Devices with a single “on” button shall be capable of selecting all possible lighting combinations for a bi-level lighting zone such that the user confusion as to which of two buttons (as is present in multi-button scenarios) controls which load is eliminated.

    i. Wall switches & dimmers shall be the following nLight model numbers, with device options as specified:

        1) nPODM (single on/off, push-buttons, LED user feedback)

        2) nPODM DX (single on/off, single dimming raise/lower, push-buttons, LED user feedback)

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3) nPODM 2P (dual on/off, push-buttons, LED user feedback)

4) nPODM 2P DX (dual on/off, dual dimming raise/lower, push-buttons, LED user feedback)

5) nPODM 4P (quad on/off, push-buttons, LED user feedback)

6) nPODM 4P DX (quad on/off, quad dimming raise-lower, push-buttons, LED user feedback)

11. Networked System Graphic Wall Station

a. Device shall have a 3.5” full color touch screen for selecting up to 16 programmable lighting control preset scenes or acting as up to 16 on/off/dim control switches.

b. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).

c. Device shall enable configuration of all switches, dimmers, and lighting preset scenes via password protected setup screens.

d. Device shall enable user supplied .jpg screen saver image to be uploaded.

e. Device shall surface mount to single-gang switch box.

f. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply.

g. Device shall have a micro-USB style connector for local computer connectivity.

h. Device shall have two RJ-45 ports for communication

i. Device shall be the following nLight model number:

1) nPOD GFX

12. Networked System Scene Controllers

a. Device shall have two, three, four, or eight buttons for selecting programmable lighting control profiles or acting as on/off switches.

b. Devices shall be available in four colors (Ivory, White, Light Almond, Gray).

c. Device shall recess into single-gang switch box and fit a standard GFI opening.

d. Devices shall provide LED user feedback.

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e. Communication and Class 2 low voltage power shall be delivered to each device via standard CAT-5 low voltage cabling with RJ-45 connectors.

f. All devices shall have two RJ-45 ports.

g. Device shall be capable of reprogramming other devices in its zone so as to implement user selected lighting scene.

h. Device shall be capable of selecting a lighting profile be run by the system's upstream Gateway so as to implement selected lighting profile across multiple zones (and not just its local zone).

i. Device shall have LEDs indicating current selection.

j. Scene Selector device shall be the following nLight model number:

1) nPODM 2S (2 Scene, push-button)

2) nPODM 4S (4 Scene, push-button)

3) nPODM 4S DX (4 Scene, push-button, On/Off/Raise/Lower)

4) nPODM 2L (2 Adjustable Preset Levels, push-button, On/Off)

5) nPODM 2L AB (2 Scene, push-button, On/Off/High/Low)

6) nPODM 4L DX (4 Adjustable Preset Levels, push-button, On/Off/Raise/Lower)

13. Communication Bridges

a. Device shall surface mount to a standard 4" x 4" square junction box.

b. Device shall have 8 RJ-45 ports.

c. Device shall be capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to Control Gateway.

d. Device shall be powered with Class 2 low voltage supplied locally via a directly wired power supply or delivered via a CAT-5 cabled connection.

e. Device shall be capable of redistributing power from its local supply and connect lighting control zones with excess power to lighting control zones with insufficient local power. This architecture also enables loss of power to a particular area to be less impactful on network lighting control system.

f. Communication Bridge devices shall be the following nLight model numbers:

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g. nBRG 8 (8 Ports)

2.4 LIGHTING CONTROL PROFILES

A. Changes to the operation of the system shall be capable of being made in real-time or scheduled via lighting control profiles. These profiles are outlines of settings that direct how a collection of devices function for a defined time period.

B. Lighting control profiles shall be capable of being created and applied to a single device, zone of devices, or customized group of zones.

C. All relays and dimming outputs shall be capable of being scheduled to track or ignore information regarding occupancy, daylight, and local user switches via lighting control profiles.

D. Specific device parameters (e.g. sensor time delay and photocell set-point) shall be configurable via a lighting control profile.

E. All lighting control profiles shall be stored on the network control gateway device, with a system backup on the software's host server.

F. Lighting control profiles shall be capable of being scheduled to run according to the following calendar options: start date/hour/minute, end date/hour/minute, and sunrise/sunset +/- timed offsets.

G. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.

H. Daylight savings time adjustments shall be capable of being performed automatically, if desired.

I. Lighting control profile schedules shall be capable of being given the following recurrence settings: daily, weekday, weekend, weekly, monthly, and yearly.

J. Software shall provide a graphical tool for easily viewing scheduled lighting control profiles.

2.5 MANAGEMENT SOFTWARE

A. Every device parameter (e.g. sensor time delay and photocell set-point) shall be available and configurable remotely from the software

B. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current PIR Status, current Microphonics Status, remaining occupancy time delay(s), current photocell reading, current photocell inhibiting state, photocell transitions time remaining, current dim level, device temperature, and device relay state(s).

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C. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom label(s), and parent network device.

D. A printable network inventory report shall be available via the software.

E. A printable report detailing all system profiles shall be available via the software.

F. Software shall require all users to login with a User Name and Password.

G. Software shall provide at least three permission levels for users.

H. All sensitive stored information and privileged communication by the software shall be encrypted.

I. All device firmware and system software updates must be available for automatic download and installation via the internet.

J. Software shall be capable of managing systems interconnected via a WAN (wide area network)

2.6 BMS COMPATIBILITY

A. System shall provide a BACnet IP gateway as a downloadable software plug-in to its management software.

B. BACnet IP connection shall also be available utilizing JACE-600 hardware unit.

C. BACnet IP hardware shall be capable of supporting up to 1500 total devices across up to 5 total Gateways

D. BACnet IP connection shall communicate information gathered by networked system to other building management systems.

E. BACnet IP connection shall translate and forward lighting relay and other select control commands from BMS system to networked control devices via profiles stored in the system Gateway. All system devices shall be available for polling for devices status.

F. BACnet IP hardware device shall be the following nLight model name:

1. nBACnet

2.7 SYSTEM ENERGY ANALYSIS & REPORTING SOFTWARE

A. System shall be capable of reporting lighting system events and performance data back to the management software for display and analysis.

B. Intuitive graphical screens shall be displayed in order to facilitate simple viewing of system energy performance.

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C. An “Energy Scorecard” shall be display that shows calculated energy savings in dollars, KWHr, or CO2.

D. Software shall calculate the allocation of energy savings to different control measures (occupancy sensors, photocells, manual switching, etc).

E. Energy savings data shall be calculated for the system as a whole or for individual zones.

F. A time scaled graph showing all relay transitions shall be presented.

G. A time scaled graph showing a zones occupancy time delay shall be presented

H. A time scaled graph showing the total light level shall be presented.

I. User shall be able to customize the baseline run-time hours for a space.

J. User shall be able to customize up to four time-of-day billing rates and schedules.

K. Data shall be made available via a .CSV file

2.8 START-UP & SUPPORT FEATURES

A. To facilitate start-up, all devices daisy-chained together (using CAT-5) shall automatically be grouped together into a functional lighting control zone.

B. All lighting control zones shall be able to function according to default settings once adequate power is applied and before any system software is installed.

C. Once software is installed, system shall be able to auto-discover all system devices without requiring any commissioning.

D. All system devices shall be capable of being given user defined names.

E. All devices within the network shall be able to have their firmware upgraded remotely and without being physically uninstalled for purposes of upgrading functionality at a later date.

F. All sensor devices shall have the ability to detect improper communication wiring and blink it’s LED in a specific cadence as to alert installation/startup personnel.

END OF SECTION

NOT FOR BID

SECTION 26 21 00
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 2 PRODUCTS

1.1 ELECTRICAL SERVICE REQUIREMENTS

A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.

B. Products Furnished by Contractor: Comply with Utility Company requirements.

END OF SECTION

NOT FOR BID

SECTION 26 22 00
LOW-VOLTAGE TRANSFORMERS

<<<<<<<<< UPDATE NOTES

PART 1 GENERAL

2.1 SECTION INCLUDES

A. General purpose transformers.

2.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate the work with placement of supports, anchors, etc. required for mounting.

4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

2.3 SUBMITTALS

A. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

1. Vibration Isolators: Include attachment method and rated load and deflection.

B. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.

2.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

NOT FOR BID

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

2.5 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2 PRODUCTS

3.1 MANUFACTURERS

A. Eaton Corporation: www.eaton.com.

B. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.

C. Siemens Industry, Inc: www.usa.siemens.com.

D. Source Limitations: Furnish transformers produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

3.2 TRANSFORMERS - GENERAL REQUIREMENTS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:

1. Altitude: Less than 3,300 feet (1,000 m).

2. Ambient Temperature:

a. Greater than 10 kVA: Not exceeding 104 degrees F (40 degrees C).

b. Less than 10 kVA: Not exceeding 77 degrees F (25 degrees C).

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core

NOT FOR BID

laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

3.3 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Insulation System and Allowable Average Winding Temperature Rise:

1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.

2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

C. Coil Conductors: Continuous copper windings with terminations brazed or welded.

D. Winding Taps:

1. Less than 3 kVA: None.

2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.

3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.

4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.

E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.

F. Sound Levels: Standard sound levels complying with NEMA ST 20

G. Mounting Provisions:

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1. Less than 15 kVA: Suitable for wall mounting.
2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
3. Larger than 75 kVA: Suitable for floor mounting.

H. Transformer Enclosure: Comply with NEMA ST 20.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
2. Construction: Steel.
   a. Less than 15 kVA: Totally enclosed, non-ventilated.
   b. 15 kVA and Larger: Ventilated.
3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
4. Provide lifting eyes or brackets.

3.4 SOURCE QUALITY CONTROL

A. Factory test transformers according to NEMA ST 20.

PART 3 EXECUTION

4.1 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Use flexible conduit, under the provisions of Section 26 05 33.13, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

F. Install transformers plumb and level.

G. Transformer Support:

1. Provide required support and attachment in accordance with Section 26 05 29, where not furnished by transformer manufacturer.
2. Use integral transformer flanges to support wall-mounted transformers.

NOT FOR BID

3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 03 30 00.

4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

H. Provide grounding and bonding in accordance with Section 26 05 26.

I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.

4.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS Sections 7.2.1.1 and 7.2.1.2. Tests and inspections listed as optional are not required.

4.3 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.

B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

4.4 CLEANING

A. Clean dirt and debris from transformer components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

NOT FOR BID

SECTION 26 24 13
SWITCHBOARDS

<<<< UPDATE NOTES

PART 1 GENERAL

2.1 SECTION INCLUDES

A. Low-voltage (600 V and less) switchboards and associated accessories for service and distribution applications.

B. Overcurrent protective devices for switchboards.

2.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

4. Coordinate with manufacturer to provide shipping splits suitable for the dimensional constraints of the installation.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Service Entrance Switchboards:

1. Coordinate with Utility Company to provide switchboards with suitable provisions for electrical service and utility metering, where applicable.

2. Coordinate with Owner to arrange for Utility Company required access to equipment for installation and maintenance.

3. Obtain Utility Company approval of switchboard prior to fabrication.

4. Arrange for inspections necessary to obtain Utility Company approval of installation.

NOT FOR BID

2.3 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for switchboards, enclosures, overcurrent protective devices, and other installed components and accessories.

B. Shop Drawings: Indicate dimensions, voltage, bus ampacities, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1. Include dimensioned plan and elevation views of switchboards and adjacent equipment with all required clearances indicated.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual installed locations of switchboards and final equipment settings.

E. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Enclosure Keys: Two of each different key.

2.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

2.5 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store switchboards in accordance with manufacturer's instructions, NECA 400, and NEMA PB 2.1.

B. Store in a clean, dry space having a uniform temperature to prevent condensation (including outdoor switchboards, which are not weatherproof until completely and properly installed). Where necessary, provide temporary enclosure space heaters or temporary power for permanent factory-installed space heaters.

C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

NOT FOR BID

D. Handle carefully to avoid damage to switchboard internal components, enclosure, and finish.

2.6 FIELD CONDITIONS

A. Maintain field conditions within required service conditions during and after installation.

PART 2 PRODUCTS

3.1 MANUFACTURERS

A. Switchboards - Basis of Design: Eaton.

B. Switchboards- Other Acceptable Manufacturers:

1. Eaton Corporation; [_____]: www.eaton.com/#sle.

2. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.

3. Siemens Industry, Inc: www.usa.siemens.com/#sle.

C. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

D. Source Limitations: Furnish switchboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

3.2 SWITCHBOARDS

A. Provide switchboards consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Description: Dead-front switchboard assemblies complying with NEMA PB 2, and listed and labeled as complying with UL 891; ratings, configurations and features as indicated on the drawings.

D. Service Entrance Switchboards:

1. Listed and labeled as suitable for use as service equipment according to UL 869A.

2. For solidly-grounded wye systems, provide factory-installed main bonding jumper between neutral and ground busses, and removable neutral disconnecting link for testing purposes.

NOT FOR BID

3. Comply with Utility Company requirements for electrical service.

4. Utility Metering Provisions: Provide separate barriered compartment complying with Utility Company requirements where indicated or where required by Utility Company. Include hinged sealable door and provisions for Utility Company current transformers (CTs), potential transformers (PTs), or potential taps as required.

E. Service Conditions:

1. Provide switchboards and associated components suitable for operation at indicated ratings under the service conditions at the installed location.

F. Short Circuit Current Rating:

1. --CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

2. Provide switchboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

3. Listed series ratings are not acceptable.

G. Main Devices: Configure for top or bottom incoming feed as indicated or as required for the installation. Provide separate pull section and/or top-mounted pullbox as indicated or as required to facilitate installation of incoming feed.

H. Bussing: Sized in accordance with UL 891 temperature rise requirements.

1. Through bus (horizontal cross bus) to be fully rated through full length of switchboard (non-tapered). Tapered bus is not permitted.

2. Provide solidly bonded equipment ground bus through full length of switchboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

3. Phase and Neutral Bus Material: Copper.

4. Ground Bus Material: Copper.

I. Conductor Terminations: Suitable for use with the conductors to be installed.

1. Line Conductor Terminations:

a. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

b. Main and Neutral Lug Type: Mechanical.

2. Load Conductor Terminations:

NOT FOR BID

a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

b. Lug Type:

1) Provide mechanical lugs.

J. Enclosures:

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

a. Indoor Clean, Dry Locations: Type 1 or Type 2 (drip-proof).

b. Outdoor Locations: Type 3R.

2. Finish: Manufacturer's standard unless otherwise indicated.

3. Outdoor Enclosures:

a. Color: Manufacturer's standard.

b. Access Doors: Lockable, with all locks keyed alike.

K. Future Provisions:

1. Prepare designated spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

2. Equip distribution sections with full height vertical bussing to accommodate maximum utilization of space for devices.

3. Where designated spaces for future device provisions are not indicated, include provisions for minimum of 6 device(s) rated at 25 percent of rating of switchboard main or incoming feed.

4. Arrange and equip through bus and ground bus to accommodate future installation of additional switchboard sectionswhere indicated.

L. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.

1. Where overcurrent protective devices equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.

2. Where accessory ground fault sensing and relaying equipment is used, equip companion overcurrent protective devices with ground-fault shunt trips.

a. Use zero sequence or residual ground fault detection method unless otherwise indicated.

NOT FOR BID

b. Provide test panel and field-adjustable ground fault pick-up and delay settings.

M. --CHOOSE ONE OF THE THREE PARAGRAPHS BELOW--

N. Instrument Transformers:

1. Comply with IEEE C57.13.

2. Select suitable ratio, burden, and accuracy as required for connected devices.

3. Current Transformers: Connect secondaries to shorting terminal blocks.

4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

3.3 OVERCURRENT PROTECTIVE DEVICES

A. Circuit Breakers:

1. Interrupting Capacity:

a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.

b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.

2. Molded Case Circuit Breakers:

a. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers; listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.

1) Provide thermal magnetic circuit breakers unless otherwise indicated.

b. Minimum Interrupting Capacity:

1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.

2) 14,000 rms symmetrical amperes at 480 VAC.

c. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.

d. Provide the following features and accessories where indicated or where required to complete installation:

NOT FOR BID

1) Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.

3.4 SOURCE QUALITY CONTROL

A. Factory test switchboards according to NEMA PB 2, including the following production (routine) tests on each switchboard assembly or component:

1. Dielectric tests.
2. Mechanical operation tests.
3. Grounding of instrument transformer cases test.
4. Electrical operation and control wiring tests, including polarity and sequence tests.
5. Ground-fault sensing equipment test.

PART 3 EXECUTION

4.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the switchboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive switchboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

4.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install switchboards in accordance with NECA 1 (general workmanship), NECA 400, and NEMA PB 2.1.

C. Arrange equipment to provide required clearances and maintenance access, including accommodations for any drawout devices.

D. Where switchboard is indicated to be mounted with inaccessible side against wall, provide minimum clearance of 1/2 inch (10 mm) between switchboard and wall.

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Install switchboards plumb and level.

G. Provide grounding and bonding in accordance with Section 26 05 26.

H. Install all field-installed devices, components, and accessories.

NOT FOR BID

I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.

J. --CHOOSE ONLY ONE OF THE TWO PARAGRAPHS BELOW WHERE APPLICABLE--

K. Set field-adjustable circuit breaker tripping function settingsas directed.

L. Set field-adjustable ground fault protection pickup and time delay settingsas directed.

M. Provide filler plates to cover unused spaces in switchboards.

4.3 FIELD QUALITY CONTROL

A. Before energizing switchboard, perform insulation resistance testing in accordance with NECA 400 and NEMA PB 2.1.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.1.

D. Molded Case and Insulated Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than [_____] amperes. Tests listed as optional are not required.

E. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.

1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.

F. Instrument Transformers: Perform inspections and tests listed in NETA ATS, Section 7.10. The dielectric withstand tests on primary windings with secondary windings connected to ground listed as optional are not required.

G. Test shunt trips to verify proper operation.

H. Correct deficiencies and replace damaged or defective switchboards or associated components.

4.4 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of switchboard covers and doors.

NOT FOR BID

4.5 CLEANING

A. Clean dirt and debris from switchboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred surfaces to match original factory finish.

4.6 PROTECTION

A. Protect installed switchboards from subsequent construction operations.

END OF SECTION

NOT FOR BID

SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Power distribution panelboards.

B. Overcurrent protective devices for panelboards.

1.2 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

1.3 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e (Amended 2017).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2018.

E. NEMA PB 1 - Panelboards 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.

G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.

H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

K. UL 67 - Panelboards Current Edition, Including All Revisions.

L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

NOT FOR BID

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.

4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.5 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

C. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Panelboard Keys: Two of each different key.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

NOT FOR BID

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Eaton Corporation: www.eaton.com.

B. Schneider Electric; Square D Products: www.schneider-electric.us.

C. Siemens Industry, Inc: www.usa.siemens.com.

D. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.2 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet (2,000 m).

2. Ambient Temperature:

a. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).

C. Short Circuit Current Rating:

NOT FOR BID

1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.

1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.

2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

a. Outdoor Locations: Type 3R.

2. Boxes: Galvanized steel unless otherwise indicated.

a. Provide wiring gutters sized to accommodate the conductors to be installed.

3. Fronts:

a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.

b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.

4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

J. Load centers are not acceptable.

2.3 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

NOT FOR BID

B. Conductor Terminations:

1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

2. Main and Neutral Lug Type: Mechanical.

C. Bussing:

1. Phase and Neutral Bus Material: Copper.

2. Ground Bus Material: Copper.

D. Circuit Breakers:

1. Provide bolt-on type.

2. Provide thermal magnetic circuit breakersfor circuit breaker frame sizes less than 225 amperes.

3. Provide electronic trip circuit breakersfor circuit breaker frame sizes 225 amperes and above.

E. Enclosures:

1. Provide surface-mounted or flush-mounted enclosuresas indicated.

2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.

3. Provide clear plastic circuit directory holder mounted on inside of door.

2.4 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:

1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.

2. Interrupting Capacity:

a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:

1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.

2) 14,000 rms symmetrical amperes at 480 VAC.

NOT FOR BID

b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.

3. Conductor Terminations:

a. Provide mechanical lugs unless otherwise indicated.

b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.

5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.

6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

7. Do not use tandem circuit breakers.

8. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Install panelboards plumb.

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G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.

I. Provide minimum of six spare 1 inch (27 mm) trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

J. Provide grounding and bonding in accordance with Section 26 05 26.

K. Install all field-installed branch devices, components, and accessories.

L. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.

M. Provide filler plates to cover unused spaces in panelboards.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than [_____] amperes. Tests listed as optional are not required.

C. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.4 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

3.5 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

NOT FOR BID

SECTION 26 28 13
FUSES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fuses.

1.2 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses 2012.

B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements Current Edition, Including All Revisions.

D. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses Current Edition, Including All Revisions.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.

2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.

3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.4 SUBMITTALS

A. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

1.5 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

NOT FOR BID

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Bussmann, a division of Eaton Corporation: www.cooperindustries.com.

B. Littelfuse, Inc: www.littelfuse.com.

C. Mersen: ep-us.mersen.com.

2.2 APPLICATIONS

A. Individual Motor Branch Circuits: Class RK1, time-delay.

2.3 FUSES

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.

C. Provide fuses of the same type, rating, and manufacturer within the same switch.

D. Comply with UL 248-1.

E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

F. Voltage Rating: Suitable for circuit voltage.

G. Class R Fuses: Comply with UL 248-12.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Do not install fuses until circuits are ready to be energized.

B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

NOT FOR BID

SECTION 26 32 13
ENGINE GENERATORS

PART 2 PRODUCTS

1.1 PACKAGED ENGINE GENERATOR SYSTEM

A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. System Description:

1. Application: Emergency/standby.

2. Configuration: Single packaged engine generator set operated independently (not in parallel).

D. Packaged Engine Generator Set:

1. Type: Diesel (compression ignition).

2. Power Rating: [__125___] kW, standby.

3. Voltage: As indicated on drawings.

E. Generator Set General Requirements:

1. Prototype tested in accordance with NFPA 110 for Level 1 systems.

2. Factory-assembled, with components mounted on suitable base.

3. List and label engine generator assembly as complying with UL 2200.

4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.

5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.

F. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.

G. Starting and Load Acceptance Requirements:

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1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.

2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.

3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).

4. Maximum Load Step: Supports 100 percent of rated load in one step.

H. Exhaust Emissions Requirements:

1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.

2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.

1.2 ENGINE AND ENGINE ACCESSORY EQUIPMENT

A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.

B. Engine Fuel System - Diesel (Compression Ignition):

1. Fuel Source: Diesel, ASTM D975 No. 2-D or approved cold weather diesel blends.

2. Fuel Storage: Sub-base fuel tank.

3. Engine Fuel Supply: Provide engine-driven, positive displacement fuel pump with replaceable fuel filter(s), water separator, check valve to secure prime, manual fuel priming pump, and relief-bypass valve. Provide fuel cooler where recommended by manufacturer.

4. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.

5. Sub-Base Fuel Tank:

a. Provide sub-base mounted, double-wall fuel tank with secondary containment; listed and labeled as complying with UL 142.

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b. Tank Capacity: Size for minimum of 24 hours of continuous engine generator operation at 100 percent rated load, but not larger than permissible by applicable codes.

c. Features:

1) Direct reading fuel level gauge.

2) Normal atmospheric vent.

3) Emergency pressure relief vent.

4) Fuel fill opening with lockable cap.

5) Dedicated electrical conduit stub-up area.

C. Engine Starting System:

1. System Type: Electric, with DC solenoid-activated starting motor(s).

2. Battery(s):

a. Battery Type: Lead-acid.

b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging.

c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.

3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.

D. Engine Speed Control System (Governor):

1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.

2. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.

E. Engine Lubrication System:

1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.

NOT FOR BID

F. Engine Cooling System:

1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.

2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.

G. Engine Air Intake and Exhaust System:

1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.

2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.

1.3 ALTERNATOR (GENERATOR)

A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling; voltage output configuration as indicated, with reconnectable leads for 3 phase alternators.

B. Exciter:

1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.

2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.

3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.

C. Temperature Rise: Comply with UL 2200.

D. Insulation System: NEMA MG 1, Class H; suitable for alternator temperature rise.

E. Enclosure: NEMA MG 1, drip-proof.

F. Total Harmonic Distortion: Not greater than five percent.

1.4 GENERATOR SET CONTROL SYSTEM

A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.

B. Control Panel:

NOT FOR BID

1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.

2. Generator Set Control Functions:

    a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).

    b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.

    c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.

    d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.

    e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.

    f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).

    g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.

3. Generator Set Status Indications:

    a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.

    b. Current (Amps): For each phase.

    c. Frequency (Hz).

    d. Real power (W/kW).

    e. Reactive power (VAR/kVAR).

    f. Apparent power (VA/kVA).

    g. Power factor.

    h. Duty Level: Actual load as percentage of rated power.

    i. Engine speed (RPM).

    j. Battery voltage (Volts DC).

    k. Engine oil pressure.

    l. Engine coolant temperature.

    m. Engine run time.

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n. Generator powering load (position signal from transfer switch).

4. Generator Set Protection and Warning/Shutdown Indications:

a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following protections/indications:

1) Overcrank (shutdown).

2) Low coolant temperature (warning).

3) High coolant temperature (warning).

4) High coolant temperature (shutdown).

5) Low oil pressure (shutdown).

6) Overspeed (shutdown).

7) Low fuel level (warning).

8) Low coolant level (warning/shutdown).

9) Generator control not in automatic mode (warning).

10) High battery voltage (warning).

11) Low cranking voltage (warning).

12) Low battery voltage (warning).

13) Battery charger failure (warning).

b. In addition to NFPA 110 requirements, provide the following protections/indications:

1) High AC voltage (shutdown).

2) Low AC voltage (shutdown).

3) High frequency (shutdown).

4) Low frequency (shutdown).

5) Overcurrent (shutdown).

c. Provide contacts for local and remote common alarm.

d. Provide lamp test function that illuminates all indicator lamps.

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5. Other Control Panel Features:

    a. Event log.

END OF SECTION

NOT FOR BID

SECTION 26 36 00
TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
   1. Automatic transfer switches.
   2. Remote annunciators.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

C. Section 26 05 29 - Hangers and Supports for Electrical Systems.

D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

E. Section 26 32 13 - Engine Generators: For interface with transfer switches.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2014.

C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment 2020.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2013.

E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. NFPA 110 - Standard for Emergency and Standby Power Systems 2019.

G. UL 1008 - Transfer Switch Equipment Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
      a. Engine Generators: See Section 26 32 13.
   2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
   3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   4. Coordinate the work with placement of supports, anchors, etc. required for mounting.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Preinstallation Meeting: Convene one week before starting work of this section; require attendance of all affected installers.

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.

NOT FOR BID

B. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
   1. Clearly indicate whether proposed short circuit current ratings are based on testing with specific overcurrent protective devices or time durations; indicate short-time ratings where applicable.
   2. Identify mounting conditions required for equipment seismic qualification.

C. Evidence of qualifications for installer.

D. Evidence of qualifications for maintenance contractor (if different entity from installer).

E. Source quality control test reports.

F. Maintenance contracts.

1.06 QUALITY ASSURANCE

A. Comply with the following:
   1. NFPA 70 (National Electrical Code).
   2. NFPA 110 (Standard for Emergency and Standby Power Systems); meet requirements for Level 2 system.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with power transfer systems of similar size, type, and complexity; manufacturer's authorized installer.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store transfer switches in accordance with manufacturer's instructions.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure, and finish.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.09 WARRANTY

A. Provide minimum two year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

B. Transfer Switches - Basis of Design: Generac Power Systems as indicated under product description below: www.generac.com/industrial/#sle.Transfer Switches - Basis of Design: Generac Power Systems as indicated under product description below: www.generac.com/industrial/#sle.Transfer Switches - Basis of Design: Generac Power Systems as indicated under product description below: www.generac.com/industrial/#sle.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Transfer Switches:
   1. ASCO Power Technologies; ASCO Series 300: www.ascopower.com/#sle.

NOT FOR BID

B. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

2.02 TRANSFER SWITCHES

A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Applications:

D. Construction Type: Either "contactor type" (open contact) or "breaker type" (enclosed contact) transfer switches complying with specified requirements are acceptable.

E. Automatic Transfer Switch:
   1. Basis of Design: ASCO Series 300.
   2. Transfer Switch Type: Automatic transfer switch.
   3. Transition Configuration: Open-transition (no neutral position), utilizing in-phase monitor.
   4. Voltage: As indicated on the drawings.
   5. Ampere Rating: As indicated on the drawings.
   6. Neutral Configuration: Switched neutral.

F. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).

G. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.

H. Switching Methods:
   1. Open Transition:
      a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
      b. Where in-phase transfer is indicated, utilize in-phase monitor to initiate transfer when phase angle difference between sources is near zero to limit in-rush currents.
   2. Neutral Switching: Use simultaneously switched neutral (break-before-make) method. Overlapping neutral method is not acceptable.
   3. Obtain control power for transfer operation from line side of source to which the load is to be transferred.

I. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.

J. Enclosures:
   1. Environment Type per NEMA 250: As indicated on the drawings.
      a. Outdoor Locations: Type 3R or Type 4.
   2. Provide lockable door(s) for outdoor locations.
   3. Finish: Manufacturer's standard unless otherwise indicated.

K. Short Circuit Current Rating:
   1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating as indicated on the drawings.

L. Automatic Transfer Switches:
   1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.

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2. Control Functions:
   a. Automatic mode.
   b. Test Mode: Simulates failure of primary/normal source.
   c. Voltage and Frequency Sensing:
      1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
      2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
      3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
   d. Outputs:
      1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
      2) Auxiliary contacts; one set(s) for each switch position.
   e. Adjustable Time Delays:
      1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
      2) Transfer to alternate/emergency source time delay.
      3) Retransfer to primary/normal source time delay.
      4) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.
   f. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.
   g. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.
3. Status Indications:
   a. Connected to alternate/emergency source.
   b. Connected to primary/normal source.
   c. Alternate/emergency source available.
4. Automatic Sequence of Operations:
   a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
   b. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
   c. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.
   d. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.

M. Remote Annunciators:
1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
2. Transfer Switch Status Indications:
   a. Connected to alternate/emergency source.
   b. Connected to primary/normal source.
   c. Alternate/emergency source available.

NOT FOR BID

2.03 SOURCE QUALITY CONTROL

A. Perform production tests on transfer switches at factory to verify operation and performance characteristics prior to shipment. Include certified test report with submittals.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.

C. Verify that rough-ins for field connections are in the proper locations.

D. Verify that mounting surfaces are ready to receive transfer switches.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Arrange equipment to provide minimum clearances and required maintenance access.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install transfer switches plumb and level.

F. Unless otherwise indicated, mount floor-mounted transfer switches on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 03 30 00.

G. Provide grounding and bonding in accordance with Section 26 05 26.

H. Identify transfer switches and associated system wiring in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. Prepare and start system in accordance with manufacturer's instructions.

B. Automatic Transfer Switches:
   1. Inspect and test in accordance with NETA ATS, except Section 4.
   2. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The insulation-resistance tests listed as optional are not required.

C. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.04 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of transfer switches to Owner, and correct deficiencies or make adjustments as directed.

B. Training: Train Owner's personnel on operation, adjustment, and maintenance of transfer switches.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of four hours of training.
   3. Instructor: Manufacturer's authorized representative.
   4. Location: At project site.

NOT FOR BID

3.06 PROTECTION

A. Protect installed transfer switches from subsequent construction operations.

3.07 MAINTENANCE

A. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of transfer switches for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

B. Conduct site visit at least once every three months to perform inspection, testing, and preventive maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.

END OF SECTION

NOT FOR BID

SECTION 26 51 00
INTERIOR LIGHTING

<<<<<<<<< UPDATE NOTES

PART 1 GENERAL

2.1 SECTION INCLUDES

A. Interior luminaires.

B. Emergency lighting units.

C. Exit signs.

D. Ballasts and drivers.

2.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.

2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.

3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.

4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

2.3 SUBMITTALS

A. Shop Drawings:

1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

2. Provide photometric calculations where luminaires are proposed for substitution upon request.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed

NOT FOR BID

accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:

   a. Include estimated useful life, calculated based on IES LM-80 test data.

2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.

3. Ballasts: Include wiring diagrams and list of compatible lamp configurations.

4. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.

C. Samples:

1. Provide one sample(s) of each luminaire proposed for substitution upon request.

D. Certificates for Dimming Ballasts: Manufacturer's documentation of compatibility with dimming controls to be installed.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.

2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.

3. Extra Ballasts: Two percent of total quantity installed for each type, but not less than one of each type.

G. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

2.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

NOT FOR BID

2.5 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

2.6 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

2.7 WARRANTY

A. Provide five year manufacturer warranty for all LED luminaires, including drivers.

B. Provide five year pro-rata warranty for batteries for emergency lighting units.

PART 2 PRODUCTS

3.1 ----------

3.2 SECTION 26 06 50.16 - LIGHTING FIXTURE SCHEDULE CAN BE USED AS AN ALTERNATIVE TO A SCHEDULE ON DRAWINGS. USE THE FIRST ARTICLE BELOW TO INDICATE WHERE LUMINAIRE SCHEDULE CAN BE FOUND OR USE THE SECOND ARTICLE BELOW TO INCLUDE A LUMINAIRE SCHEDULE IN THIS SECTION.

3.3 ----------

3.4 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

3.5 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

NOT FOR BID

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Recessed Luminaires:

1. Ceiling Compatibility: Comply with NEMA LE 4.

2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.

H. LED Luminaires:

1. Components: UL 8750 recognized or listed as applicable.

2. Tested in accordance with IES LM-79 and IES LM-80.

3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

3.6 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Battery:

1. Size battery to supply all connected lamps, including emergency remote heads where indicated.

D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

3.7 EXIT SIGNS

3.8 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:

1. Provide ballasts containing no polychlorinated biphenyls (PCBs).

2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

NOT FOR BID

B. --CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

C. Dimmable LED Drivers:

1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.

2. Control Compatibility: Fully compatible with the dimming controls to be installed.

PART 3 EXECUTION

4.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

4.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

4.3 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Install products in accordance with manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Suspended Ceiling Mounted Luminaires:

1. Do not use ceiling tiles to bear weight of luminaires.

NOT FOR BID

2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.

3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.

4. Secure pendant-mounted luminaires to building structure.

5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.

6. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

G. Recessed Luminaires:

1. Install trims tight to mounting surface with no visible light leakage.

2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.

3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.

H. Suspended Luminaires:

1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.

2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.

3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet (1.2 m) between supports.

4. Install canopies tight to mounting surface.

I. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

J. Install accessories furnished with each luminaire.

K. Bond products and metal accessories to branch circuit equipment grounding conductor.

L. Emergency Lighting Units:

1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

NOT FOR BID

M. Exit Signs:

1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

N. Install lamps in each luminaire.

4.4 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

B. Operate each luminaire after installation and connection to verify proper operation.

C. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

4.5 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

4.6 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

4.7 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

B. Just prior to Substantial Completion, replace all lamps that have failed.

4.8 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

NOT FOR BID

SECTION 26 56 00
EXTERIOR LIGHTING

<<<<<<<<< UPDATE NOTES

PART 1 GENERAL

2.1 SECTION INCLUDES

A. Exterior luminaires.

2.2 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

2.3 SUBMITTALS

A. Shop Drawings:

1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

2. Provide photometric calculations where luminaires are proposed for substitution upon request.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:

a. Include estimated useful life, calculated based on IES LM-80 test data.

C. Samples:

1. Provide one sample(s) of each luminaire proposed for substitution upon request.

2.4 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

NOT FOR BID

2.5 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

2.6 WARRANTY

A. Provide five year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

3.1 ----------

3.2 SECTION 26 06 50.16 - LIGHTING FIXTURE SCHEDULE CAN BE USED AS AN ALTERNATIVE TO A SCHEDULE ON DRAWINGS. USE THE FIRST ARTICLE BELOW TO INDICATE WHERE LUMINAIRE SCHEDULE CAN BE FOUND OR USE THE SECOND ARTICLE BELOW TO INCLUDE A LUMINAIRE SCHEDULE IN THIS SECTION.

3.3 ----------

3.4 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

3.5 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. LED Luminaires:

1. Components: UL 8750 recognized or listed as applicable.

NOT FOR BID

2. Tested in accordance with IES LM-79 and IES LM-80.

3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

PART 3 EXECUTION

4.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

4.2 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

4.3 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Install products in accordance with manufacturer's instructions.

C. Install luminaires in accordance with NECA/IESNA 501.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Install accessories furnished with each luminaire.

G. Bond products and metal accessories to branch circuit equipment grounding conductor.

H. Install lamps in each luminaire.

4.4 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

NOT FOR BID

B. Operate each luminaire after installation and connection to verify proper operation.

C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

4.5 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

4.6 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

4.7 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

B. Just prior to Substantial Completion, replace all lamps that have failed.

4.8 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

END OF SECTION

NOT FOR BID

SECTION 28 20 00
VIDEO SURVEILLANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Video surveillance system requirements.

B. Video recording and viewing equipment.

C. Cameras.

D. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

C. Section 26 05 29 - Hangers and Supports for Electrical Systems.

D. Section 26 05 34 - Conduit.

E. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

F. Section 27 10 00 - Structured Cabling: Data cables for IP video surveillance system network connections.

1.3 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 303 - Standard for Installing Closed-Circuit Television (CCTV) Systems; 2005.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of cameras with structural members, ductwork, piping, equipment, luminaires, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.

2. Coordinate the work with other installers to provide power for cameras and equipment at required locations.

3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Preinstallation Meetings:

NOT FOR BID

1. Conduct meeting with facility representative to review camera and equipment locations and camera field of view objectives.

1.5 SUBMITTALS

A. Shop Drawings: Include plan views indicating locations of system components and proposed size, type, and routing of conduits and/or cables. Include elevations and details of proposed equipment arrangements. Include system interconnection schematic diagrams. Include requirements for interface with other systems.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each system component. Include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.

C. Design Data:

1. Standby battery/UPS calculations.

2. Video storage capacity calculations.

D. Certify that proposed system design and components meet or exceed specified requirements.

E. Evidence of qualifications for installer.

F. Field quality control test reports.

G. Project Record Documents: Record actual locations of system components and installed wiring arrangements and routing.

H. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.

I. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

J. Software: One copy of software not resident in read-only memory.

1.6 QUALITY ASSURANCE

A. Comply with the following:

1. NFPA 70.

2. Applicable TIA/EIA standards.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience with video surveillance systems of similar size, type, and complexity and providing contract maintenance service as a regular part of their business; authorized manufacturer's representative.

NOT FOR BID

1.7 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions and NECA 303.

B. Store products in manufacturer's unopened packaging, keep dry and protect from damage until ready for installation.

1.8 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.9 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide minimum one year manufacturer warranty covering repair or replacement due to defective materials or workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Video Recording and Viewing Equipment - Basis of Design: Hanwha Techwin America.

B. Cameras - Basis of Design: Hanwha Techwin America.

2.2 VIDEO SURVEILLANCE SYSTEM

A. Provide new video surveillance system consisting of all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. System Description: IP system with connection to network (IP) cameras.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

2.3 VIDEO RECORDING AND VIEWING EQUIPMENT

A. Provide video recording and viewing equipment compatible with cameras to be connected.

B. Network Video Recorders (NVRs):

1. Supports connection of network (IP) cameras.

2. Supports continuous and event-based recording.

3. Network Video Recorder Type XRN-810S:
    a. Capacity: 8 channels.
    b. Storage Capacity: 6 TB.
    c. Network: Single 1 Gigabit Ethernet.
    d. Features:
        1) Compression: H.265, H.264, MJPEG
        2) Resolution range: 352x288 (CIF) up to 2560x1920 (5MP).

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3) Supports remote access via desktop and mobile device.
4) Provides PoE+ ports

C. Software:

1. Unless otherwise indicated, provide all software and licenses required for fully operational system.

2.4 CAMERAS

A. Provide cameras and associated accessories suitable for operation under the service conditions at the installed location. Provide additional components (e.g. enclosures, heaters, blowers, etc.) as required.

B. Where not factory-installed, provide additional components (e.g. lenses, mounting accessories, etc.) as necessary for complete installation.

C. Network (IP) Cameras:

1. Network (IP) Indoor/Outdoor Dome Type Camera:
   a. Basis of Design: Hanwha Techhwin America PNM-9020V.
   b. Camera Type: True day/night with IR cut filter.
   c. Resolution: Up to 4096x1800.
   d. Frame Rate: Up to 30 frames per second (fps) at all available resolutions.
   e. Minimum Illumination: 0.3 lux color, 0.3 lux black and white.
   f. Lens: 3.6mm fixed.
   g. Video Streaming: Supports 3 encoding types using E.265, H.264, MJPEG compression .
   h. Power: Power over Ethernet (IEEE 802.3af) or 24 VAC as indicated or as required.

D. Camera Enclosures and Mounting Brackets:

1. Provide factory compatible accessories. Camera enclosures suitable for operation under the service conditions at the installed location.

2. Provide factory compatible mounting accessories mounting brackets necessary for installation. Hanwha Techwin SBP-300WM1 with SBP-201HM.

2.5 ACCESSORIES

A. Provide components as indicated or as required for connection of video surveillance system to devices and other systems indicated.

B. Provide components as indicated or as required for system power and network connections.

C. Provide cables as indicated or as required for connections between system components.

1. Data Cables for IP Network Connections: Unshielded twisted pair (UTP), CAT6

2. Provide cable range extenders for cables over 100m: Panduit PoE Extender Series. Provide required 120V outlet connected to closets 120V circuit via ¾" conduit and 2#12+#12gnd.

NOT FOR BID

D. Provide accessory racks/cabinets as indicated or as required for equipment mounting.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings and configurations of system components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive system components.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to system where applicable.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Install video surveillance system in accordance with NECA 1 (general workmanship) and NECA 303.

B. Install products in accordance with manufacturer's instructions.

C. Provide required support and attachment in accordance with Section 26 05 29.

D. Wiring Method: Unless otherwise indicated, use cables (not in conduit).

1. Use suitable listed cables in wet locations, including underground raceways.

2. Use suitable listed cables for vertical riser applications.

3. Use listed plenum rated cables in spaces used for environmental air.

4. Install wiring in conduit for the following:
   a. Where required for rough-in.
   b. Where required by authorities having jurisdiction.
   c. Where exposed to damage.
   d. Where installed outside the building.
   e. For exposed connections from outlet boxes to cameras.

5. Conduit: Comply with Section 26 05 34.

6. Conceal all cables unless specifically indicated to be exposed.

7. Cables in the following areas may be exposed, unless otherwise indicated:
   a. Equipment closets.
   b. Within joists in areas with no ceiling.

8. Route exposed cables parallel or perpendicular to building structural members and surfaces.

9. Include service loop cable lengths to allow relocation of cameras within 30 ft of installed location.

E. Provide grounding and bonding in accordance with Section 26 05 26.

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F. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

G. Identify system wiring and components in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

A. Prepare and start system in accordance with manufacturer's instructions.

B. Adjust cameras to provide desired field of view and produce suitable images under all service lighting conditions.

C. Program system parameters according to requirements of Owner.

D. Test for proper interface with other systems.

E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.4 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.5 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.

B. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of four hours of training.
3. Location: At project site.

3.6 PROTECTION

A. Protect installed system components from subsequent construction operations.

END OF SECTION

NOT FOR BID

SECTION 31 1000
SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

1.02 RELATED REQUIREMENTS

A. Section 01 5713 - Temporary Erosion Control.

B. Section 01 7000 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

C. Section 31 2200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

D. Section 31 2323 - Fill and Backfill: Filling holes, pits, and excavations generated as a result of removal operations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill Material: As specified in Section 31 2200 - Grading

PART 3 EXECUTION

3.01 SITE CLEARING

A. Comply with other requirements specified in Section 01 7000.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 VEGETATION

A. Do not remove or damage vegetation beyond the limits indicated on drawings.

B. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:
   1. At vegetation removal limits.

C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
   2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
   3. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.

E. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

3.03 DEBRIS

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

NOT FOR BID

SECTION 31 2200
GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of topsoil and subsoil.

B. Cutting, grading, filling and rough contouring the site.

C. Finish Grading.

1.02 RELATED REQUIREMENTS

A. Section 01 4500 - Quality Control: Testing fill compaction.

B. Section 01 5713 - Temporary Erosion Control.

C. Section 31 1000 - Site Clearing.

D. Section 31 2316 - Excavation.

E. Section 31 2323 - Fill and Backfill.

F. Attachment "A" - Report of Geotechnical/Geologic Study, as prepared by GEOCON West, Inc., dated March 8, 2019.

1.03 REFERENCE STANDARDS

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb Rammer and 18-inch Drop; '07.

B. CBC - 2019 California Building Code, based on 2018 International Building Code (IBC), with California Amendments.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Samples: Submit 10-lb sample of each type of fill to testing laboratory, in air-tight containers.

1.05 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of utilities remaining, by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. All grading shall be performed in accordance with the applicable provisions of the CBC.

2.02 MATERIALS

A. Topsoil: Excavated material, graded, free of roots, rocks larger than 1-inch, subsoil, debris and large weeds.

B. Subsoil: Excavated material, graded, free of lumps larger than 6-inches, rocks larger than 3-inches and debris.

C. Granular Fill: Type A.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that survey benchmark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours and datum.

NOT FOR BID

B. Identify known underground, above ground, and aerial utilities. Stake and flag locations.

C. Notify utility company to remove, rebuild and relocate utilities.

D. Protect above and below grade utilities which are to remain.

E. Protect bench marks, existing structures, sidewalks, paving and curbs from excavation equipment and vehicular traffic.

3.03 CLEARING AND GRUBBING

A. Debris from the demolition of the existing structures, grasses, weeds, brush, trees and other deleterious materials shall be removed from the proposed building, exterior hardscape and pavement areas and areas to receive structural fill before grading is performed. Any organic material and miscellaneous/demolition debris shall be legally disposed of off site. Any highly organic soils encountered shall be stripped and stockpiled for use on finished grades in landscape areas or exported from the site. Disking or mixing of organic material into the earth materials proposed to be used as structural fill shall not be permitted. Trees and their roots shall be completely removed, ensuring that 95 percent or more of the root systems are extracted.

B. Man-made objects encountered (i.e., septic tanks, leach lines, irrigation systems, underground utilities, old foundations, construction debris, etc.) shall be over-excavated, exported from the site, and legally disposed of off site. Cesspools or seepage pits, if encountered shall be abandoned and capped according to directions and supervision of San Bernardino County Department of Health, the State of California, and/or the appropriate governmental agency procedures which has jurisdiction over them before fill and/or pavement is placed over the area. If no procedures are required by the Health Department or if the following recommendations are more stringent, the cesspool or seepage pit shall be pumped free of any liquid and filled with a low strength sand/cement slurry to an elevation 5.0 feet below the final site grade in the area. The upper 5.0 feet of the cesspool or seepage pit shall be excavated and the area backfilled with a properly compacted fill material. The location of the cesspool or seepage pit shall be surveyed and plotted on the final "As Graded" plan prepared by the project Civil Engineer.

C. Wells, if encountered, shall be abandoned and capped according to directions and supervision of the San Bernardino County Department of Health, the State of California, and/or the appropriate governmental agency procedures which has jurisdiction over the well before fill and/or pavement is placed over the area.

3.04 TESTING AND INSPECTION

A. During grading, tests and observations shall be performed by the Geotechnical Engineer or this representative in order to verify that the grading is being performed in accordance with the project specifications. The minimum acceptable degree of compaction shall be 90 percent of the maximum dry density as obtained by the ASTM D1557 test method. Where testing indicates insufficient density, additional compactive effort shall be applied until retesting indicates satisfactory compaction.

B. Testing will be also conducted to verify that the soils will not subject concrete to sulfate attack and are not corrosive. Testing of any proposed import will be necessary prior to placement on the site. Testing of on-site soils may be done on either a selective or random basis as site conditions indicate.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

END OF SECTION

NOT FOR BID

SECTION 31 2316
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for footings, slabs-on-grade, and site structures.

B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 01 5713 - Temporary Erosion Control: Slope protection and erosion control.

B. Section 01 7000 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.

C. Section 02 4100 - Demolition: Shoring and underpinning existing structures.

D. Section 31 2200 - Grading: Surface preparation for paving materials.

E. Section 31 2323 - Fill and Backfill: Fill materials, filling, and compacting.

F. Attachment "A" - Report of Geotechnical/Geologic Study, as prepared by GEOCON West, Inc., dated March 8, 2019.

PART 2 PRODUCTS

-- NOT APPLICABLE --

PART 3 EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

3.02 EXCAVATING

A. Excavate to accommodate new structures and construction operations.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut utility trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove excess excavated material from site.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4500 - "Quality Control", for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces by Architect before placement of foundations.

3.04 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

NOT FOR BID

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION

NOT FOR BID

SECTION 31 2323
FILL AND BACKFILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for site grading and footings, slabs-on-grade, and site structures.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

A. Section 01 5713 - Temporary Erosion Control: Slope protection and erosion control.

B. Section 31 2200 - Grading: Site grading.

C. Section 31 2316 - Excavation: Removal and handling of soil to be re-used.

D. Section 32 1313 - Portland Cement Concrete Paving: Leveling bed placement under paving.

E. Attachment "A" - Report of Geotechnical/Geologic Study, as prepared by GEOCON West, Inc., dated March 8, 2019.

1.03 REFERENCE STANDARDS

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; 2010.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.

G. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.

H. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: 4 inches below finish grade elevations indicated on drawings, unless otherwise indicated.

1.05 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.

D. Compaction Density Test Reports.

1.06 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.

NOT FOR BID

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
2. Prevent contamination.
3. Protect stockpiles from erosion and deterioration of materials.

C. Verify that survey bench marks and intended elevations for the Work are as indicated.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill - Fill Type A: Subsoil excavated on-site.
   1. Graded.
   2. Free of lumps larger than 3 inches, rocks larger than 6 inches, and debris.
   3. Conforming to ASTM D2487 Group Symbol CL, or as approved by the Soils Engineer.

B. Structural Fill - Fill Type A: Subsoil excavated on-site.
   1. Graded.
   2. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   3. Conforming to ASTM D2487 Group Symbol CL.

C. Concrete for Fill: Lean concrete, 1 or 2 sack slurry.

D. Sand: Complying with State of California Highway DepartmentDepartment of Transportation standard.

2.02 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, woven, Structural Geogrid BX1200; manufactured by Tensar Earth Technologies, Inc., or approved equal by Architect; submittal required.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

C. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

F. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

G. Correct areas that are over-excavated.
   1. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

H. Compaction Density Unless Otherwise Specified or Indicated:

NOT FOR BID

1. Under paving, slabs-on-grade, and similar construction: 95 percent of maximum dry density.

I. Reshape and re-compact fills subjected to vehicular traffic.

J. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FILL AT SPECIFIC LOCATIONS

3.05 FIELD QUALITY CONTROL

A. See Section 01 4500 - "Quality Control", for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, ASTM D2922, or ASTM D3017.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.06 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

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.

END OF SECTION

NOT FOR BID

SECTION 32 1216
ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Asphaltic concrete paving and surface sealer.

B. Aggregate base course.

1.02 RELATED REQUIREMENTS

A. Section 02 4100 - Demolition: Selective demolition, site demolition.

B. Section 31 2200 - Grading: Preparation of site for paving and compacted base.

C. Section 31 2316 - Excavation.

D. Section 31 2323 - Fill and Backfill.

1.03 QUALITY ASSURANCE

A. Perform work in accordance with Standard Specifications for Public Works Construction, latest edition, Section 203-6.

B. Mixing Plant: Conform to Standard Specifications for Public Works Construction, latest edition, Section 203-6.

C. Obtain materials from same source throughout.

D. Maintain one copy of each document on site.

1.04 FIELD CONDITIONS

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

2.01 PERFORMANCE REQUIREMENTS

A. Design paving and subbase at 60,000 lbs for medium duty commercial vehicle traffic.

2.02 MATERIALS

A. Prime Coat: Homogeneous medium curing liquid asphalt, MC-70 per Standard Specifications for Public Works Construction, latest edition, Section 302-5.3.

B. Tack Coat: AR-1000 per Standard Specifications for Public Works Construction, latest edition, Section 302-5.4.

C. Asphalt Concrete: AR-4000 per Standard Specifications for Public Works Construction, lates edition, Section 203-6.

D. Aggregates for binder mix shall conform to Standard Specifications for Public Works Construction, latest edition, Section 203-7, 3/4" maximum, medium grade.

E. Seal Coat shall conform to Standard Specifications for Public Works Construction, latest edition, Section203-9.

F. Mineral Filler: Finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter.

G. Aggregate Base: Class II aggregate base shall conform to the provisions of Section 26 of the Standard Specifications for the State of California, Department of Transportation, Division of Highways, latest edition.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

NOT FOR BID

3.02 PREPARATION - SUBBASE

A. Preparation of subbase shall be in conformance with the Geotechnical Study.

3.03 PREPARATION - AGGREGATE BASE

A. Preparation of Aggregate Base shall be in conformance with Sections 26-1.035, 26-1.04 and 26-1.05 of Standard Specifications of the State of California, Department of Transportation, Division of Highways, latest edition

B. Verify gradients and elevations of base are correct.

C. Verify that compacted subbase is dry and ready to support imposed loads.

3.04 BASE COURSE

A. Place and compact base course.

3.05 PREPARATION - PRIMER

A. Apply primer on base or subbase over subgrade surface at uniform rate of 1/2 gal/sq yd.

B. Apply primer to contact surfaces.

C. Use clean sand to blot excess primer.

3.06 PREPARATION - TACK COAT

A. Apply tack coat on asphalt or concrete surfaces over subgrade surface at uniform rate of 1/2 gal/sq yd.

B. Coat surfaces of catch basin frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.07 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install work in accordance with Standard Specifications for Public Works Construction, latest edition, Section 302-5.5.

B. Place asphalt within 24 hours of applying primer or tack coat.

C. Place to compacted thickness. Thickness identified on Drawings.

D. Install gutter drainage grilles and frames in correct position and elevation.

3.08 SEAL COAT

A. Apply seal coat to surface course in accordance with Standard Specifications for Public Works Construction, latest edition, Section 203-9, at a rate of 0.05 gal/sq yd, not less that 14 days after laying of asphalt concrete surfacing.

3.09 TOLERANCES

A. Flatness: Maximum variation of 1/4-inch measured with a 10-foot straight edge.

B. Variation from True Elevation: Within 1/2-inch.

3.10 STRIPING

A. Thoroughly clean all areas where striping will be applied and locate all striping as shown on Drawings. Apply striping paint in strict accordance with manufacturer's instructions, using all means necessary to protect surface until dry.

3.11 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 4500 - "Quality Control".

3.12 PROTECTION

A. Immediately after placement, protect pavement under provisions of Division 1.

END OF SECTION

NOT FOR BID

SECTION 32 1313
PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, integral curbs, gutters, parking areas and roads.

B. Aggregate base course.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.

B. Section 01 5713 - Temporary Erosion and Sedimentation Control.

C. Section 02 4100 - Demolition: Selective demolition, site demolition, structure removal.

D. Section 09 9000 - Paints and Coatings: Pavement markings.

E. Section 31 2200 - Grading: Preparation of site for paving.

F. Section 31 2323 - Fill and Backfill: Compacted subbase for paving.

G. Section 32 1713 - Wheel Stops: Precast concrete parking bumpers.

1.03 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute; '05.

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; '09.

C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; '09.

D. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete; '09.

E. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); '04 (2008).

F. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction; '04a (2008).

G. FS TT-S-227e - Polyurethane or Polysulfide Sealants; Federal Specifications.

H. FS TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces; Federal Specifications.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Provide product data on joint sealant.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain cementitious materials from same source throughout.

PART 2 PRODUCTS

2.01 AGGREGATE BASE

A. Aggregate Base Course: Thickness and size of aggregate as indicated on the drawings.

2.02 FORM MATERIALS

A. Form Materials: Conform to ACI 301.

2.03 REINFORCING STEEL

A. Reinforcing Steel: ASTM A615, grade 60 billet steel deformed bars.

2.04 CONCRETE MATERIALS

A. Concrete Materials: ASTM C150/C150M, Type II - Moderate Portland type.

NOT FOR BID

1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.
   1. Acquire aggregates for entire project from same source.

C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

D. Admixtures: Fly Ash is Not Allowed.

2.05 ACCESSORIES

A. Curing Compound: FS TT-C-800, Type 1, 30 percent solids.

B. Joint Filler: ASTM D1751 type; 1/2-inch, "Homex 300" expansion joint filler.

C. Joint Sealant: Federal Specification TT-S-227e, 3/4-inch thick polyurethane joint sealant by Pacific Polymers, Inc.; "Elasto-Thane 227 High Shore".

D. All accessories listed above shall be used, as required.

2.06 CONCRETE MIX - BY PERFORMANCE CRITERIA

A. Mix and deliver concrete in accordance with ASTM C94, Alternative No. 2.

B. Select proportions for normal weight concrete in accordance with ACI 301, Method 2.

C. Provide concrete to the following criteria
   1. Compressive Strength: 4,000 psi @ 28 days.
   2. Slump: 3 to 4 inches.

D. Use accelerating admixtures in cold weather only when approved by Architect/Engineer. Use of admixtures will not relax cold weather placement requirements.

E. Use calcium chloride only when approved by Architect/Engineer.

F. Use set retarding admixtures during hot weather only when approved by Architect/Engineer..

2.07 SOURCE QUALITY CONTROL

A. Provide mix design under provisions of Section 01 4500 - "Quality Control".

B. Submit proposed mix design to appointed firm for review prior to commencement of work.

C. Test samples in accordance with ACI 301.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify base conditions

B. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

C. Verify gradients and elevations of base are correct.

3.02 PREPARATION

A. Moisten subgrade to minimize absorption of water from fresh concrete.

B. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

3.03 FORMING

A. Place and secure forms to correct location, dimension, profile and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place expansion joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.04 JOINTS

A. Place expansion joints at 50-foot intervals (maximum), and control joints at 20-foot intervals (maximum), or as indicated. Align curb, gutter, paving and sidewalk joints.

B. Place joint filler between paving components and building or other appurtenances.

NOT FOR BID

3.05 PLACING CONCRETE

A. Place concrete in accordance with ACI 301.

B. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.

C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

D. Place concrete to pattern indicated. Saw cut contraction joints 3/16-inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.06 FINISHING

A. Paving: Light broom.

B. Sidewalk Paving: Light broom, radiused to 3/8-inch radius, and trowel joint edges.

C. Curbs and Gutters: Light broom.

D. Inclined Vehicular Ramps: Broomed perpendicular to slope.

E. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

F. Joint Sealant:

1. Surface Preparation: All joints must be absolutely clean. For concrete, sandblasting is required. All curing compounds, old caulks, waterproofing compounds, etc., must be removed. Polyethylene rod or polyurethane foam is recommended as a joint-filler and backup material. Fillers treated with bituminous products, grease or oil, should not be used. Where present, they must be removed or separated by vinyl tape or polyethylene film. All surfaces must be primed with ELASTO-THANE PRIMER.
2. Application: Apply by caulking gun, hand or pressure type, or pour from container. Bulk sealant can be applied by pumping equipment, trowel or putty knife. Press firmly into joint to assure good contact.

3.07 FIELD QUALITY CONTROL

A. Field Inspection and testing will be performed under provisions of Section 01 4500 - "Quality Control".

B. Testing firm will take cylinders and perform slump tests in accordance with ACI 301.

3.08 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

END OF SECTION

NOT FOR BID

SECTION 32 1713
WHEEL STOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Precast concrete parking wheel stops (Parking Bumpers) and anchorage.

1.02 RELATED REQUIREMENTS

A. Section 32 1216 - Asphaltic Concrete Paving: Substrate for wheel stops.

B. Section 32 1313 - Portland Cement Concrete Paving: Substrate for wheel stops.

1.03 REFERENCE STANDARDS

A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; '09.

B. ASTM C33/C33M - Standard Specification for Concrete Aggregates; '08.

C. ASTM C150/C150M - Standard Specification for Portland Cement; '09.

D. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete; '06.

PART 2 PRODUCTS

2.01 MATERIALS

A. Parking Wheel Stops: Precast concrete, conforming to the following:
   1. Cement: ASTM C150, Portland Type I - Normal; white color.
   2. Concrete Materials: ASTM C33 aggregate, water and sand.
   3. Reinforcing Steel: ASTM A615/A615M, deformed steel bars; unfinished, strength and size commensurate with precast unit design.
   4. Air Entrainment Admixture: ASTM C260.
   5. Concrete Mix: Minimum 5000 psi, 28 day strength, air entrained to 5 - 7 percent.
   6. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacturer.
   7. Embed reinforcing steel, and drill or sleeve for two dowels.
   8. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining or surface cracking.
   9. Minor patching in plant is acceptable, providing appearance of units is not impaired.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units without damage to shape or finish. Replace or repair damaged units.

B. Install units in alignment with adjacent work.

C. Fasten units in place with 2 dowels per unit.

END OF SECTION

NOT FOR BID

SECTION 32 1726
TACTILE/DETECTABLE WARNING TILE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnishing and installing cast-in-place tactile warning tile modules where indicated.

1.02 RELATED REQUIREMENTS

A. Section 09 3000 - Tile Finish.

B. Section 32 1313 - Portland Cement Concrete Paving.

1.03 REFERENCE STANDARDS

A. ASTM B117 - Standard Practive for Operating Salt Spray (Fog) Apparatus; '03.

B. ASTM C1028 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine; '04.

C. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials; '99.

D. ASTM G151 - Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that use Laboratory Light Sources; '00.

E. CBC - 2019 California Building Code, based on 2018 International Building Code (IBC), with California Amendments.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Provide manufacturer's literature describing products, installation procedures and routine maintenance.

C. Shop Drawings: Indicate fabrication details; composite structural system; plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.

D. Samples for Verification Purposes: Submit two (2) tile samples minimum 6-inch square of the kind proposed for use.

E. Maintenance Data: Submit copies of manufacturer's specified maintenance practices for each type of tactile tile and accessories as required.

1.05 QUALITY ASSURANCE

A. Provide cast-in-place tactile tiles and accessories as produced by a single manufacturer.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.

C. Americans with Disabilities Act (ADA): Provide tactile warning surfaces which comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act.

D. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR). Title 24, Part 1, Articles 2, 3 and 4 and Part 2, Section 205 definition of "Detectable Warning". Section 1127B.5 for "Curb Ramps" and Section 1133.8.5 for "Detectable Warning at Hazardous Vehicle Areas".

E. Vitrified Polymer Composite (VPC) cast-in-place tiles shall be an epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes. The tile shall incorporate an in-line dome pattern of truncated domes 0.2" in height, 0.9" diameter at the base, and 0.4" diameter at top of dome spaced 2.35" nominal as measured on a diagonal and 1.70" nominal as measured side by side. For wheelchair safety the field area shall consist of a non-slip surface with a minimum of 40 - 90 degree raised points 0.045" high, per square inch; "Armor Tile" as manufactured by Engineered Plastics, Inc. Phone: 800-682-2525.
   1. Dimensions: Tiles shall be held within the following dimensions and tolerances:

NOT FOR BID

a. Length and Width: 36" x 48"
b. Depth:1.400 +/- 5% max.
c. Face Thickness:0.1875 +/- 5% max.
d. Warpage of Edge:+/- 0.5% max.

2. Slip Resistance of Tile when tested by ASTM C1028, the combined wet/dry static coefficient of friction not to be less than 0.80 on top of dome and field area.
3. Accelerated Weathering of Tile when tested by ASTM G151 for 2000 hours shall exhibit the following result: No deterioration, fading or chalking of surface tile.

F. Vitrified Polymer Composite (VPC) Cast-in-Place Tiles embedded in concrete shall meet or exceed the following test criteria:
1. Accelerated Aging and Freeze Thaw Test of Tile when tested to ASTM D1037 shall show no evidence of cracking, delamination, warpage, checking, blistering, color change, loosening of tiles or other defects.
2. Salt and Spray Performance of Tile and Adhesive System when tested to ASTM B117 not to show any deterioration or other defects after 100 hours of exposure.

G. Embedment flange spacing shall be 3.0" minimum to 3.1" maximum center to center spacing as illustrated on product drawing.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surface shall be protected by sturdy wrappings and tile type shall be identified by part number.

B. Tiles shall be delivered to location at building site for storage prior to installation.

1.07 FIELD CONDITIONS

A. Environmental Conditions and Protection: Maintain minimum temperature of 40 degrees F in spaces to receive tactile tiles for at least 48 hours prior to installation, during installation and for not less than 48 hours after installation.

B. Cleaning materials shall have code acceptable low VOC solvent content and low flammability if used on the site.

1.08 EXTRA MATERIALS

A. Furnish new materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification for cast-in-place tactile tiles. Furnish not less than two (2) percent (but not less than 12 square feet) of the supplied materials for each type, color and pattern installed.

1.09 GUARANTEE

A. Cast-in-Place tactile tiles shall be guaranteed in writing for a period of five (5) years from date of Substantial Completion. The guarantee includes defective work, breakage, deformation and loosening of tiles.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Engineered Plastics Inc. - Product: Armor-Tile, or approved equal.

B. Color: (Raised Truncated Domes and Detectable Directional Texture) - Yellow conforming to Federal Color No.33538.
1. Color shall be homogeneous throughout the tile.

C. Comply with requirements of CBC 1133B.8.3.

D. Substitutions and Product Options: Under provisions of Section 01 60 00 - "Product Requirements".

NOT FOR BID

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. During tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.

C. The factory-installed plastic sheeting must remain in place during the entire installation process, to prevent the splashing of concrete onto the finished surface of the tile.

D. The concrete shall be poured and finished true and smooth to the required dimensions and slope prior to the tile placement. Immediately after finishing concrete, an electronic level should be used to check that the required slope is achieved.

E. While concrete is workable, a 3/8" radius edging tool shall be used to create a finished edge of concrete, then steel trowel shall be used to float the concrete around the tile's perimeter, flush to the field level of tile.

3.02 CLEANING AND PROTECTION

A. Clean tactile tiles not more than four days prior to date of scheduled inspection intended to establish date of Substantial Completion in each area of project. Clean tactile tile by method specified by tactile tile manufacturer.

B. Protect tiles against damage during construction period to comply with tactile tile manufacturer's specification.

C. Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.

END OF SECTION

NOT FOR BID

SECTION 32 3113
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Posts, rails, and frames.

B. Wire fabric.

C. Barbed wire.

D. Manual gates with related hardware.

E. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete anchorage for posts.

1.03 REFERENCE STANDARDS

A. ASTM A121 - Standard Specification for Metallic-Coated Carbon Steel Barbed Wire; 2013.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a.

E. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

F. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2011.

G. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2013.

H. CLFMI CLF-PM0610 - Product Manual; 2017.

I. CLFMI CLF-SFR0111 - Security Fencing Recommendations; 2014.

J. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric); 1990.

K. CLFMI CLF 2445 - Product Manual; 1997.

1.04 SUBMITTALS

A. See Section 01 3000 - "Submittals", for submittal procedures.

B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Line Posts: 1.9 inch diameter.

B. Corner and Terminal Posts: 2.38 inch diameter.

C. Fabric with Pre-Inserted Slats: 2 inch diamond mesh interwoven wire, 6 gage, 0.1920 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.

1. Privacy Slats: High-density polyethylene (HDPE), woven into fabric.

2.02 MATERIALS AND COMPONENTS

A. Materials and Components: Conform to CLFMI CLF 2445.

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B. Fabric Size: CLFMI CLF 2445 Heavy Industrial service.

C. Intermediate Posts: Type I round.

D. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round.

E. Gates: See Drawings.

2.03 MATERIALS

A. Posts, Rails, and Frames: _____:

B. Posts, Rails, and Frames: ASTM F1083 Schedule 40 hot-dipped galvanized steel pipe, welded construction, minimum yield strength of 30 ksi.

C. Line Posts: Type I round in accordance with FS RR-F-191/1D

D. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.

E. Wire Fabric:
   1. ASTM A392 zinc coated steel chain link fabric.
   2. Comply with CLFMI CLF-PM0610.

F. Barbed Wire:
   1. Zinc-coated steel, complying with ASTM A121 Type Z Coating Class 1; 2 strands of 0.099 inch diameter wire, with 2-pointed barbs at 4 inches on center.

G. Ready-mixed, complying with ASTM C94/C94M; normal Portland cement; 2,500 psi strength at 28 days, 3 inch slump; 1/2 inch nominal size aggregate.

2.04 COMPONENTS

A. Line Posts: 2 inch diameter.

B. Corner and Terminal Posts: 3 inch diameter.

C. Gate Posts: 3-1/2 inch diameter.

D. Top and Brace Rail: 2 inch diameter, plain end, sleeve coupled.

E. Gate Frame: 3 inch diameter for welded fabrication.

F. Fabric: 2 inch diamond mesh interwoven wire, 9 gage, 0.1144 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.

G. Tension Wire: 6 gage, 0.1920 inch thick steel, single strand.

H. Tie Wire: Steel wire (no aluminum allowed).

2.05 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

2.06 FINISHES

A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 ounces per square foot.

B. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.

C. Accessories: Same finish as framing.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F567.

B. Place fabric on outside of posts and rails.

C. Set intermediate posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.

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D. Line Post Footing Depth Below Finish Grade: ASTM F567.
E. Corner and Terminal Post Footing Depth Below Finish Grade: ASTM F567.
F. Brace each corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.
H. Install center brace rail on corner gate leaves.
I. Do not stretch fabric until concrete foundation has cured 28 days.
J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
K. Position bottom of fabric 2 inches above finished grade.
L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
M. Attach fabric to end and corner posts with tension bars and tension bar clips.
N. Install bottom tension wire stretched taut between terminal posts.
O. Do not attach the hinged side of gate to building wall; provide gate posts.
P. Install hardware and gate with fabric _____ to match fence.

3.02 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.
B. Maximum Offset From True Position: 1 inch.

END OF SECTION

NOT FOR BID

SECTION 33 0110.58
DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 GENERAL

1.01 DESCRIPTION

A. This section describes the requirements for flushing and disinfection of potable water mains, services, pipe appurtenances and connections, in accordance with AWWA C651 and as specified herein.

B. The Contractor shall flush and disinfect potable water mains and appurtenances, complete, including providing the water and the disposal thereof.

1.02 SECTION INCLUDES

A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 1416.

1.03 RELATED REQUIREMENTS

A. Section 33 1416 - Site Water Utility Distribution Piping.

1.04 REFERENCE STANDARDS

A. AWWA C651 - Disinfecting Water Mains 2014, with Addendum (2020).

1.05 SERVICE APPLICATION

A. All existing water mains and appurtenances taken out of service for inspection, repairs or other construction activities that might lead to contamination shall be disinfected prior to connection to Cucamonga Valley Water District (CVWD) existing system.

B. All new water mains, services and appurtenances shall be disinfected prior to placing the facilities into CVWD's system.

C. All components incorporated into a connection to CVWD's existing system shall be disinfected prior to installation.

D. Disinfection of piping shall be done after passing hydrostatic testing of pipelines in accordance with Section 33 1400. If approved by CVWD, concurrent testing may be performed.

1.06 SUBMITTALS

A written schedule shall include plans for water conveyance, control and disinfection shall be submitted in writing for approval a minimum of 7 days before commencing flushing and disinfection operations. The submittal shall also include the Contractor's plan for obtaining sufficient flow to flush disinfected water, neutralization of water from the pipeline, and release of water from pipelines after testing and disinfection has been completed.

PART 2 MATERIALS

2.01 MATERIAL REQUIREENTS

A. All test equipment, chemicals for chlorination, temporary valves, temporary blowoffs, or other water control equipment and materials shall be determined and furnished by the Contractor.

B. Liquid chlorine solution shall be in accordance with the requirements of AWWA B301, and shall be injected with a solution feed chlorinator and a water booster pump.

C. Calcium Hypochlorite shall be in accordance with the requirements of ANSI/AWWA B300, and shall be dissolved in water to a known concentration in a container and pumped into the pipeline at a measured rate.

D. Sodium Hypochlorite Solution shall be in accordance with the requirements of ANSI/AWWA B300, and shall be diluted in water to desired concentration and pumped into the pipeline at a measured rate.

E. The placing of HTH capsules, tablets or powder in pipe sections during the laying process is not acceptable.

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F. For measuring chlorine concentration, use a medium range, drop count, titration kit or an orthotolidine indicator comparator with wide range color discs. The kit shall be capable of determining chlorine concentration in the range 1.0 to 25 mg/L. Test kits shall be Hach Chemical, Hellige, or approved equal. Maintain an adequate number of kits in good working order and available for immediate test of residuals at points of sampling.

PART 3 EXECUTION

3.01 GENERAL

A. The disinfection requirements under Title 17 and 22 of the California Code of Regulations, Article 5, §64580 Disinfection of New or Repaired Mains, shall be in accordance with AWWA C651.

B. Disinfection of pipelines shall not proceed until all appurtenances and any necessary sampling ports have been installed and Owner's Representative provides authorization.

C. The Contractor shall make every effort to keep the water main and its appurtenances clean and dry during the construction installation process.

D. All potable water pipelines, valves, fitting and appurtenances which become contaminated during installation shall be cleaned, rinsed with potable water, and then sprayed or swabbed with a 5 percent sodium hypochlorite chlorine disinfecting solution prior to installation.

3.02 PRELIMINARY FLUSHING

A. Prior to disinfection, water mains 12 inches and smaller shall be flushed in accordance with AWWA C651. The flushing velocity in the main shall not be less than 2.5 feet per second (fps) for main sizes up to 16 inches in diameter. Flushing shall be sustained for a period of time not less than twice the minimum theoretical time necessary to flush the entire length of main. If so directed by Owner's Representative, portions of certain appurtenances may be required to be temporarily reconfigured for flushing purposes. In the event of possible adverse effects of flushing on system operations, flushing shall be conducted during the hours of least demand or as directed by Owner's Representative. CVWD shall not be responsible for loss or damage resulting from flushing operations.

B. For mains 18 inches and larger, an acceptable alternative to flushing shall be approved by Owner's Representative.

3.03 DESINFECTING POTABLE WATER PIPELINES

A. Chlorination shall be performed by a certified chlorination and testing contractor. Chlorination shall be in accordance with the instructions of the chlorination manufacturer.

B. All pumping equipment, piping, appurtenances and all other equipment in contact with the potable water shall be disinfected in accordance with the requirements of AWWA C651 using the Continuous-Feed Method as modified herein.

C. Where pumping equipment is used with an injector, a backflow device shall be installed and connected to the potable water supply.

D. The chlorine solution shall be introduced at one end of the pipeline through a tap, a corporation stop, a hydrant or other approved connection to ensure treatment of the entire system being disinfected. Install all required corporation stops and other plumbing materials necessary for chlorination or flushing of the main.

E. Introduce potable water into the pipeline at a constant measure rate. Inject chlorine solution into the potable feed water at a measured rate. Proportion the two rates so that the chlorine concentration in the pipeline is maintained at a minimum to maximum concentration of 50 mg/L to 100mg/L, with a chlorine residual of 25 mg/L after 24 hours in the pipe. Check concentration at points downstream of the injection point and at each end of the pipe periodically during the filling to ascertain that sufficient chlorine is being added and has reached all sections of the pipe.

F. During the period that the chlorine solution or slug is in the pipeline, open and close valves to obtain a chlorine residual at hydrants and other pipeline appurtenances. Care shall be taken to

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ensure that no chlorinated water enters any active pipeline. The chlorine concentration shall not exceed 100 mg/L in copper tubing or in contact with copper.

G. Owner's Representative will verify the presence of the chlorine disinfection solution throughout the system by sampling and testing for acceptable chlorine concentrations at various appurtenances and/or at test ports provide by the Contractor.

H. The chlorinated water shall be retained in the system for a minimum of 24 hours. Take samples in the presence of the Owner's Representative at air valves, pipeline extremities and other representative points of access to confirm that a chlorine residual of 25 mg/L minimum exists along the pipeline.

I. During the process of chlorinating the pipelines, all valves and other appurtenances shall be operated while the pipeline is filled with the heavy chlorinated water.

J. If the initial test fails to produce satisfactory results the disinfection process shall be repeated until satisfactory results are obtained. Two consecutive satisfactory test results shall be required after any unsatisfactory test results.

K. Disinfecting mains and appurtenances and hydrostatic testing may run concurrently for the required 24-hour test period. In the event there is a leakage and repairs are necessary, repeat disinfection of the pipeline by injection of chlorine solution into the line as provided in this Section.

L. Final flushing shall be done by the Contractor after being notified of a satisfactory chlorine residual test by Owner's Representative. The chlorinated water shall be flushed from the pipeline until chlorine measurements show that the concentration in the water leaving the pipeline is no greater than what generally prevails in the system or is acceptable for its intended use.

M. Where connections are made to an existing potable water system, swab or spray the interior surfaces of all pipe and fittings used in making the connections shall be with a one percent hypochlorite solution before they are installed. Start through flushing as soon as the connection is complete and continue until all discolored water is eliminated.

3.04 DISPOSAL OF TESTING WATER

A. All water used in testing and disinfecting the portions of pipeline or water system component, including that used for retesting, shall be disposed of following such testing, retesting, and disinfecting by the Contractor at Contractor's sole expense. The disposal of water shall, in all cases, be carried out in compliance with the water quality objectives and discharge permit restrictions established by the California Regional Water Quality Control Board.

B. For contracts administered by Owner, the Contractor will be authorized to discharge test water to the storm drain under the National Pollution Discharge Elimination System (NPDES) permit issued to Owner if all requirements and procedures per such permit are followed. For all other projects, including Developer projects, Contractor or Developer shall obtain an NPDES permit and comply with that permit.

C. Disposal of test water or chlorinated water used for disinfection will require the Contractor to apply a reducing agent (i.e. sodium thiosulfate, or ascorbic acid, etc.) to the test water in order to neutralize residual chlorine to meet the discharge limitation of "Non-Detect" (ND). Reducing agents used in neutralizing chlorinated water shall be in accordance with Appendix "C" of AWWA C651. Additionally, the flow of water from the portions of pipeline shall be controlled to prevent erosion of surrounding soil, damage to vegetation, and altering of ecological conditions in the area and shall not contribute to silt, mud, debris, or other contaminants entering storm drains or surface waters.

3.05 BACTERIOLOGICAL SAMPLING PORTS

A. Bacteriological sampling ports shall be installed in accordance with AWWA C651 and the Approved Standard Drawings.

B. Bacteriological sampling ports shall be installed at intervals no greater than 1,200 feet on new water main, plus one port located at the end of the line and one port for each branch line.

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Under special conditions outlined under AWWA C651, Owner's Representative may require additional bacteriological sample ports at no additional cost to Owner.

C. No hose or fire hydrant shall be used in the collection of samples.

D. When approved by Owner's Representative, air/vac's and blowoff assemblies may be modified to be used as a sampling port with a riser modification in accordance with AWWA C651 Figure 2. Upon the completion of collecting samples, all modified air/vac and blowoff assemblies shall be returned to its previous condition and shall be in conformance with all sections of this specification and the Approved Standard Drawings.

E. After samples have been collected, all temporary sampling port assemblies including the corporation stop at the main shall be removed and capped with a threaded plug of similar metal type (saddle or direct tap). Polyethylene encasement shall be repaired after the removal of sampling ports as per AWWA C105.

3.06 BACTERIOLOGICAL TESTING OF DISINFECTED POTABLE WATER PIPELINES

A. After the chlorinated water has been flushed from the system, Owner will perform bacterial analysis on the water samples from the disinfected system. The Contractor shall install necessary temporary bacterial sample risers in accordance with the Approved Standard Drawings. Only after successfully passing bacterial analysis shall temporary bacterial sample risers be removed and abandoned as directed by Owner's Representative.

B. Before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main. At least one set of samples shall be collected from every 1,200 feet of new water main, plus one set from the end of the line and at least one set from each branch line.

C. If the initial disinfection fails to produce satisfactory bacteriological results or if other water quality is affected, the new main may be reflushed and shall be resampled. If check samples also fail to produce acceptable results, the main shall be re-chlorinated by the continuous-feed method until satisfactory results are obtained-that being two consecutive sets of acceptable samples taken 24 hours apart.

D. The Contractor shall be responsible for all repeat flushing, disinfecting, disposal, dechlorination and bacteriological testing costs.

E. After satisfactory disinfection, replace air valves, restore the pipe coating and remove temporary disinfection and test facilities.

END OF SECTION

NOT FOR BID

SECTION 33 0505.31
HYDROSTATIC TESTING OF PRESSURE PIPELINES

PART 1 GENERAL

1.01 DESCRIPTION

This section describes the requirements and procedures for pressure and leakage testing of all pressure mains. Hydrostatic testing shall conform to AWWA C600 and these specifications.

1.02 REQUIREMENTS PRIOR TESTING

A. All thrust blocks and anchor blocks shall be allowed to cure.

B. All piping, valves, fire hydrants, services, and related appurtenances shall be installed.

C. Pressure tests on exposed, aboveground and vault installed piping shall be conducted only after the entire piping system has been installed and attached to pipe supports, hangers or anchors as shown on the Approved Plans.

1.03 HYDROSTATIC TESTING OF PIPELINES

Hydrostatic testing of pipelines shall be performed prior to disinfection operations in accordance with Section 33 0110.58. In the event repairs are necessary, as indicated by the hydrostatic test, the Owner's Representative may require additional flushing in accordance with section 33 0110.58.

1.04 CONNECTION TO EXISTING MAINS

The Contractor shall install test plates at each valve that is connected to an active water main. Hydrostatic testing shall be performed prior to placing the facilities into service in the CVWD's system. Test plates shall be removed by the Contractor after the pressure test has been accepted. CVWD authorization for connection to existing system shall be given only on the basis of acceptable hydrostatic testing, disinfection and bacteriological test results. Connection to existing mains shall be performed under direct CVWD inspection.

1.05 VALVE LOCKS

A. The Contractor shall install valve-locking devices on all valves at stub-outs or where a valve connects directly to an active domestic water main. Locking devices shall also be installed on the control valves at newly constructed detector checks. The locking device shall be provided by the Contractor. At the time the new water system is progressed for service, locking devices will be removed by the Contractor under direct inspection by a CVWD Inspector.

PART 2 PRODUCTS

2.01 WATER

A. Potable water, supplied by a source approved by the Owner, shall be used for all hydrostatic testing of potable pipelines.

B. Contractor shall make all arrangements for and bear all expenses for providing all potable water for testing. The source of the water and point of introduction of water, required for making of tests, shall be subject to the approval of the Engineer.

2.02 CONNECTIONS

A. Testing water shall be supplied through a metered connection equipped with a backflow prevention device at the point of connection to the potable water source used.

B. The Contractor shall provide any temporary piping needed to deliver potable water to the piping that is to be tested.

2.03 TESTING EQUIPMENT

Contractor shall provide any pressure gages, pipes, bulkheads, pumps, and meters necessary to perform the hydrostatic testing.

PART 3 EXECUTION

3.01 GENERAL

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A. The Contractor shall provide the Owner with a minimum of 5 day notice prior to the requested date and time for hydrostatic tests.

B. Upon the completion of the laying, jointing, and backfilling, and proper curing of the joints, the pipeline or portions thereof shall be hydrostatically tested. For convenience of testing, the pipeline may be divided into sections and each section tested separately. The maximum length of each test section shall not exceed 4000 feet. The maximum elevation difference for each test section shall not exceed 50 feet.

C. The Contractor shall furnish all labor, materials, tools, equipment, hoses, pumps, gages, fittings, temporary bulkheads, thrust protection and plugs and miscellaneous other items for testing.

D. Unless otherwise approved, conduct all tests in the presence of the Engineer or Owner's Representative. Repeat tests in the presence of local authorities.

E. Test pressure shall not exceed rated working pressure of gate or butterfly valves.

F. Corporation stops shall be rated the same as the design pressure of the pipeline.

G. Temporary blocking during the test will be permitted only at temporary plugs, caps or where otherwise directed by the Owner's Representative.

H. The test pressure shall not exceed the thrust restraint design pressure or 1.5 times the pressure rating of the pipe or joint, whichever is less (as specified by the manufacturer). Test pressures required are at the lowest elevation of the pipeline section being tested, unless otherwise specified.

I. While filling the pipeline, care shall be taken to release all air within the pipe and appurtenances to be tested. Air shall be released through services, fire hydrants, air release valves, or other approved locations.

J. After filling the pipeline and before application of test pressure, test section shall be maintained at the working pressure for a minimum of one (1) hour to allow the pipeline to stabilize with respect to line movement under pressure, water absorption by the lining and for an initial leak inspection.

K. The pressure shall be increased to 1.5 times the stated system pressure, or 150 pounds per square inch (psi), whichever is greater, to a maximum of 300 psi. Pressure shall be measured at, or corrected to, the lowest point in the portion of the pipeline being tested.

L. The test pressure for the entire section under test (if no leaks have been found, or if found, have been repaired and re-subjected to test pressure) shall be maintained for four (4) hours between ±5 psi of the stated test pressure for the duration of the test. During the test time the amount of leakage shall be determined by measuring the quantity of water which must be added to maintain the test pressure.

M. If the leakage exceeds the allowable loss, the leak points shall be located and repaired as required by the Owner's Representative. All defective pipes, fittings, valves and other appurtenances discovered shall be removed and replaced with sound material. The hydrostatic test shall be repeated until the leakage does not exceed the rate specified. All visible leaks shall be similarly repaired.

N. Conduct all tests prior to piping being enclosed in walls, floors, and ceilings.

O. Allow concrete blocking to reach design strength before testing.

END OF SECTION

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SECTION 33 1416
SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water pipe for site conveyance lines.

B. Pipe valves.

1.02 RELATED REQUIREMENTS

A. Section 33 0505.31 – Hydrostatic Testing.

B. Section 33 0110.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.

C. Section 33 1419 – Fire Hydrants.

1.03 REFERENCE STANDARDS

A. AWWA C110 – Ductile Iron and Gray Iron Fittings, 3 In. through 48 In. for water and other liquids.

B. AWWA C111 – Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.

C. AWWA C200 - Steel Water Pipe, 6 In. (150 mm) and Larger 2017.

D. AWWA C205 – Cement Mortar Protective Lining and Coating for Steel Water Pipe 4 In. and larger.

E. AWWA C206 - Field Welding of Steel Water Pipe 2017.

F. AWWA C207 - Steel Pipe Flanges for Waterworks Service, Sizes 4 in. through 144 in. (100 mm through 3600 mm) 2018.

G. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings 2017.

H. AWWA M11 - Steel Pipe - A Guide for Design and Installation 2016, with Addendum (2019).

I. AWWA C900 – Polyvinyl Chloride Pipe (PVC) Pressure Pipe and Fabricated Fittings, 4in. through 12 in.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with Cucamonga Valley Water District and Rancho Cucamonga Fire Protection District Standard 5-10 requirements.

PART 2 PRODUCTS

2.01 WELDED STEEL PIPE (CEMENT MORTAR LINED AND COATED)

A. All welded steel pipe shall conform with applicable provisions of AWWA C200, C205, C206, C207, and C208, latest, and applicable portions of M11 “Steel Pipe Manual”, latest, as modified herein, by the Drawings, or by the Owner.

B. All welded steel pipe shall be manufactured by organizations with at least ten years successful experience in manufacturing, fabricating, lining, and coating the type of pipe specified. Owner shall approve manufacturer’s methods, equipment, facilities, and operations before performance of any work and manufacturer's completed product before its use.

C. Standard or special pipe sections and standard or special connections, outlets, and fittings may be manufactured at a single plant, or they may be manufactured at two separate plants (Plant 1: manufacturing of standard sections of lined, coated, and cured steel pipe consisting of steel pipe cylinder formation and lining, coating, and curing; Plant 2: fabricating special pipe sections and standard or special connections. outlets. and fittings using standard sections of manufactured lined, coated, and cured steel pipe), Special pipe sections and standard or

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special connections, outlets, and fittings fabricated at a separate manufacturing plant shall be comprised of standard pipe cylinders that have been formed, lined, coated, and cured at a single manufacturing plant. The separate manufacturing plant shall use facilities and methods for lining and coating repair and curing equal to the facilities and methods of the manufacturer of the standard sections of lined, coated, and cured steel pipe.

1. Pipe and Fittings: All pipe and fittings furnished shall conform to applicable provisions of AWWA C200, C205, C206, C207, and C208, latest, and applicable portions of AWWA M11, “Steel Pipe Manual”, latest, as modified herein, by the Drawings, or by District.
2. Pipe and fittings shall be Class 150 minimum. Minimum steel cylinder thickness shall be as noted by the construction drawings or specified by District; it shall not be less than 10-gage or as noted by the standard drawings. All pipe and fittings shall be machine cement mortar lined and machine cement mortar coated.
3. All fittings shall be shop fabricated unless the construction drawings indicate that fittings may be field fabricated, Contractor describes methods of fabrication, and District specifically approves field fabrication. All fittings shall be fabricated from individual pipe sections, welded together, and lined and coated as described hereafter.
4. Lining of Fittings:
   a. The application of cement mortar lining to miters, angles, bends, reducers, and other special sections, the shape of which precludes application by the machine spinning process, shall be accomplished by mechanical placement, pneumatic placement, or hand application and finished to produce a smooth, dense surface.
   b. If the interior of the fitting has not been previously machine lined, wire-fabric reinforcement or ribbon-mesh reinforcement shall be applied to the interior of fittings larger than 24 inches and shall be secured at frequent intervals by tack welding to pipe, by dips or by wire. Repaired areas of machine applied linings at miters, pipe ends, outlets, and other cuts made in the lining for fabrication of the fittings need not be reinforced if the width of the repair area does not exceed 12 inches. Repairs for widths exceeding 6 inches shall be bonded to the steel and adjacent faces of the lining with an approved bonding agent.
   c. Immediately after lining has been completed, pipe and fittings shall be water cured without being disturbed for at least one day before applying the exterior coating, if such a coating is specified. If cement mortar coating is not specified, the lining shall be kept moist for four days before shipment. In either case, the lining shall be cured for at least four days before shipment. To prevent moisture loss during the curing period, ends of the pipe sections shall be kept closed with plastic end caps or covers which will remain in place until time of installation. The date of lining and class of pipe shall be plainly marked on the inside of each fitting.
5. Coatings of Fittings
   a. Mortar coating for pipe bends and other special sections not adaptable to the application of spiral-wire coating reinforcement shall be reinforced with wire fabric or ribbon mesh. The wire fabric or ribbon mesh shall be applied over the surface of the pipe to be coated, and may be held away from the pipe shell with self-furring mesh, furring clips, or an equivalent method. The application of the mortar coating shall be by mechanical or pneumatic means to the specified thickness, except that hand application may be substituted for all specials. After the outside coating has been applied, the pipe and fittings shall be kept continually moist by continuous spraying for at least four days. Provisions shall be made to protect the coating from erosion during sprinkling. The date of coating and class of pipe shall be plainly marked on the inside of each fitting.
6. Pipe Joints: Unless specified otherwise, joints shall conform to the following types. Joints shall be as specified on the construction drawings or by District. All joints shall be continuity bonded.
7. Rubber Gasket Joints: All rubber gasket joints shall conform to AWWA C200, latest.
8. Flanged Joints: All flanges 4 inches through 12 inches shall conform to AWWA C207, latest, Class E (ring) or ANSI 816.5 Class 150. All flanges larger than 12 inches shall

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conform with AWWA C207, latest, Class E (ring). All flange bolts shall be standard hex head machine and conform to ASTM A325. All flange nuts shall be heavy hex cold pressed semi-finished steel and conform to ASTM A194-2, 2H.

9. All flanges shall be fully welded to pipe on both faces, one pass minimum on the inside, and two passes minimum on the outside. Pipe linings shall extend to mating faces of flanges. Bolt threads shall be lubricated with an approved anti-seize compound. Flanges together with bolts and nuts, shall be, once installed, coated with an approved bitumastic material.
10. Swedged Lap Welded Joints: Bell ends shall be formed integrally with pipe cylinders, being swedged out by machine. Bell ends shall be designed and fabricated to withstand design pressure of class of pipe specified and to permit spigot ends (plain end) to enter belled ends approximately 1 inch with clearance of approximately 1/32 inch.
11. Banded Lap Welded Joints: Where lap welded joints are required and swedged lap welded joints cannot be fabricated, belled ends shall be formed by welding steel bands to outside circumferences of plain ends of pipe. Bell ends shall be designed and fabricated to withstand design pressure of class of pipe specified and to permit spigot ends (plain ends) to enter belled ends approximately 1 inch with a clearance of approximately 1/32 inch.
12. Sleeve Couplings: Where sleeve couplings are required, they shall conform to the construction drawings. Pipe coatings at pipe ends shall be held back 12 inches and pipe shall have weld seams ground flush within 12 inches from pipe ends, unless specified otherwise. For above ground applications, pipe ends and sleeve couplings shall be painted. For below ground applications, pipe ends and sleeve couplings shall be coated with an approved bitumastic material. An approved bitumastic coating shall be substituted for mortar coating within 12 inches of pipe ends. After joints have been coupled, sleeve couplings shall be coated with an approved bitumastic material.
13. Cut-to-Fit Joints: Where cut-to-fit joints are required, they shall conform to the standard drawings and the construction drawings. Pipe coatings at cut-to-fit joints shall be held back as required to permit construction of joints; pipe coatings shall thereafter be added in the field. Field applied pipe coatings shall match manufactured pipe coatings. Contractor shall provide, at his expense, cut-to-fit joints, in addition to those specified, if necessary to accommodate his work and schedule.
14. Shop Testing of Joints and Joint Ends: Every pipe section, standard, or special, shall be hydrostatically tested after joint ends have been completely shop formed and attached in place by welding, as applicable, or dye check tested provided pipe cylinders had been previously hydrostatically tested.

2.02 POLYVILYL CHLORIDE PIPE

A. Polyvinyl chloride (PVC) pipe furnished and installed under these Specifications shall conform to applicable AWWA Standards (latest), as modified herein, by the Drawings, or by Owner.

B. All pipe furnished shall be manufactured by an organization which has had not less than 10 years successful experience in the manufacture of the type of pipe specified. Owner shall approve manufacturer’s product before its use.

C. Pipe and Couplings: All pipe and couplings furnished shall conform to AWWA C900 and C905 (latest) and the following additional requirements:

1. Unless otherwise specified or shown on Drawings, AWWA C900 pipe and couplings (4" through 12" diameter) shall be minimum Class 200 (maximum dimension ratio of 18). Polyvinyl chloride pipe shall have same dimensions as ductile iron pipe and pipe bell and pipe spigot shall have same thickness as pipe barrel.
   a. Standard lengths of pipe shall have nominal length of 20 feet, 0 inches, plus or minus 1 inch. Standard lengths of pipe shall be furnished with integral bells and spigots and with rubber gaskets. Couplings may be used for closures and curved alignments where permitted by Owner.
   b. Pipe shall have sufficient strength to withstand an internal hydrostatic pressure of four times rated operating pressure for its class per AWWA C900 (latest).

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D. Fittings: All fittings shall be Class 200 ductile iron unless otherwise specified or shown on the Drawings. Ductile iron fittings shall conform with AWWA C110, C111, and C153 (ANSI A21.10, A 21.11, and A21.53, respectively), latest. Unless specified otherwise, fittings shall be push-on joint and comply with AWWA C111 (ANSI A21.11). Fittings shall have an asphaltic outside coating in accordance with AWWA C11 0 or C 153 (ANSI A21.10 or A21.53), latest, and cement mortar lining in accordance with AWWA C1 04 (ANSI A21.4), latest. Fittings shall have standard lining thickness and shall be seal coated with asphaltic material or other approved material. The lining process must produce a dense, compacted lining that shall be bonded to the interior of the fitting and have a smooth surface.

E. Testing: All pipe and couplings furnished shall be tested in the United States in accordance with AWWA C900.

2.03 PRIVATE FIRE SERVICE MAINS

Private fire service mains shall be in accordance with CVWD, Fire Department and NFPA 24 standards and specifications and the following:

A. Depth of cover/bury is measured from the top of the pipe to the top of the finished grade and is required to be in accordance with the following:
   1. Minimum of 30 inches.
   2. 36 inches under driveways and roads.
   3. 48 inches under railroad tracks, including private rail spurs and light rail tracks.
   4. 48 inches under large piles of heavy commodities and areas subject to heavy shock and vibrations.
   5. As required by the manufacturer's listing when specifications require greater depth of cover than this Standard or NFPA 24.

B. Pipe and restrained joint systems are required to be protected from corrosion.

C. Required restraint against movement at changes in direction can be achieved by the use of thrust blocks or approved restrained joint systems. The dimensions of thrust blocks are required to be in accordance Rancho Cucamonga Fire Protection District Standard Drawing 5-10k and NFPA 24. A pre-pour inspection of the thrust block forms or excavation is required.

2.04 FIRE SERVICE BACKFLOW ASSEMBLY

A. Fire Service Backflow assembly shall be selected in accordance with CVWD Standard Drawing 110. All assemblies USC, FCC & HR approved.

B. All pipes shall be CML&C steel or schedule 40 cement lined std. steel.

C. Pipe supports as required for 2.5-inch and larger assembly.

D. Thrust blocks shall be class 420-C-2000 P.C.C. and shall be approved on a case-by-case basis by CVWD Engineering Department.

2.05 VALVE AND BOX ASSEMBLY

A. Valve box shall be Brooks Box #1-RT with cast iron ring and cover marked "WATER" required for use in concrete pavement.

B. Resilient-wedge valves to be used for all applications 4-inch to 12-inch. Approved resilient-wedge valves are as follows:
   1. Kennedy (Ken-Seal 11) #4561
   2. Mueller #A-2360
   3. AFC Series 500
   4. Clow #F6102
   5. AVK Series #25

C. Valve operator extension is required when top of nut exceeds a depth of 5 feet from finished surface as in accordance with CVWD Standard Drawing 115.

D. All bolts and flanges used in the construction of RSGVs shall be in accordance with CVWD Standard Drawing 307.

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PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.02 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.

3.03 TRENCHING

A. Unless specified otherwise, pipelines and appurtenances shall be installed in open trench excavations to the depth and in the direction specified by the construction drawings. Excavation for trenches shall include removal of all material of any nature as required for installation of pipe, fittings, or appurtenances and shall include blasting, either sloping or shoring, and all necessary dewatering, if any, all at Contractor's expense. Contractor is advised that unsuitable earth may be encountered during trenching operations. Where such material is encountered, Contractor shall, at his expense, remove such material, discard it at legal disposal site(s), and thereafter replace it with approved backfill material.

B. Excavation Safety Drawings: Before excavating any earth or soil to a depth of five (5) feet or more, Contractor shall, pursuant to Labor Code Section 6705, submit to the Owner detailed drawings (hereafter referred to as excavation safety drawings) showing design of shoring, bracing, sloping, or other provisions to be made for worker, individual, or property protection. Said excavation safety drawings shall comply with OSHA Construction Safety Orders (CaI/OSHA or Federal OSHA, whichever is applicable at time of construction) and shall be prepared and certified by a registered civil or structural engineer, engaged by Contractor at his expense, who shall affix his signature and seal to each sheet of said excavation safety drawings. Contractor shall not excavate until the Owner has received and acknowledged properly certified excavation safety drawings. Contractor shall comply with all other applicable requirements of Labor Code Section 6705 and, as therein provided, no requirements of that Section shall be construed to impose tort liability on Owner or Owner's representatives, including Owner's Engineer.

C. Trench and Bell Hole Sloping or Shoring: Trenches and bell holes shall be adequately sloped or shored so that earth will not slide or settle into trench, so that all existing improvements and utilities (above and below ground) will be fully protected from damage, and so that workers and individuals are protected from injury. At minimum, Contractor shall keep toe of trench spoil at least 5 feet from top of trench. Contractor shall assume full responsibility for all damages caused by inadequate sloping or shoring. Contractor shall make all necessary repairs or perform all reconstruction at his expense and he shall bear all other expenses resulting from such damages.

D. Unless specified otherwise, all pipeline trenches within pipe zone shall, wherever possible, have vertical sides and minimum widths as specified on the standard drawings, however, trenches shall be sloped or shored as required for worker, individual, and property protection.

E. Whenever maximum allowable trench width, as shown by the Drawings, is exceeded for any reason, the Owner may, at its discretion, require Contractor, at his expense, to cradle pipe (Class B Portland cement concrete) or to provide higher class bedding to support pipe as required to limit load on pipe to allowable supporting strength. The Owner shall approve method of support prior to its use.

F. Trenches shall be excavated to depths specified by or shown on construction drawings or as otherwise directed by the Owner. If trench excavation is carried below grade without direction or permission, Contractor shall, at his expense, refill trench to proper grade with moist clean sand, sand and gravel, or other suitable material as approved by the Owner, tamped in place to 90

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percent relative compaction minimum. Excess excavated material shall be incorporated in backfill or discarded at legal disposal site(s) by Contractor at his expense.

3.04 INSTALLATION – WELDED STEEL PIPE (CEMENT MORTAR LINED AND COATED)

A. Pipe manufacturer, fitting manufacturer, and material supplier, in addition to District and District's representative, shall have access to the Work during installation. Contractor shall use assistance provided by either manufacturer or supplier where required for proper installation of pipe, fittings, or materials; however, Contractor shall limit role of either manufacturer or supplier to advisory service.

B. Contractor shall not move pipe using dozer blades, backhoe buckets, or the like (sharp metal surfaces). Contractor shall use nylon chokers or straps, not steel slings, in moving, placing, or setting pipe. Nylon chokers or straps shall be placed at third points (one-third length of pipe from each end).

C. All out-of-round pipe shall be rejected and removed from the Work site immediately. Rejected pipe shall be replaced immediately. Contractor shall not use hammers, bars, wrenches, or other tools to modify pipe ends to accommodate installation.

D. All pipe ends shall be secured with plastic covers. Said plastic covers shall be left in place until pipe is prepared for installation. If any plastic covers are damaged or destroyed before pipe has been installed, they shall be immediately replaced.

E. All pipe and fittings shall be laid true to line and grade and at the locations shown by the construction drawings or as specified. Pipe and fittings shall be installed in accordance with applicable sections of AWWA M11, “Steel Pipe Manual”. Bell ends shall be placed uphill unless otherwise permitted.

F. All flanges shall be fully welded to pipe on both faces, one pass minimum on the inside and two passes minimum on the outside. Pipe linings shall extend to mating faces of flanges and pipe coatings shall extend to backs of flanges, tapered as necessary for installation of bolts and nuts. All exposed steel shall be field coated with an approved bitumastic material.

G. Special care shall be taken to avoid damaging lining or coating during lowering of pipe into trench and making of field joints. Unless specified otherwise, field joints shall be bell and spigot rubber gasket joints, continuity bonded (two evenly spaced bonding clips per joint minimum). Flanged joints, welded joints, and mechanical joints may be required for particular applications.

H. After pipe has been set in trench, exterior of spigot and interior of bell shall be thoroughly cleaned. Lubricant as recommended by pipe manufacturer and as approved by District shall be applied to rubber gasket, and said gasket shall then be snapped into place and excess lubricant removed. Lubricant shall be water soluble, nontoxic, shall impart no objectionable taste or odor to water, shall have no deteriorating effects on the rubber gaskets, and shall not support the growth of bacteria.

I. Before inserting spigots into bells, to make joints, bells shall be hand mortared with quick setting non-shrink commercial grout mixed with an approved bonding agent. Once spigots have been inserted into bells, joints shall be gauged to ensure that gaskets have been properly seated.

J. For pipe less than 24 inches in diameter, sufficient quantities of moist cement mortar shall be placed on interior joining ends of pipe to completely fill space between respective mortar linings. Moist mortar shall be placed only after respective mortar linings have been properly wetted. Moist mortar shall not be placed against dry mortar linings. Excess mortar shall be removed by drawing an approved pipe cleaning tool through the pipe after joints have been made (pipe sections have been joined). For fully welded joints, pipe sections shall be pulled together and restrained with come-along devices, or hoists with chains and slings, and mortar shall be allowed to set for twenty minutes before welding joint. Once joint has been pulled closed and cleaning tool has been drawn through pipe sections, pipe alignment shall not be adjusted, nor shall pipe be bounced or hammered. Come-along devices, or hoists with chains and slings, shall be removed only after joint has been fully welded.

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K. For cement mortar coated pipe, joint exteriors shall be coated with cement mortar utilizing a joint diaper. Said diaper shall be furnished by pipe manufacturer and shall be centered over joint and securely fastened to pipe. Cement mortar joint mix consisting of one part Portland cement to two parts (by weight) clean, sharp sand, shall contain just enough water to allow mix to be poured into diaper and flow around circumference of joint. Said mix shall be allowed to set prior to backfilling around joint.

L. Joints shall be completed to provide continuous interior lining and exterior coating. Field lining and coating must equal or exceed shop lining and coating when completed with respect to strength, uniformity, and density and there shall be no voids between lining or coating and steel cylinder.

M. If cement mortar lining has to be removed, Contractor shall scribe, chisel, and remove the lining using appropriate tools. If cement mortar coating has to be removed, Contractor shall first scribe, then saw cut said coating 3/4 of its thickness, and then remove coating using a chisel driven by a hammer, chipping gun, or other suitable tool. Impact shall be applied parallel with pipe barrel, not perpendicular thereto.

N. At the end of each day's work, all openings in the pipeline shall be plugged with watertight, expandable plugs or approved equal. Said plugs shall be secured in place so that they cannot be removed by children or animals.

3.05 INSTALLATION – POLYVINYL CHLORIDE PIPE

A. Pipe manufacturer, fitting manufacturer, and material supplier, in addition to the Owner and the Owner’s representative, shall have access to the Work during installation. Contractor shall use assistance provided by either manufacturer or supplier where required for proper installation of pipe, fittings, or materials; however, Contractor shall limit role of either manufacturer or supplier to advisory service.

B. Unless otherwise specified or shown on the Drawings, backfill within the pipe zone shall have a minimum sand equivalent of 50 as determined by ASTM D2419 (latest).

C. After pipe has been set in trench, exterior of spigot and interior of bell shall be thoroughly cleaned. Lubricant recommended by pipe manufacturer and as approved by the Owner shall be applied to rubber gasket. Lubricant shall be water soluble, nontoxic, shall impart no objectionable taste or odor to the water, shall have no deteriorating effects on the rubber gaskets, and shall not support growth of bacteria. Excess lubricant shall be removed. Pipe ends shall be aligned, and spigot shall be pulled into bell with come-along devices, or hoists with chains and slings, unless permitted otherwise. If either the pry bar or the backhoe bucket method is permitted, a timber header shall be placed between the pipe and the pry bar or backhoe bucket before the spigot is pushed into bell.

D. Whenever cutting of pipe is required, it shall be done with a special cutting tool specifically made for cutting and machining PVC pipe. Cut ends and rough edges shall be ground smooth and beveled for push-on joints.

E. Pipe locator wire (No. 14 AWS insulated copper) shall be installed in trench with pipe where shown by the Standard Drawings unless it is specifically deleted by the Construction Drawings or by Owner. It shall be held in place by looping the pipe at 20-foot intervals maximum, or as specified.

F. As work progresses, a pipe cleaning tool as approved by Owner shall be drawn through the pipe to remove dirt, rocks, or other foreign material. At the end of each day’s work, all openings in the pipeline shall be plugged with watertight expandable plugs or Owner approved equal.

G. Unless specified otherwise, polyvinyl chloride pipe shall not be encased with concrete. If protection is necessary, it shall be accomplished by the use of conductor casing(s) as approved by Owner.

3.06 INSTALLATION – PRIVATE FIRE MAINS

Private fire service mains are required to be installed in accordance with NFPA 24 and the following:

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A. A construction permit is required to be issued by the Fire District prior to the excavation of the site and prior to the installation of any private underground fire protection water supply piping. The approved plans and the job card are required to be available at the job site during construction and at the time of inspection. Additional construction permits are required to be issued by the City of Rancho Cucamonga Building and Safety Department for master water supply systems.

B. The contractor is responsible for scheduling inspection appointments at least 48 hours in advance. Appointments are schedule directly with the Fire Inspector and not through the online system.

C. Pipe is required to be installed on a 12-inch bed of clean fill sand and/or dirt. The first 12 inches of cover above the top of the pipe is also required to be clean fill sand and/or dirt.

Exception: When manufacturer's specifications require different materials or depth of materials.

D. All piping is required to be installed with its listing markings facing up.

E. Conductive tracer wire is required to be installed with all plastic mains.

F. All bolted joint accessories are required to be cleaned and thoroughly coated with asphalt or other corrosion retardant material after installation.

G. Prior calling for a hydrostatic test, all pipe joints are required to be exposed for inspection, pipe is required to be center loaded, and thrust blocks are required to be cured.

H. All piping is required to be hydrostatically tested to a pressure of 200 psi or 50 psi above the system working pressure, whichever is greater, and is required to maintain that pressure for 2 hours. The 2-hour period of time starts when the Inspector arrives to verify the test pressure. Hydrostatic testing is required to be in accordance with Section 33 0505.31.

I. Mains and all laterals, including those serving hydrants, are required to be completely flushed before any connections are made to downstream, overhead fire protection system piping in accordance with Section 33 0110.58.

3.07 INSTALLATION – FIRE SERVICE BACKFLOW ASSEMBLY

A. Location, type, and installation of backflow assembly in accordance with the Approved Plans and CVWD Standard Drawing 110.

B. All piping between main and backflow assembly to be flushed before backflow is installed and witnessed by CVWD inspector.

C. Contractor shall paint all above ground appurtenances with one coat of primer and 2 coats of almond Rust-Oleum or Fire Department approved color.

D. Gate valves to be chained and locked in the open position at all times when the service is activated.

E. Resilient seated gate valves and test cocks required.

3.08 INSTALLATION – VALVE AND BOX ASSEMBLY

A. All valves, operating units, stem extension, and accessories shall be installed as shown and specified.

B. Install valves with the bolt holes straddling the vertical centerline of pipe and the operating nut in the vertical position unless otherwise noted on the Approved plans.

C. Valves shall be installed in accordance with the manufacturer's recommendations and the applicable section of these specifications for the piping material and joint type being used.

D. Bolts and nuts shall be clean and lubricated prior assemble.

END OF SECTION

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SECTION 33 1419
FIRE HYDRANTS

PART 1 GENERAL

1.01 DESCRIPTION

This section includes materials and installation of wet-barrel fire hydrant assemblies. All wet-barrel fire hydrants shall conform to AWWA C503 and these specifications.

1.02 SYSTEM DESCRIPTION

Private Hydrants are required to be 6-inch wet barrel type and shall have the follow number and size of outlets as follows:

1. One 2 ½ inch NST male threaded outlet with cap and tether chains
2. One 4-inch NST male threaded outlet with cap and tether chains

1.03 SUBMITTALS

Submittals shall be provided in accordance with Section 01 3000.

1.04 DELIVERY, STORAGE AND HANDLING

Fire hydrants shall be delivered and stored in accordance with AWWA C210, AWWA C213, and AWWA C550. The port openings shall be covered with plastic, cardboard or wood while in transit and during storage in the field. These covers shall remain in place until the hydrant is ready to be installed. Fire hydrants shall not be stored in contact with bare ground. Fire hydrants shall not be stacked at the project site.

PART 2 MATERIALS

2.01 FIRE HYDRANT ASSEMBLY

A. Fire hydrants are required to be Clow models 850 or 950.

B. The complete fire hydrant assembly is required to include all 6-inch components, including the riser, fittings, supply pipe, and gate valve.

C. All outlets shall be provided with National Standard Fire-Hose Threads. Outlets shall be provided and equipped with brass or ductile iron caps and chains.

D. Fire hydrants shall be opened by turning left (counterclockwise) unless otherwise indicated on the Approved Plans.

2.02 UNDERGROUND PIPING AND FITTINGS

All underground piping, fittings, and devices are required to be listed for the service use and installed in accordance with the Standard and NFPA 24 as amended by Chapter 80 of the California Fire Code latest edition, Section 33 1416 and the Approved Plans.

2.03 CONCRETE

Concrete used in the construction of the fire hydrant assembly for thrust or anchor blocks shall be in accordance with NFPA 24 and Rancho Cucamonga Fire Protection District

2.04 FIELD PAINTING AND COATING

Fire hydrants are required to be primered and painted safety yellow using high-grade industrial paint such as Rust-Oleum Safety Yellow #7543 or equivalent. The hydrant caps are required be painted safety blue using a high-grade industrial paint such as Rust-Oleum Safety Blue #7524 or equivalent.

2.05 FIRE HYDRANT PAVEMENT MARKERS

Fire hydrant pavement markers shall be blue and shall be selected in accordance with Rancho Cucamonga Fire District and City of Rancho Cucamonga Public Works Department.

PART 3 EXECUTION

3.01 INSTALLATION

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A. Fire hydrant assemblies shall be installed at locations shown on the Approved Plans and in accordance with the Fire District Standard Drawing 5-10d.

B. The fire hydrant outlet ports shall be orientated as shown on the Approved Standard Plans.

C. Where vehicle impact protection is required by the fire code official and the Approved plans, bollards will be designed and installed in accordance with Fire Code Section 312 and Fire District Standard Drawing 5-10j.

D. The control gate/foot valve is required be installed with an 8-inch galvanized, PVC, or ductile iron pipe sleeve to the road surface and an 8-inch diameter road valve box lid identified with the word “WATER” and painted blue. The valve is required to be installed 6-20 feet from the hydrant and may not be installed where vehicles are designated or likely to park or where equipment, storage, storage containers, or other similar items are likely to be placed over the road valve box lid.

E. All hydrants are required to be identified with a blue reflective street marker. The marker installation is required to be in accordance with the City of Rancho Cucamonga Public Works Department Standard Drawing PW-134.

3.02 DISINFECTION OF FIRE HYDRANT ASSEMBLY

Disinfection and flushing shall be in accordance with Section 33 0110.58 as part of the process of disinfecting the main pipeline. The fire hydrant shall be operated during the disinfection period to completely disinfect all internal parts.

3.03 HYDROSTATIC TESTING

The fire hydrant assembly shall be subject to pressure during the hydrostatic test of the pipelines in accordance with Section 33 0505.31.

END OF SECTION

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